

Advances in Health Care Management
Volume 17

International Best Practices in Health Care Management

Sandra C. Buttigieg
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INTERNATIONAL BEST PRACTICES IN HEALTH CARE MANAGEMENT

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ADVANCES IN HEALTH CARE MANAGEMENT
VOLUME 17

INTERNATIONAL BEST PRACTICES IN HEALTH CARE MANAGEMENT

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PREFACE

There are significant variations in the quality of health care management practices both within and across local, regional, and international health systems (Clancy & Cronin, 2005). With increasing globalization of health services, both quality and efficiency of care can benefit from shared learning on a regional or global basis, rendering countries, regions, and continents to become increasingly interdependent. Indeed, comparative international management research in the health sector is not only achievable, but more importantly is becoming increasingly necessary as several factors, or rather pressures, are driving globalization of health, health care, and health care management. Amongst the top challenges for health systems worldwide are the demands of changing demographics notably the economic, social, and chronic multimorbidity burden of aging populations; high costs of care that challenge governments to curtail the rising health care expenditure; and the more knowledgeable, empowered but also litigious patients demanding higher quality and safety. Additionally, disease patterns have become increasingly globalized primarily as a result of air travel that has shrunk the world into a global village, but also because the global burden of diseases affects countries worldwide. Indeed, there are lessons to be learnt from the different health systems' approaches to address rather similar challenges that health care management research needs to examine in depth. The optimal way to achieve this is by international comparative health systems research and international pursuit of best practice models. Best practices in health care management organize clinical and administrative processes in ways that achieve better results as compared to normal standards in industry, potentially earning brand status. Although systems and quality of health care delivery differ across the world, empirical research has found that human beings involved in health care, whether in the role of patients or health care providers, have similar wants and needs. Identifying and documenting best practices within and across countries are more important than ever.

The focus of this volume of the *Advances in Health Care Management* is the management of health systems and health care organizations, not the treatment of disease. It is with the aim of pursuing international

comparative health system research that the editors have sought to frame this volume. The volume is divided into two main sections, namely commentaries and scholarly exemplary research that address and help to shape emerging thinking about what constitutes international best practices in health care management.

Section I provides a series of three chapters. The first chapter by Buttigieg, Rathert, D'Aunno, and Savage introduces the subject of methodological challenges, ethical issues, and pitfalls inherent in international research that scholars are more likely to encounter when venturing beyond the comfort zone of domestic studies. Additionally, this chapter also provides solutions and practicalities of how to achieve meaningful results and conclusions from cross-national and cross-cultural research. The second chapter by Garman and Johnson defines world-class care in academic medical centers emphasizing the interest and reasons for motivation to create international benchmarks of process and outcomes data. Furthermore and in concordance with the first chapter, Garman and Johnson invite readers to explore the various challenges in identifying international best practices in particular because of the diversity in health care delivery standards and regulatory procedures across countries. The third chapter by Goes, Savage, and Friedman provides a challenging account on the roles of context and innovation when defining international best practice in health care. The authors argue that defining best practices in health care is complex, dynamic, and more context-specific rather than universal.

Section II has six outstanding chapters with contributions from across the world and providing challenging accounts of international comparative research. The chapters deal with a wide array of subject areas that irrespective of the level of analysis employed are inter-linked (Friedman, Savage, & Goes, 2012) in terms of their impact on performance of health systems, efficiency, and effectiveness of health care management and ultimately on the quality of care delivery.

The first chapter by Schnarr and colleagues explores the link between health governance models and global health innovation by employing a cross-country comparison of eight OECD nations, namely Australia, Britain, Canada, France, Germany, the Netherlands, Switzerland, and the United States. In so doing, this chapter improves our understanding toward identifying enablers and barriers of innovation, which is slow to disseminate across health systems. Therefore by the same reasoning, best care practice examples may not so easily transfer internationally simply because of conditions set by the different health governance models.

The second chapter by Longo provides a compelling example of best practice management models emerging as a result of international collaboration between hospitals in Italy and the United States in the challenging areas of transplantation and advanced specialized therapies. Additionally, these models are best practice examples of public–private integrative partnership (PPPs) and therefore, within a public governance system mixed with a private management approach, a patient-centric orientation, and a shared financial risk.

The third chapter by Dong is very opportune in that it focuses on health care costs and financial sustainability of health care providers amidst increasing global interest on government regulation and market competition, as well as frequent discourse of financial crises. Dong examines a comprehensive dataset of accounting data from 43 countries and analyzes rising labor costs, earnings management, and financial performance of health care providers around the world.

The fourth chapter by McCaughey, DelliFraine, and Erwin explores best practices in hospitals that promote occupational safety and satisfaction for their employees, by comparing three North American hospitals in two diverse health systems (the United States and Canada). What is of great interest in the study by McCaughey and colleagues is that they examine safety perceptions, occupational injury rates, job satisfaction, and turnover intent among health care workers, who are managed by the same organization that provides similar occupational safety training, but who are based in two different countries, raising the question of health system's impact on hospitals' *modus operandi*.

The last two chapters, and therefore the fifth and sixth chapters, focus on international best practices in health care management at the process level with the aims of improving outcomes and reducing costs. Through a systematic literature review, Kash and colleagues provide an international comparison of the costly preoperative testing and assessment protocols in search for best practices to reduce surgical care costs in the United States, United Kingdom, and Canada. The final chapter by Buttigieg and colleagues aims for process optimization in two emergency departments in Germany and Malta through the use of Point-of-Care-Testing (POCT) in two life-threatening conditions, namely acute coronary syndrome and blunt abdominal trauma. This comparative study raises awareness of the importance of having faster turnaround time in the emergency room to not only saves lives, but also to reduce morbidity, which is a critical cost driver for hospitals. Finally, this volume also provides a practical account by von Eiff

of what is meant by benchmarking and best practice management, in search of health care and hospital excellence. von Eiff identifies benchmarking and best practice management as a powerful decision-making tool for health care managers in order to master the challenge of the paradigm shift all developed health care systems are faced with, namely to improve medical quality and patient outcomes, while simultaneously containing and/or reducing costs to ensure sustainability in health service provision. Furthermore, it is pointed out that by comparing international best practices between best-in-class hospitals or health care systems, as well as best-of-breed solutions from other industries, we can generate leapfrog results in clinical quality, patient satisfaction, and cost management.

This volume of *Advances in Health Care Management* provides the reader with a set of chapters that extend or test existing theories or approaches to globalization of health services or clinical performance management compared across two or more different political, social, and regulatory contexts. The chapters offer various approaches to explore health systems, organizational and structural questions facing health care managers and policy makers, across the world. This volume should stimulate key stakeholders to think internationally in search of innovative best practices in health care and health care management so as to ensure stability and sustainability in the health sector.

Sandra C. Buttigieg
Cheryl Rathert
Wilfried von Eiff
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SECTION I
COMMENTARIES ON
INTERNATIONAL RESEARCH
AND BEST PRACTICES

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INTERNATIONAL RESEARCH IN HEALTH CARE MANAGEMENT: ITS NEED IN THE 21ST CENTURY, METHODOLOGICAL CHALLENGES, ETHICAL ISSUES, PITFALLS, AND PRACTICALITIES

Sandra C. Buttigieg, Cheryl Rathert,
Thomas A. D'Aunno and Grant T. Savage

ABSTRACT

Purpose – This commentary argues in favor of international research in the 21st century. Advances in technology, science, communication, transport, and infrastructure have transformed the world into a global village. Industries have increasingly adopted globalization strategies. Likewise, the health sector is more internationalized whereby comparisons between diverse health systems, international best practices, international benchmarking, cross-border health care, and cross-cultural issues have become important subjects in the health care literature. The focus has now turned to international, collaborative, cross-national, and cross-cultural

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research, which is by far more demanding than domestic studies. In this commentary, we explore the methodological challenges, ethical issues, pitfalls, and practicalities within international research and offer possible solutions to address them.

Design/methodology/approach — *The commentary synthesizes contributions from four scholars in the field of health care management, who came together during the annual meeting of the Academy of Management to discuss with members of the Health Care Management Division the challenges of international research.*

Findings — *International research is worth pursuing; however, it calls for scholarly attention to key methodological and ethical issues for its success.*

Originality/value — *This commentary addresses salient issues pertaining to international research in one comprehensive account.*

Keywords: Comparative research; ethics; health care management; international research; methodology; pitfalls; practicalities

INTRODUCTION

The shrinking distances between geographical regions, through advances in technology, science, communication, transport, and infrastructure, has transformed the world into a global village. This globalization and internationalization has led to an increase in mobility, migration, and diversity in societies as people move to live, study, work, and therefore access services outside their countries of origin (Pak et al., 2008). In particular, internationalization has affected the health sector, in which comparisons between diverse health systems, international best practices, international benchmarking, cross-border health care, and cross-cultural issues have become popular subjects in health literature.

There is no doubt that international, collaborative, cross-national, and cross-cultural research offers a wealth of opportunities for innovation to scholars, who can look beyond the comfort zone of domestic studies. In international research, scholars should properly address methodological challenges to avoid the risk of inferential errors. For example, constructs and concepts may have culture-specific attributes and meanings, and therefore may render different results and conclusions. Moreover, international

researchers in health care need to overcome pitfalls that may arise from political, economical, social, technological, environmental, and legal differences influencing health systems.

In this commentary, we explore these issues in more detail and offer possible solutions to address them. We begin by debating the purpose of international research in the 21st century, followed by identification of key methodological challenges, and ethical issues that may arise from conducting international research in health care. Finally, we discuss keys to success, pitfalls, and practicalities.

WHY THE NEED FOR INTERNATIONAL RESEARCH IN HEALTH CARE MANAGEMENT?

Several factors promote the globalization of health, health care, and health care management, and thus promote the need for comparative, international management research in the health care sector. Our general argument is that increased globalization not only makes international research feasible, but more importantly, makes it necessary because there is a great deal to learn from each nation's efforts to address the following common issues and challenges. In short, globalization increases cross-national interdependence in ways that health care management research needs to examine.

Converging Global Disease Patterns

Recent analyses have mapped worldwide expenditures on different diseases. Following the Pareto Principle, these analyses find that a small number of diseases (33 out of 269) account for nearly 50% of worldwide spending; 70 diseases account for three-quarters of total spending (Joynt, Gawande, Orav, & Jha, 2013; Lim et al., 2013). Most of the high-cost diseases are prevalent throughout the modernized world. The top diseases projecting into the future include obesity, chronic hypertension, atherosclerosis, ventricular arrhythmias, and cancer/lungs/bronchus.

In a related vein, the breakdown of borders between countries and the increase of migration between them means that health care problems become borderless and disease patterns become more global. To the extent that much of disease and illness is a product of environmental and behavioral factors such as obesity, sedentary lifestyles, smoking, and alcohol

consumption, increasing cultural convergence may be expected to lead to greater similarity in disease patterns around the globe. And finally, increased air travel and shipping facilitates the rapid spread of infectious disease.

Rising Percentage of Elderly

Another key factor that may promote globalization is the rise in the percentage elderly (65+ years) in the population and its implications for health care financing (United Nations, 2011). Statistics indicate that between 2000 and 2030, the proportion of the population aged 65+ in the developed world will rise from 1-in-7 to 1-in-4 (i.e., from 14.7% to 23.8%) (Kulik, Ryan, Harper, & George, 2014). The graying of the population will leverage greater outlays on pensions and health care services. While public spending will be increasing, there will be fewer working-age adults available to support each elderly person, either in terms of their ability to pay taxes to finance these pensions and health care expenditures or simply to render elder care at home. Between 2000 and 2030, the ratio of working-age adults (15–63 years old) to the elderly will drop from 4.5-to-1 to 2.5-to-1.

What do these demographic developments portend? Rising public outlays will place further fiscal strain on national health care budgets in welfare states and increase calls for system reforms and new sources of capital. They will also force countries to confront the need for systems providing long-term care and supporting chronic disease management. These systems and supports will involve investments in home health and nursing home care, in community-based care models, and in programs that prospectively identify and target interventions to the chronically ill population.

Rising Costs of Care and Pressures for Cost Containment

Nations are commonly experiencing rising outlays on health care as a percentage of their GDP. Causes of rising costs stem not so much from the increasing percentage of elderly in the population, but from rising income levels (which lead to greater levels of health care spending), increasing demand for health care services, and increasing investments in technology and research and development. Such pressures will be exacerbated by shortages of trained health care professionals found in many countries, which will lead to demand for higher wages. All of these forces will place

greater strains on government budgets and lead to greater pressures for cost containment. Nations are likely to experiment with different mixes of strategic responses, including managed care, price caps on physician and hospital services, budgetary ceilings on system expenditures, higher consumer co-payments/contributions/cost sharing, increased investment in outpatient and home health care, greater focus on prevention and health care education, and reconsideration of the mix of public versus private sector involvement in health care (both financing and delivery).

Demands for Higher Quality and Safety

Since the late 1990s, there have been increased concerns in the United States regarding the presence of medical practice variations, the lack of an evidence base for much of medical practice, the failure of physicians to adhere to the minority of conditions for which such an evidence base does exist, and the growing recognition of systemically based errors in the practice of medicine. Similar concerns are now being voiced elsewhere, fostered in part by new empirical documentation of regional variations in health care practice patterns. It is not clear how countries will reconcile the problem of rising costs with the demands for greater quality and access to more sophisticated treatments. All nations are now increasingly confronted with the exigencies of managing the “Iron Triangle” of health care (Friedman, Savage, & Goes, 2012), which is to say, balancing the competing demands for higher quality and greater access at lower or equal cost. They are likely to focus on different axes of this Triangle.

Increased Consumer Activism

There is increasingly more evidence that patients are dissatisfied with their health care system’s ability to deliver. In a five-nation survey, 14–33% of the public felt that their system needed complete rebuilding, while only 9–25% felt their system worked well and needed only minor changes (Useem, 2004). The majority expressed the opinion that while there were some good things in their system, fundamental change was needed. These surveys also revealed several additional findings. First, physicians in these countries are much less likely than the public to call for complete system overhauls. Second, citizens’ satisfaction with their own health care system is negatively correlated with the WHO’s ranking of the system’s

overall performance (Jamison & Sandbu, 2001). Taken together, such results suggest the need for assessing a country's health care system performance using multiple measures from multiple stakeholders.

Calls for Integrated Health Care

Providers in the United States have vigorously pursued the integration of different health care services during the 1990s. Integration strategies have included horizontal consolidation of similar types of facilities (hospital systems), vertical combinations of different levels of providers (linkages between primary, secondary, and tertiary levels in a continuum of care), and vertical linkages of providers with insurers. The integration movement has now spread to the rest of the world. Many nations are pursuing integrated care through mechanisms familiar in the United States, such as disease management, care protocols, telemedicine (Packer, Labonte, & Runnels, 2009), shared decision-making, and collaborative care models. The WHO has established a European Office for Integrated Health Care Services (in Barcelona) to promote the integration of health and social services and to improve the interplay among institutions, professions, and functions within a nation's health care system. As in the United States, much of the promise for integration rests on building bridges between systems of care and cure, between specialists and generalists, between ambulatory and acute care services, and in the development of "telematics", that is, technologies that facilitate the exchange of information.

Globalizing Data Collection

Comparative statistics on health care have been made increasingly available by such institutions as the Organization for Economic Co-operation and Development (OECD), the World Health Organization (WHO), and the World Bank. The interest in globalization is reflected in several recent attempts to collect and disseminate information on the cross-national performance of different countries' health systems. The OECD, for example, annually publishes a set of benchmark statistics on health status indicators in many countries (now numbering 30). The OECD and the WHO have also developed frameworks for understanding how well national health systems perform. The OECD report distinguishes major actors in the value chain (e.g., consumers, providers, provider managers, insurance

managers, and government) and their roles in furthering objectives under three different subsystems: (1) private health insurance with private providers, (2) social health insurance with mixed private–public providers, and (3) general tax funding with public providers. The WHO (2014) report examines how health systems (including their organizations, institutions, and resources devoted to produce health-improving actions) operate in four key functional areas: service provision and organization, investment in resource generation, methods of financing, and government stewardship. Comparisons across these four areas may help countries understand variations in their health status performance over time.

Globalizing of Managerial and Policy Knowledge

For some time, but accelerating in the early 1990s, we have seen a proliferation of international forums and conferences on health management and policy issues for both academics and professionals. Academic conferences have focused on such disciplinary areas as strategic management and organization theory. Global survey research teams have recently formed to pursue cross-national studies in such diverse areas as access to health care, quality of care, hospital nurse staffing, and the diffusion of technological innovation. New journals have developed to address issues of common interest such as the *International Journal for Quality in Health Care* (launched in 1989) and the *International Journal of Integrated Care* (inaugurated in 2001). Professional Associations, for example, the Health Industry Group Purchasing Association (HIGPA), have begun global conferences in both the United States and Europe, following the earlier lead of Arthur Andersen's (now Accenture's) Global Pharmaceutical Leaders Program. Additionally, a number of major consulting firms now have "global" health care practices.

METHODOLOGICAL CHALLENGES OF INTERNATIONAL RESEARCH

Researchers and methodologists across disciplines are increasingly grabbing opportunities and challenges to collaborate with culturally diverse colleagues. Specifically in health care management, before shifting the paradigm from domestic research to cross-national/cross-cultural research, one needs

to understand system/organizational/citizens/patient behavior from other horizons, as well as to make sense of multiple perspectives and shifting identities. For one to appreciate the complexities involved in cross-cultural research, it is essential to look at the different facets, which define culture. The dimensions involved are language, communication, courtesies, rituals, roles, customs, relationships, practices, behaviors, norms, values, thoughts, and manners of social interaction (Samovar, Porter, & McDaniel, 2011).

Depending on the focus of their research and their reason for existence, research institutions mention a variety of methodological issues in international research. For example, the National Academy of Sciences, the National Academy of Engineering and Institute of Medicine highlighted five core elements of international research collaboration (2011), namely cultural differences, country-specific ethical issues, risk management, intellectual property issues, and legal issues and contractual agreements. On the other hand, *OECD Global Science Forum* (2011) highlights the challenges involved in international research between developed and developing countries as being sound financial management and capacity building in developing countries so as to ensure balance and long-term research cooperation with developed countries.

Moreover, Adler (1983, pp. 29–47) distinguishes between six orientations in terms of the approach used in international research in management, ranging from domestic research, termed as “parochial”; replication of domestic studies in other cultures, termed as “ethnocentric”; studies in several cultures, termed as “polycentric”; studies contrasting many cultures, termed as “comparative”; studies of multinational organizations, termed as “geocentric”; and studies of intercultural interaction within work settings, termed as “synergistic” research. Additionally, Adler (1983) argues that each orientation has specific methodological issues, thereby requiring specific solutions.

On a more practical level, the major challenge is to design appropriate methodologies that will be able to produce credible research outcomes. Indeed, in this section, we will focus on common methodological problems and their solutions that are the most relevant when investigating cross-cultural health care management issues.

The first group of problems arises as a result of the fact that researchers have to be satisfied with a convenient choice of countries and cultures, often depending on the availability of research partners and/or access to research sites. Additionally, researchers often fail to provide a robust rationale for selecting cultures for cross-cultural studies. In this regard, Sperber (2009) mentions selection bias in clinical trials, in that there is often

underrepresentation of ethnic minorities. Furthermore, in convenience sampling, there is no probability sampling and the samples may have confounding differences. Some solutions to these problems include first of all that researchers should provide detailed explanations of their choice of comparing/contrasting cultures/health systems, second providing assessments of confounding differences, and third being more aware of robust sampling techniques and external validity issues. It is also necessary to focus on effect sizes rather than just statistical significance in reporting cross-cultural differences since effect sizes take into consideration sample sizes and therefore the magnitude of the significance.

The second group of problems arises from the fact that researchers assume that all individuals in a specific culture share the same characteristics, termed as “ecological fallacy” (Brewer & Venaik, 2014). Indeed, one should be aware of differences that exist between individual level and cultural level characteristics. Sperber (2009) emphasizes that among the challenges inherent in cross-cultural research, are the researchers’ poor cross-cultural competence, thereby being unable to objectively identify the real differences between countries. For example, Sperber argues that differences between countries may be of socioeconomic rather than of cultural nature. Additionally, cross-cultural studies do not always consider or measure contextual factors in each specific participating country, thereby leaving the possibility of having alternative explanations, which are not cultural in nature to answer the research questions (Kuntz, Kuntz, Elenkov, & Nabirukhina, 2013). Some solutions to these problems are that researchers should be familiar with the different cultures, in particular whether they are individualistic or collectivist in nature in view of their differences in social norms (Merkin, Taras, & Steel, 2014). Karremans et al. (2011) argue that whereas collectivistic cultures are characterized by a strong focus on the group or society as a whole, individualistic cultures have a stronger focus on relating to the people close to them. Therefore, collectivistic societies emphasize group norms to promote social harmony, which are likely to influence how people generally respond to and deal with specific situations, for example, conflict.

The third group of methodological issues arises from language problems. In particular when preparing survey instruments or interviewing schedules, there is lack of rigor and quality checks in translation. Indeed, studies involving translation and back-translation do not always provide sufficient details of procedures, and it is virtually impossible to be sure that experts in the languages concerned carry out the translations. Therefore, it is imperative to report full details of the procedures involved in translations

and back translations, whose main threats are variations in style, intensity, frequency/time frame, breadth, and meaning (Brislin, 1970; for a detailed account, cf. Epstein, Osborne, Elsworth, Beaton, & Guillemin, 2013). Epstein et al. (2013) make several recommendations, namely that to secure content accuracy, a multidisciplinary committee that includes bilingual experts should be involved and supported by clear guidelines; and to only use back-translation when participants have inadequate proficiency in the target language. Additionally, one should also consider the use of linguistic panels and the adoption of a multistep approach as a guarantee of quality (Acquadro, Conway, Hareendran, & Aaronson, 2008).

The fourth and final group of methodological issues is related to bias and equivalence issues, particularly when using new instruments or in cultures in which the instrument has not been used (for a comprehensive account of bias and equivalence: cf. van de Vijver & Tanzer, 1997; He & van de Vijver, 2012). He and van de Vijver (2012) define bias as a generic term for any challenge of the comparability of cross-cultural data and which leads to invalid conclusions. Indeed, cross-cultural researchers should have critical appreciation of the boundaries of the construct and more focus on falsification. Pertinent questions include: “does the test measure similar attributes across cultures?” “Is the test sensitive to cultural differences? Or simply testing socio-economic differences?” and “Can scores be compared across ethnic groups?”. Indeed, for cross-cultural differences and similarities to be statistically tested, it is crucial to include tests of independent reliabilities and the reliabilities of a tool in the different cultural groups (Hammer, 2011). On the other hand, demonstration of equivalence (lack of bias) is a prerequisite for any cross-cultural comparison. He and van de Vijver (2012) identify three levels of equivalence, namely structural equivalence when the same construct is measured in each cultural group but the functional form of the relationship between scores obtained in various groups is unknown; measurement unit equivalence, when the scores have the same measurement unit across populations but have different origins; and full scale equivalence when the scores have the same measurement unit and origin in all populations.

Despite the methodological issues involved in cross-cultural and cross-national research, globalization and internationalization continue to render this type of research attractive and more feasible. It is imperative that researchers across cultures should have a full understanding of constructs and concepts and should agree on equivalence of terms. Additionally, more research procedures and measurement tools that minimize measurement and sampling error in cross-cultural research are needed. Furthermore,

data access to secure satisfactory sampling; survey development, process, and response to capture the international context; and detailed analysis and interpretation are necessary to successfully draw meaningful conclusions and recommendations.

ETHICS ISSUES IN INTERNATIONAL HEALTH CARE RESEARCH

Ethics in health care research have been at the forefront of general research ethics for many years. In Western medicine, recognition of patient rights began with Hippocrates (Bhutta, 2002). Although rights for participants in experiments were recognized earlier, it was the global outrage following the Nazi experiments that led to the Nuremberg Code, a document specifically to guide ethics in human research. The Declaration of Helsinki in 1964 put forth basic principles for human medical research. Later guidelines were developed in the United States (The Belmont Report) that articulated the principles for autonomy, beneficence, and justice as guiding human research. In 1993, the Council for International Organization of Medical Sciences developed international research guidelines in collaboration with the WHO (Bhutta, 2002). While these guidelines have improved the conduct of international research, some health care ethics scholars argue they don't go far enough (Benatar & Singer, 2000; Emanuel, Wendler, Killen, & Grady, 2004).

Here we present current issues to consider in international health care research, in terms of ethics. We first present some of the key challenges to consider in terms of ethics when considering international health care research. Although much of the past focus on ethics has been based on patients in clinical trials in developing countries, we argue that the same issues can be prevalent in general management research in health care. In fact, we suggest that these issues may be less apparent in management research, and thus harder to discern if there are problems. We then discuss some traditional Western moral frameworks and principles, and provide examples of how diversity in interpretation of these principles may cause ethics problems. We conclude by focusing on the benchmarks proposed by Emanuel and colleagues (2004). Overall, key scholars tend to agree that those who conduct international research must become familiar with the contexts in which their research is being conducted (Benatar & Singer, 2000; Bhutta, 2002; Emanuel et al., 2004). Indeed, some argue that

investigators need to have basic understanding of, “the social, economic, and political milieu that frames the context ... and greatly influences the health of their research subjects” (Benatar & Singer, 2000, p. 826).

Globalization and Health Inequities

Ethics in international research are inseparable from globalization of health care. Importantly, there are diverse views on the morality of various health care practices, both within and across countries and cultures (Rathert & Phillips, 2010). With globalization, health professionals, patients, information, services, and research all may travel rapidly across international borders. Professionals may confer about treatment with professionals in different locations (Schroth & Khawaja, 2007). Electronic medical records enable providers to access remote patient information (Chanda, 2002). Health care professionals move across borders, either to obtain an education and return to the home country, or in some cases, they are trained in a poorer country then move to a wealthier country, which can result in a “brain drain” (Labonte & Schrecker, 2007). Patients are increasingly traveling for care as well (Schroth & Khawaja, 2007).

Globalization also affects the determinants of health, and therefore, which health aspects are considered important or more deserving of resources. While there are numerous individual factors that play a role in health, such as gender and genetics, social and economic factors may play a greater role (Phillips & Rathert, 2012). The WHO argues that there is a health-social gradient (the “socioeconomic gradient”) in all countries. That is, the lower one’s socioeconomic status, the poorer one’s health (Cox, 2004). Indeed, some international health care research ethics scholars have argued that the key ethical focus of international health care research should be to reduce inequities (Benatar & Singer, 2000; Bhutta, 2002). Indeed, it is notable that most of the research in developing countries is funded by for-profit pharmaceutical companies as opposed to governments (Labonte & Schrecker, 2007). The goals of for-profit transnational corporations are to develop what sells the best, not what brings about the most benefit for poorer populations. As such, research that addresses wealthier nations’ problems of obesity, baldness, and impotence often takes place in developing nations whose populations face greater threats from tuberculosis and malaria (Martin, Sorenson, & Faunce, 2007), and currently, the Ebola virus. For example, Benatar and Singer (2000) pointed out that as of 2000, 50% of the United States’ global expenditures on research is on

health care that affects 5% of the global population. In addition, they argue that 90% of medical research is conducted on diseases that cause 10% of the global disease burden.

The Exploitative Nature of Research

Most international research to date has been conducted by pharmaceutical companies in drug testing; however, ethical problems that have arisen due to this research can be transposed to other types of clinical trials, process improvement, and management research. Importantly, research conducted by wealthy countries in poor countries tends to be exploitative, that is, those in developing countries assume most of the research risks, while those in developed countries assume most of the benefits (Emanuel et al., 2004). In addition, poverty, lack of access to health care, language differences, and health illiteracy all increase the chances of exploitation, as does the lack of understanding of scientific research processes (Emanuel et al., 2004). Furthermore, some argue that offering compensation to research participants in developing countries is a type of coercion because for poor participants, or those without access to the health care, even minimal compensation will make it hard to refrain from participating (Phillips & Rathert, 2012). Indeed, Bhutta (2002) asserted that any international research must not only respond to community needs and national priorities, it also must engage such communities in development of the research questions. Unfortunately, globalization has caused research to focus on broader priorities rather than those of the immediate community (Bhutta, 2002).

Standard of Care and Informed Consent

Much debate in international research has focused on the notion of “standard of care” and how to properly provide informed consent to participants. Benatar and Singer (2000) argued that although most health care researchers conducting international research agree that new interventions should be tested against a “normal” standard of care, as opposed to a placebo, the concept has never been clearly defined. The term has typically meant the “best proved treatment” for the specific condition being studied (p. 824), which typically means how the condition is treated in wealthy developed nations. Yet, Benatar and Singer argued that this definition is too vague. Other debates on standard of care argue that in some cases it is

appropriate to test a new treatment against a placebo, particularly when studying populations for whom the “best proved treatment” is not typically available (Bhutta, 2002). Accordingly, standard of care should expand to the immediate environment, giving participants in comparative research a similar external environment such as general medical care, access to technology, follow-up facilities after the study, and access to care (Benatar & Singer, 2000).

Informed consent for participation in health care research has been recognized as an issue for many years. Differences in language, social context, and even moral values about specific health care practices can make informed consent complex and problematic. Even within a wealthy developed country, sometimes the specific language required to be provided to the participant is beyond his or her reading skills and comprehension. Emanuel et al. (2004) proposed some specific benchmarks to facilitate true informed consent. As with other scholars who focus on international health care research ethics, Emanuel et al. (2004) emphasize engaging the local community to help develop recruitment strategies “that are consistent with cultural, political, and social practices” (p. 934). For example, in some places compensation for participation is expected, while in others it is offensive. In addition, they argue for considering the local context when disclosing information, in terms of language and examples, as well as using consent procedures that are acceptable. Emanuel et al. (2004) offer the example that while U.S. regulations require a written signature, in some cultures this is considered offensive, and verbal consent is the preferred method. Finally, appropriate informed consent requires that researchers ensure participants are truly volunteering and know they are free to withdraw. Clearly, these procedures are complex when we plan comparative methodologies across countries and cultures.

Traditional Moral Frameworks and Ethical Principles

It is important to keep in mind that certain moral frameworks tend to underpin ethical principles and decision-making, and these can vary across cultures (Phillips & Rathert, 2012). Ethical theorists have debated whether morality is relative, or whether there are some definitive moral judgments that cross cultures. Western moral theory has traditionally aimed to establish one basic framework that should underlay moral judgments, and the two most common have been utilitarianism and deontology (Phillips & Rathert, 2012). Utilitarianism proposes that what is right is determined by

the consequences of an action. In health care research, this means what brings about the most “good.” In contrast, deontology proposes that rightness is determined by the path to the consequences; that is, sometimes the “right” thing needs to be done regardless of the consequences. In Western medicine, for example, truth-telling in terms of letting patients know accurately what their diagnoses and prognoses are is considered the ethical thing to do, regardless of the consequences. Indeed, it could be argued that patients cannot truly consent if they are not accurately told what is wrong with them and what their treatment options are. However, in some cultures it is considered unethical to fully disclose the patient’s condition if it would cause duress, particularly disclosure of a terminal illness. As noted above, it is important for researchers to understand the local context, community, and traditions for even what some might consider mundane health care practices.

There are key Western health care principles by which practitioners abide. In addition, there are key health care research principles by which practitioners and investigators attempt to abide. Beauchamp and Childress have provided the seminal theoretical work on the key principles for health care ethics. The generally recognized professional health care ethics include autonomy (in terms of disclosure, understanding, and voluntariness); nonmaleficence; beneficence; and justice. Principles guiding the patient–professional relationship include veracity (truth-telling); privacy; confidentiality; and fidelity (Beauchamp & Childress, 2009). Recall that the Belmont Report identified the key principles for guiding human subjects research as autonomy, beneficence, and justice. While health care and research ethics principles appear to be in agreement, such principles are often not only interpreted in a variety of ways, they also can sometimes be contradictory, and can be particularly problematic in international research or research within developing countries (Emanuel et al., 2004).

Emanuel et al. (2004) have worked extensively to develop principles to guide health care research. Recently their attention has turned toward developing benchmarks that link to these principles. They argue that particularly for international research we need benchmarks in addition to principles, for the aforementioned reasons. Rarely are ethics principles absolute, they will sometimes compete, and “must be balanced against each other” (p. 930). From benchmarks, systematic practical measures can be obtained that can help investigators know if their practices are addressing the ethics principles. Full discussion of each principle and example benchmarks are discussed in their article (Emanuel et al., 2004). Some examples in terms of topics discussed above are provided here. First, the principle of Favorable

Risk-Benefit Ratio may be invoked to avoid exploitation. It seems feasible that all investigators would aim for such a principle. However, rather than making assumptions, the following benchmark could be measured: “Assess the potential risks and benefits of the research to the study population in the context of its health risks” (p. 931). Similarly, the principle of Informed Consent can be further specified and measured by the benchmark: “Implement supplementary community and familial consent procedures where culturally appropriate” (p. 931). Finally, a third principle, Collaborative Partnership, aims to address concerns about inequities, includes a benchmark, “Share fairly financial and other rewards of the research” (p. 931).

There are many attributes in health care and health care research that result in complex implementation of ethics principles, and international research adds additional complexity. While most of the key ethics principles are agreed upon the world over, interpretation and practical realities can raise conflicts that must be balanced (Emanuel et al., 2004). When investigators aim for greater understanding of the contexts in which they are conducting their research, including the social, economic, and political climates, then international research can bring about great opportunities. By understanding the key issues brought about by globalization, recognizing the underlying moral theories and frameworks that drive key ethics principles, and focusing on specific benchmarks that can be attained across cultures and linked directly to each principle, investigators can be more confident that their methods will be developed in an ethically appropriate manner.

KEYS TO SUCCESS, PITFALLS, AND PRACTICALITIES

How one measures success depends on where one stands and what one seeks to attain. As scholars interested in health care management in the international context, we have differing perspectives depending on the national health systems with which we are the most familiar — and the problems that we attempt to solve. International researchers face a balancing act in understanding both the emic and etic aspects of any health system and its organizational and management issues. Hence, two keys to success for publishing are to clearly articulate the problem (or theoretical conundrum) examined within an international health care management research program, as well as ensuring the data that are gathered and the analyses performed are

appropriate. In other words, explicitly stating what was examined (and why), as well as how it was examined (and why), goes a long way toward ensuring future success. Another key to success is the ability to work in multicultural teams and to foster creativity and innovation thanks to the diversity of these teams. Indeed, it is essential to seek diverse membership in terms of gender, culture, and discipline to be able to capitalize fully on diversity. However, working in groups and teams is not without its problems. And the more complex and diverse the teams are, the more are they likely to suffer from mismatch of member skills with research project, unclear responsibilities, conflict as regards authorship and presence of free-riders, as well as mismanaged goal alignment and interpersonal conflicts.

Other keys to success are more mundane but, perhaps, harder to attain: Creating and exploiting an international research project's strengths and minimizing its weaknesses. Such success factors, however, must avoid other common pitfalls associated with publishing research in the international context, including targeting an inappropriate publication outlet, not following journal guidelines, ineffectively introducing the research problem, failing to respond to critical reviews, etc. Perhaps the most daunting is identifying an appropriate publication outlet for a research project. Researching journals, contacting editors, and explaining the project before submitting a manuscript can not only save time, but also will often improve one's chances of acceptance.

Lastly, there are a number of practical matters that may come up with submitting international research, such as copyright permissions versus paying fees for open access, managing the manuscript proofing process, dealing with split and unfavorable reviews, etc. Responding to reviews, especially split reviews, is problematic for many authors. For example, determining the direction for revisions may require contacting the editor for additional advice. At the same time, there are several comprehensive ways to ensure reviewers' concerns are addressed.

CONCLUSION

We have attempted to identify key issues, challenges, and opportunities in the conduct of international research in health care management. Because the world's populations and diseases are converging, such research is becoming more essential than ever. Successful efforts to adequately establish reliable and valid research protocols will require clear focus on

appropriate methodologies and measures. Additionally, there needs to be more engagement of local populations, and their particular health issues and contexts into research designs and research questions. Furthermore, attention must be paid to developing appropriate, diverse, and highly functioning research teams. And finally, prior to initiating research, consideration must be given to its audience and publication outlets. With these issues in mind, a direction for future research may be to collate experiences using multiple case study approach of research teams that have successfully conducted international comparative research. Such case studies would examine team processes and experiences, methodological challenges, practicalities, and pitfalls. Lastly, by analyzing these case studies, the identification of best practices for the international research process could provide better guidance to researchers who intend to venture more into this much needed area of research.

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DEFINING WORLD-CLASS CARE IN ACADEMIC MEDICINE: ENABLERS AND CHALLENGES

Andrew N. Garman and Tricia J. Johnson

ABSTRACT

Purpose — Interest has grown among U.S. academic medical centers in developing international benchmarks for excellence in process and outcomes. Drivers behind this trend, as well as barriers to the development of useful benchmarks, are explored in this invited commentary.

Design/methodology/approach — The commentary is based on the authors' conversations with members of the U.S. Cooperative for International Patient Programs as well as the University Healthsystem Consortium (UHC).

Findings — Six key themes are summarized in this commentary, including four key drivers and two barriers.

Originality/value — The practice-based perspectives this commentary summarizes provide a useful starting point for researchers and

practitioners interested in establishing international comparison with the United States.

Keywords: Quality; benchmarking; medical travel; efficiency; innovation; medical research

In recent years, interest has been growing among U.S. academic medical centers (AMCs) to create international benchmarks of process and outcomes data with AMCs from other developed countries. This interest is being driven by at least four motivations. First among these is the long-standing tradition and recognition among U.S. AMCs that sharing data can accelerate the identification and dissemination of higher-value practices. Recent examples of data sharing and transparency by U.S. hospitals include the public reporting of patient experience, readmissions, and mortality through publicly accessible websites such as Physician Compare ([Centers for Medicare & Medicaid Services, 2014](#)). Expanding availability of data comparisons outside of the United States also expands the opportunities to discover promising new practices that can be adopted to improve care.

Second is recognition of the critical role that experience plays in accelerating the standardization of new care practices, which is essential to making them safer, more efficient, and more accessible ([Johnson & Garman, 2015](#)). This recognition has led many prominent U.S. AMCs to broaden their referral networks both domestically and internationally. Each year, tens of thousands of international visitors travel to the United States to seek care from its leading AMCs ([Johnson & Garman, 2010](#)). These medical travelers are typically seeking highly specialized care that is not available in their home regions. The additional patient volume helps AMCs move treatments more quickly from experimental phases toward more reliable and routinizable approaches, thereby accelerating the diffusion of innovation and making the broader health system to operate more efficiently. Comparisons of outcomes that international providers are able to achieve will become increasingly important so as to ensure that international referrals are optimized to the best interests of the patients served ([Satjapot, Johnson, & Garman, 2011](#)).

Third is the increasing harmonization of medical practices across countries, including everything from the regulatory environment to the approaches taken to health systems management ([Garman, Johnson, & Royer, 2011](#)). Currently this phenomenon has less to do with patient care

than with payer and supplier communities seeking greater efficiency in the regulatory process. As care provision models begin to look similar across countries, more meaningful comparisons of care processes and outcomes across countries should also become more practical. However, for cross-country harmonization of care processes to find support and use, providers and policymakers need to recognize that the adoption and standardization of best practices is in the best interest of everyone involved.

Fourth and perhaps most fundamental is the changing role of U.S. AMCs in the broader health system, both domestically and internationally. There is growing recognition that AMCs need to evolve in ways that better ensure that their tripartite missions involving research discoveries, clinical care, and education more rapidly and efficiently reinforce one another (Grumbach, Lucey, & Johnston, 2014). This shift is increasing attention beyond care innovations and toward innovation in the delivery system, as well as how health professionals themselves are educated, not only during their initial professional training but throughout their professional careers (Ricketts & Fraher, 2013). The U.S. Institute of Medicine (2007) describes this tighter integration between research, care delivery, and education as their vision of a “learning health system.”

Given all of the motivators for pursuing international benchmarks, it may be surprising how little has been achieved in this area thus far. As it turns out, the quest for benchmarks to identify international best practices has been far from straightforward.

CHALLENGES TO IDENTIFYING INTERNATIONAL BEST PRACTICES

Although there are many hurdles to developing the kinds of international comparisons that would facilitate robust best-practice identification, there are three that appear particularly challenging to overcome: the absence of incentives for transparency; the tendency to confuse health care with health; and the important policy differences across countries.

First, consider the incentives for transparency. In most countries, standards of excellence are defined within a given health system or region. As such, even in countries with strong public reporting cultures, the metrics used are typically structured for within-country comparisons. Unless a given provider is seeking to attract international patients, there is little incentive to compare outcomes across international borders. For providers

who do see international patients, comparisons tend to be driven by marketing rather than quality goals — that is, efforts to showcase services as superior to international alternatives, rather than to make accurate comparisons for dissemination and improvement purposes. Although standards have been developed within the United States to ensure that health care marketing is accurate and serves patients' interests ([Society for Healthcare Strategy & Market Development, 2010](#)), evidence suggests that the standards have not been universally adopted ([Ormond & Sothern, 2012](#); [Vater et al., 2014](#)).

Second is the challenge of confusing health care with health. Unlike with individual health care providers, where direct international comparisons have been fraught with challenges, standardized measurements of the health of populations have been widely accepted and disseminated for decades. Measures such as infant mortality rates and average life expectancy, as calculated by the World Health Organization, can be used to more straightforwardly compare health outcomes for different regions, and as such receive much more frequent attention than the more difficult to interpret quality metrics. Foundations such as the Commonwealth Fund have used national data to compare countries on statistics such as quality, efficiency, and access to care ([Davis, Stremikis, Squires, & Schoen, 2014](#)), and draw conclusions about the extent to which a health system is or is not effectively supporting population health. This practice of directly associating health care with population health glosses over the much larger roles factors such as environment, diet, and socioeconomic resources play in overall health. Although exact contributions of health care versus other determinants of health are difficult to assess, widely cited models have suggested the proportion of health within regions of the United States that is attributable to both health care quality and access combined is not more than 20% ([Kindig & Isham, 2014](#)). Indeed the Commonwealth Fund's own studies suggest that the best health care system among their studied countries (the United Kingdom) is in the country with the second worst health outcomes ([Davis et al., 2014](#)). Another problem with country-level statistics is that they ignore the often substantial within-country variation in health care quality. A country may on the whole yield strong outcomes while some of its providers excel and others lag behind.

A third major challenge is the role of substantial policy differences across countries ([Bottle, Middleton, Kalkman, Livingston, & Aylin, 2013](#)). A good case example of some of these challenges is provided by a pilot project recently conducted by the U.S.-based University HealthSystem Consortium (UHC). Formed in 1984, UHC is an alliance of 120 AMCs

and 302 of their affiliated hospitals. Representing the nation's leading AMCs, UHC provides a portfolio of performance improvement products and services. Central to UHC's offerings are its sophisticated clinical and operational databases, which provide substantial breadth and depth of transparency into individual members' operations and performance. These data can be explored by members in ways that facilitate the identification of high performers, who can then be examined to identify best practices that other members may be able to adopt (UHC, 2014).

Responding to the interests of members as well as AMCs from other countries, UHC sponsored a project to determine the feasibility of developing and deploying an international comparator as part of this database program. UHC leadership met with representatives from Canada, Great Britain, and Australia to establish initial parameters for a data-sharing effort. With these parameters established, five U.S. AMCs were identified to participate in the pilot project, along with counterparts in the other three countries. Data from these institutions were examined to identify potential differences that might limit the utility of the comparisons (Meurer, personal communication, July 10, 2014).

For as much work as was required to create comparable data sets, many of the clinically important differences across countries appeared to reflect differences in policy and reward structures more so than differences in clinical care per se. Two examples clearly illustrate some of these challenges. The first example relates to secondary diagnoses. These are much more common in U.S. AMCs than in those of other countries. While it is tempting to attribute these differences to the well-known differences in overall health of the underlying populations, the other confound has to do with how health care is reimbursed in the United States. More specifically, there is far greater incentive to more completely code secondary diagnoses in the United States than there is in other countries, where coding has little bearing on reimbursement. The second example relates to length of stay. All else equal, patients are often better off from a safety perspective when their treatment minimizes the length of their inpatient stays. Here the United States tends to significantly outperform other countries, discharging patients at a far brisker pace. However here, too, unlike in many other countries, the United States' reimbursement structure actively incentivizes practitioners to minimize lengths of stay for their patients. Until recently, the reimbursement structures in the United States did so without regard to the impact on subsequent readmissions. Recent reforms to Medicare via the Hospital Readmissions Reduction Program now penalize hospitals with excessive readmissions for heart attack, heart failure, and pneumonia.

Additionally, the U.S. Centers for Medicare and Medicaid Services will implement an efficiency measure in its Hospital Value-based Purchasing Program, which will incentive efficient care for not only the hospital stay, but also 30 days post-hospitalization. These types of differences create challenges in interpreting the underlying reasons for differences in hospital length of stay and population-level hospitalization rates.

CONCLUSIONS

Many of the challenges cited above are artifacts of the complexity involved in interpreting and working international benchmarks, rather than indictments of their potential value. Environmental and contextual factors will always need to be taken into consideration, particularly when the foci involve more complex systems and outcomes of care. Indeed, credible international benchmarks could eventually help point the way toward best practices in policy and incentive systems as well. Given the role of AMCs as engines of health care progress, as well as the macro trends described earlier, the potential value of robust international comparison data is likely to continue to grow. In the future we anticipate seeing more experiments like the UHC effort described above, to the betterment of care for all.

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INTERNATIONAL “BEST PRACTICES” IN HEALTH CARE: THE ROLES OF CONTEXT AND INNOVATION

Jim Goes, Grant T. Savage and
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ABSTRACT

Purpose – Explores recent approaches to international best practices and how they relate to context and innovation in health services.

Design/methodology/approach – Critical review of existing research on best practices and how they created, diffused, and translate in the international setting.

Findings – Best practices are widely used and discussed, but processes by which they are developed and diffused across international settings are not well understood.

Research implications – Further research is needed on innovation and dissemination of best practices internationally.

Originality/value — *This commentary points out directions for future research on innovation and diffusion of best practices, particularly in the international setting.*

Keywords: Best practices; international health; innovation; diffusion

Albert Einstein famously noted that the definition of insanity was doing the same thing over and over again and expecting different results. Despite enormous cost and effort devoted to innovative practices, technologies, and processes, the reality is that both medical care practice (Bhattacharjee & Hikmet, 2007) and health systems organization (Ferlie & Shortell, 2001) tend to follow well-established ruts in the road. Innovation is hard, but implementing and sustaining innovation is even harder. As humans, we are creatures of habit, and when our beliefs become habits and habits become routines, we are not only resistant to change, but resistant to even the thought of doing things differently. After all, we are already following the best practices, right?

What is a “best practice”? The term comes from industry and is widely used, but lacks consistent, rigorous definition (Harrington, 1997). A review of various health care journals and websites yielded dozens of definitions of best practices, many of them similar, but none of them universal. The chapters and discussions in this volume take direct aim at business (or practice) as usual in health care management, by *widening* the scope and discussion of best practices — not just beyond the usual tired one-liners, but also beyond the usual ways of thinking about best practices and where we can find them.

When we talk about best practices, we inevitably ground the notion in what is best at a point in time, based on existing knowledge, experience, and research evidence, and within the context and setting in which any particular “best” is established. Moreover, we assume that there *is* a best: a static, ultimate benchmark by which all other practices are judged. This is inane. What is truly best, or even better than what we have been doing, changes constantly as a function of *researching*, *rethinking*, and *reacting* to new realities, ideas, processes, technology, and ways of practicing health care. Moreover, even the notion of a best practice is limiting, time bound, and narrow. Learning from others and striving for excellence seems to be forgotten when benchmarks and best practices are brought to the

foreground. There are many “best” practices, and they change all the time. Establishment of a gold standard set of best practices works against continuous innovation of these practices. If everyone adopts and follows the best practices, innovation withers and practice regresses to the mean.

Moreover, when viewed as an innovation in practice, best practices are subject to the same constraints and influences of any innovation. The seminal work of [Rogers \(2003\)](#) illustrates the many factors that influence adoption and diffusion of an innovation. Adopting the current best practices around a particularly procedure or treatment can be costly, disruptive, demand new competencies, and be challenging to implement – all with no guarantee that the current best practices will remain best.

Context also matters in how we judge best practices. What is best practice in a tertiary, big city hospital in the United States is likely to be irrelevant and perhaps even dangerous in an overloaded, under provisioned rural hospital in India. There is no obvious set of best practices that fits both. Innovation in health care can happen anywhere, by design or necessity, but it is the *confluence* of diverse perspectives, cultures, settings, needs, and even infrastructure that determines best practices in a particular place and time.

Moreover, the search for best practices in a particular setting can generate greater understanding of both old and new problems simply by being viewed and analyzed through different sets of eyes, varying cultural perspectives, and questioning standard assumptions about what works and does not. Practices that are truly best result from the interaction of context, opportunity, and need in the moment; not following a static benchmark but continuously building on current practices through experience, learning, and innovation.

Consider the case of Jane Chen and the Embrace Baby Warmer™. Every year in developing countries, millions of babies born prematurely or with low birth weight die or suffer lifelong medical problems ([World Health Organization, 2014](#)). WHO estimates that roughly 75 percent of these deaths and medical problems could be prevented if these premature babies were kept warm following birth. While best practices for premature or low birth weight babies are well established and understood, these practices require resources, knowledge, and access to care that can be difficult to find in many developing nations. Standard options for premature births involve incubators, which are both costly and require access to electricity, both major barriers in rural developing countries.

To address this problem, Chen and her colleagues went outside the usual practices for treating premature birth, developing a low cost infant warmer

that provides a safe, affordable, and low-tech solution for premature births and that requires no electricity and uses relatively inexpensive materials. In this case, the context demanded innovation because the usual infrastructure for best practices was not available. By rethinking the problem, the team went outside established best practices for premature births, and embraced “good enough” practices — generating a feasible solution that worked because it was grounded in realities of the context.

The baby warmer example illustrates that users of “best practices” advice would be well advised to consider several key questions. First, who decides what is best? Are the deciders qualified to make that judgment? Is their judgment of “best” constrained by their training, clinical experience, or disciplinary view? Is there credible scientific evidence backing the best practice standard, or is it merely a collective agreement on what is best? Are the most qualified experts involved in making that critical assessment of best practices?

Second, what are the bounds of the espoused best practices? Are these practices context specific, or universal? Where would these best practices not apply, or fail to provide usable guidance?

Third, are these best practices feasible in all settings, or just specific settings? Do users of these best practices have the knowledge, infrastructure, skills, and capabilities to *follow* the prescribed best practices? Again, context matters.

Fourth, can the best practices be communicated to the users in an effective manner? Are there language, culture, social, or physical barriers that make adoption of the prescribed best practices difficult or impossible? Perhaps there are resource limitations, knowledge gaps, or lack of imperative to adopt best practices. What then? Best practices suffer or improve based on their translation. And a literal translation that does not consider the context and customs of one country versus another country is doomed to mediocrity at best.

It is also essential to understand that *knowing* the best practices and *following* the best practices are very different realities. A burst of enthusiasm around a new set of practices may quickly peter out in the absence of clinical and administrative leadership to follow these best practices, particularly if the resource requirements for implementation are not provided, or improved results do not materialize within a particular time window.

Finally, change always takes more effort than following the status quo. Effective implementation of best practices requires not only getting “the right people on the bus,” as Jim Collins described it, but also encouraging and incenting them to *drive* the bus. In the absence of adequate knowledge,

incentives, leadership support, workable processes, and resources to adopt and implement best practices in a particular setting, the standard will remain a vague goal instead of an actionable means of change in health care practice and organization.

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SECTION II
INTERNATIONAL BEST
PRACTICES ACROSS HEALTH
SYSTEMS

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THE LINK BETWEEN HEALTH GOVERNANCE MODELS AND GLOBAL HEALTH INNOVATION: AN EXPLORATION OF OECD NATIONS

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ABSTRACT

Purpose – While there is established research that explores individual innovations across countries or developments in a specific health area, there is less work that attempts to match national innovations to specific systems of health governance to uncover themes across nations.

Design/methodology/approach – We used a cross-comparison design that employed content analysis of health governance models and innovation patterns in eight OECD nations (Australia, Britain, Canada, France, Germany, the Netherlands, Switzerland, and the United States).

Findings – Country-level model of health governance may impact the focus of health innovation within the eight jurisdictions studied. Innovation

across all governance models has targeted consumer engagement in health systems, the integration of health services across the continuum of care, access to care in the community, and financial models that drive competition.

Originality/value – Improving our understanding of the linkage between health governance and innovation in health systems may heighten awareness of potential enablers and barriers to innovation success.

Keywords: Health innovation; health governance; health systems; international; consumer engagement

Health care systems of developed, industrialized countries are facing challenges associated with ever-increasing demands for health services that are quickly outstripping the capacity of systems to deliver health care effectively and efficiently. According to the Organization for Economic Co-operation and Development (OECD), there has been a steady increase in health expenditure as a percentage of Gross Domestic Product (GDP) among OECD countries, who are all spending well above 10 percent of their GDP on health care (OECD, 2011). While increased spending has been associated with improvements in health outcomes and life expectancies, it does not necessarily translate into better access or quality of care outcomes (Davis, Schoen, Stremikis, & Fund, 2010; Schoen, Davis, How, & Schoenbaum, 2006).

We suggest that in order to better understand health care outcomes across OECD nations, it is important to understand the health system governance in each jurisdiction and its relationship to the focus of domestic innovation. This study examines eight OECD nations, Australia, Britain, Canada, France, Germany, the Netherlands, Switzerland, and the United States by first categorizing each country by its dominant health governance model, documenting evidence of health system innovation in each jurisdiction that addresses its particular health system challenges, and determining innovation themes across governance systems. While recognizing that there are many factors that influence innovation in the health space, this study is focused on uncovering potential linkages between country-level health system governance and health innovation focus to begin to build a stronger understanding of conditions that may influence the creation and evolution of innovation in developed nations.

We begin by defining health system innovation and placing this research within the literature that explores innovations across jurisdictions. Methods are then outlined, followed by a classification and categorization of health system governance models used in the OECD countries included in this study. The analysis of country-level innovation focus is then presented, followed by linkages between health system governance and health innovation. We conclude by noting the overarching themes developed through this study, noting the limitations of this research.

HEALTH SYSTEM INNOVATION

Innovation has been defined in a number of ways. In their review of innovation, [Crossan and Apaydin \(2010, p. 1155\)](#) propose a comprehensive definition of innovation as “production or adoption, assimilation, and exploitation of value-added novelty in economic and social spheres; renewal and enlargement of products, services, and markets; development of new methods of production; and establishment of new management systems. It is both a process and an outcome.” Others have defined innovation as “the intentional introduction and application within a role, group, or organization, of ideas, processes, products or procedures, new to the relevant unit of adoption, designed to significantly benefit the individual, the group, or wider society” ([Omachonu & Einspruch, 2010, p. 3](#)). Innovations in health care organizations are typically new services, new technologies, and new ways of performing tasks ([Lansisalmi, Kivimaki, Aalto, & Ruoranenm, 2006](#)). We adopt the definition of health innovation as proposed by [Omachonu and Einspruch \(2010\)](#) as it is holistic enough to capture the breadth of health innovation.

It is beyond the scope of this article to theorize on the genesis of innovation or expand the conceptual processes for how innovation evolves. Rather, we focus on exploring examples of country-wide health innovation initiatives across comparable jurisdictions to uncover patterns across health governance models. Researchers have adopted a cross-jurisdictional, comparative approach when exploring different types of health innovation. This has included focusing on a specific innovation or health area (e.g., pharmaceuticals, medical devices, or mental health) across multiple jurisdictions. As examples, [Kimberly, de Pouvourville, and D’Aunno \(2008\)](#) presented an exploration of the origins and translation of Patient Classification Systems (PCS) and Diagnosis-Related Groups (DRG) across

15 countries, noting the similarities and differences among them. They found that although countries embraced externally developed innovation such as PCS, each jurisdiction made changes to the innovation to more appropriately reflect domestic cultures and practices. [Kazley, McLeod, and Wager \(2012\)](#) looked at the similarities and challenges for telemedicine across Europe, Asia, and the United States, discovering a number of barriers to the use of telemedicine that can be remedied by practitioners and policy makers. Multiple studies have looked at innovation in health financing, comparing payment models across multiple countries ([Naderi & Meier, 2010](#); [van de Ven & Schut, 2008](#); [van Ginneken, Swartz, & Van der Wees, 2013](#); [Weiner, Famadas, Waters, & Gikic, 2008](#)). These are but a few examples of the numerous studies that compare health innovations across geographic boundaries.

By design, this study is different. It does not trace a single innovation across multiple jurisdictions, nor does it a priori select a single health innovation or theme. We felt that to do so could potentially eliminate an important innovation focus. Therefore, we allow the literature to suggest dominant areas of health innovation in the eight countries in our study and from there, create groups of health innovation themes to be later linked to health governance models.

METHODS

The eight countries included in this analysis were selected as they are most commonly included in comparative reports on health systems in OECD countries ([Anderson & Frogner, 2008](#); [Anderson, Frogner, Johns, & Reinhardt, 2006](#); [Astolfi, Lorenzoni, & Oderkirk, 2012](#); [Cylus & Anderson, 2004](#); [Laugesen & Glied, 2011](#); [Oderkirk, Ronchi, & Klazinga, 2013](#); [White, 2007](#); [Zare & Anderson, 2013](#)). We consider cross-country comparisons as an analytic technique following the research of [Cacace, Ettelt, Mays, and Nolte \(2013, p. 157\)](#) who “see cross-country comparisons as a distinct field of interest, reliant on comparison, which we interpret as a distinct method.”

Our study methodology employed a grounded theory approach ([Glaser & Strauss, 1967](#)) and was divided into three phases. The first phase began with a critical analysis of the literature on country-level health innovation. Eight researchers were assigned one of the eight countries in the study to research domestic health innovation. In tandem, the same eight researchers were assigned one of the eight countries in the study (different

from the one that they researched for health innovation) to explore the health governance model of that country. For both the research on innovation and on health system governance, grey literature, published empirical literature, and commissioned reports were included in the critical analysis of the literature, as well as reviews of government websites that profile their respective health systems. Researchers used academic databases such as JSTOR, PubMed, LexisNexis Academic, and ProQuest, as well as web-based search engines including Google and Google Scholar. The researchers sourced and read the respective material and created summaries of the data. For the within country health innovation data, the researcher grouped the information by category (e.g., primary care, medical equipment, information technology). These preliminary categories were not determined a priori; rather, it was up to each individual researcher to suggest categories he or she felt appropriate. Over the eight researchers this included 16 preliminary health innovation categories.

Once the initial data gathering for governance systems and health innovations was completed, the study moved to the next phase. Two researchers who had not been involved in the first phase reviewed the summaries and categorizations of the health innovation data as well as the health governance data for all of the countries. Individually, they further abstracted the preliminary categories of the health innovation data, suggesting a total of eight second-order themes. There was a high level of inter-rater reliability with seven of the second-order themes being the same and one being removed as it was deemed to be a subset of another. The two researchers also independently reviewed and classified the health governance models for each of the countries, each suggesting the same three broad governance models.

The last step involved cross-comparing the seven health innovation themes with the three health governance models to look for linkages between governance models and health innovation. There was no attempt to look for or establish causality as it was deemed to be beyond the scope of this research study. This resulted in four health innovation themes across the three health governance models. [Table 1](#) provides the evolution of the coding themes for health innovation.

Broadly, innovations that were limited to a specific region or subpopulation in a health system were not included in this analysis due to the limitation of examining impact of innovation that has not been scaled across an entire health system to achieve impact at the population level. However, in a limited number of cases in countries where similar health care innovations occur in multiple regions, we consider them to be representative for

Table 1. Development of Coding Themes for Health Innovation.

Preliminary Organizing Categories	Second-Level Coding Themes	Final Coding Themes across Governance Models
Health apps Smart cards	Electronic/mobile technology tools and information technology	Culture of consumer engagement
Self-directed care Shifts in patient-provider interaction (e.g., email, Skype)	Health literacy	
Telehealth Virtual Wards Changing population demographics (e.g., aging)	Increasing access to health services and practitioners	
Around the clock health care (e.g., family health teams) Chronic illness management Knowledge exchange networks	Collaboration among practitioners	Integration of health services across the continuum of care
Surveys and reporting systems Quality and outcome frameworks	Performance metrics	Accountability for health care services in communities
Institutional cost containment Personal health budgets Supplementary payment systems Ability to tailor health coverage to individual	Cost efficiency Choice in health coverage	Financial models that drive competition

the country.¹ We did not begin the research with a specific health innovation target; rather, we allowed the research to uncover major structural and programmatic innovations in health systems, noting those that significantly impacted the operations of health care in the focal country. We selected this approach to allow for the later-stage identification of health innovation themes across our eight jurisdictions, rather than a priori selecting health innovations and determining whether they tracked across countries.

RESULTS

We present our results in three phases. We begin by outlining health governance in the eight countries studied, grouping them into three governance models. We then outline country-wide health innovations in each of the

countries in this study. Innovations are first described in the countries with universal health care systems (Australia, Britain, Canada), followed by innovation profiles in social insurance models of health care (France, Germany, the Netherlands, Switzerland), and finally, innovation profiles in private mixed model health care systems (the United States). We then outline the four innovation themes discovered through our analysis of health innovation patterns across the three governance models.

Health System Governance Structures

The unique governance structures of the health care systems in Australia, Britain, Canada, France, Germany, the Netherlands, Switzerland, and the United States were examined to identify how governance features create the context and conditions for health innovation in each country. Governance was defined as the organizational and authority structure used to control or direct health system decisions, setting policy for how health systems function and how health care services are organized. Governance structures provide an important context to understand the culture and philosophical basis upon which innovation strategies are implemented.

Three models of health system governance were found in the comparator countries: the “*State as Owner-Operator Model*”; the “*State as Guardian Model*”; and the “*Privatized Mixed Model*.” A description of the features of each model is outlined below, with particular attention to the level of control exerted over public/private services.

“State as Owner-Operator” Model

Countries such as Australia, Britain, and Canada are best characterized by a “State as the Owner-Operator” structure, wherein the State is the owner and operator of the health system providing the operational and strategic direction of the health system in each country. The government is the single-payer in what is often referred to as “Universal Health Care,” built on the moral foundation that no one should refrain from seeking care from fear of consequences, including any financial adversity (Brown, 2003). Funded through broad-based taxes at national, state/provincial, and local levels, there are various forms of cost-sharing arrangements between the levels of government. These national health systems provide public health insurance to ensure universal coverage for a specified package of benefits, often through public providers operating within system level budgets who are reimbursed through state-determined fee schedules or salaries.

Control over Public/Private Services. In universal health models, the state exerts significant control over publicly versus privately available services. The jurisdiction and responsibility for delivery of health care is decentralized in both Australia and Canada, falling to states or provinces, whereas in Britain it is managed at a national level. In Britain and Australia, specialists are allowed to maintain private practices, whereas in Canada all physicians practice within publicly funded provincial systems. Gatekeeping or commissioning by primary care physicians in Britain controls access to specialists and more expensive hospital services. Patient cost-sharing, however is typically kept to a minimum. In contrast, systems in Australia and Canada rely somewhat on cost-sharing and out-of-pocket payments from consumers. While single-payer, public provision health care systems do guarantee equal access and universal care, they often struggle with inefficiencies including long waiting lists, insufficient investment in health care facilities, poor responsiveness to health needs and access to care, low productivity, low motivation, lack of appropriate incentives for providers, and various forms of rationing care (Schmid, Cacace, Götze, & Rothgang, 2010).

“State as Guardian” Model

In France, Germany, the Netherlands, and Switzerland, health systems are best characterized by a “State as Guardian” structure wherein the government ensures a minimum coverage of health care services to all citizens (Neubauer & Pfister, 2008). This model is strongly grounded in the principle of solidarity because comprehensive benefits packages are required by the State to be available for all citizens. Accordingly, the State is not seen to be the owner but rather the guardian and administrator of health care services that are nearly exclusively privately owned and operated by social health insurance agencies with regulated insurance premiums. This type of system is essentially self-regulated through competition among insurance funds and is largely managed by the insurance agencies, the care providers, and the patients themselves who negotiate directly on elements such as payment schedules, services associated with quality of care, and patient volumes (Saltman, 2004). The actual payments for health services are operationally implemented by the private health insurance agencies and selective contracting with care providers is not uncommon. The social insurance model of health systems is funded by wage-related employer contributions and through premiums paid directly by individuals to their insurers.

Control over Public/Private Services. To achieve universal health care coverage, countries including France, the Netherlands, and Switzerland require

mandatory participation. Cost-sharing is usually higher in these countries than in the “state as owner-operator” countries as patients are required to make co-payments on insured services as well as out-of-pocket payments for services like dental and long-term care that are not included in benefits packages. France relies on private insurance to cover cost-sharing and to supplement the national benefits package; 92 percent of the citizens have private insurance (Paris, Polton, & Sandier, 2003). In Germany, the vast majority of citizens are covered by their statutory health insurance scheme in which approximately 180 health insurance or sickness funds compete for contracts to deliver services. Contributions are levied against citizens based on their gross wages and, although collected by the sickness funds, they are centrally pooled and then reallocated based on a risk adjustment formula. Germany allows certain (typically high-income) citizens to opt out of social insurance for private insurance, which plays a substitutive role for funding health care (Thomson, Osborn, Squires, & Reed, 2011). Since 2006, the Netherlands has had a single system of compulsory insurance for all residents, which is administered by approximately 20 private insurers offering a government defined benefits package. Individuals pay a flat-rate premium regardless of age, gender, or health status, but there is also an income-related tax contribution that subsidizes premiums for low-income groups. In 1996, Switzerland turned its existing system of voluntary health insurance into a mandatory social insurance system. Their system has 84 insurers offering a government defined basic benefit package, but both the premium and the deductible are allowed to vary across insurers with a minimum prescribed deductible. Approximately 10 percent of Swiss citizens opt for coordinated, managed care plans which offer restrictions on physician choice, but have lower premiums (Zweifel, 2011).

“Privatized Mixed” Model

Health care services in the United States can be characterized as a “Privatized Mixed” Model where private health insurance agencies operate alongside, or are integrated with State-run systems including Medicare, Medicaid, the State Children’s Health Insurance Program, and others such as the Veterans Affairs program. There are also available federally supported safety net providers and community health centers for people who lack insurance coverage; however, solidarity and commitment to universal coverage are not characteristic of such a system. Instead, the system operates at a high cost in the favor of delivering “more is better,” high-quality, high-technology, specialist care that is accessible without long waits to those patient consumers who can financially afford to access health

services. The purchase of insurance thus depends on consumer willingness and ability to pay for health care.

Control over Public/Private Services. The exclusion of preexisting conditions from coverage, the denial of coverage, and the inability of sick and poor individuals to pay private insurers risk-rated premiums results in large numbers of uninsured or underinsured citizens within a privatized system. While almost all people over the age of 65 and approximately 80 percent of those under the age of 65 years have insurance coverage in the United States, approximately 46 million people (16 percent) remain uninsured (American College of Physicians, 2008). Coverage is likely to expand with the passage of the Accountable Care Act (2010) which requires insurance companies in the United States to cover all applicants at the same rates regardless of preexisting medical conditions or gender, and offer minimum standards. The sweeping changes brought forward with this Act are designed to make health care more affordable for citizens, thereby reducing the number of citizens requiring publicly available health programs (e.g., Medicare). The broad, public policy implications of the Act are still unfolding in the United States and will likely influence and transform payment and service delivery systems for patients, providers, and system funders.

Payment for services has included fee-for-service models and managed care models. Fee-for-service models give consumers the flexibility to see any provider or specialist they choose. Payment for services rendered is either out of pocket by the consumer, or is covered through private insurance, a percentage of which is refunded by the insurance company (often 80 percent) usually after a yearly deductible has been paid. Coverage through private insurance sometimes will also include a consumer co-payment. The National Commission on Physician Compensation Reform in the United States has recommended moving away from fee-for-service systems for physician compensation, suggesting a gradual transition to fixed-payment models (Schroeder & Frist, 2013). This payment reform has been suggested as an element of more holistic health care reforms in the United States in recognition of long-term challenges with system sustainability (Ho & Sandy, 2014); however, as noted by Ginsburg (2012, p. 1977), “the core method of payment to many physicians for the services they provide is likely to remain fee-for-service.”

In a managed care system, governments or employers negotiate and purchase health insurance coverage from a management care organization. The organization to whom care has been delegated integrates basic

functions of health care delivery, employs mechanisms to manage utilization of medical services, and determines what services cost and what providers are paid (Shi & Singh, 2012). Consumers are incentivized to use network providers (e.g., through lower co-payments) and can be financial penalized if they do not use the health providers within their network. Consumer choice is largely influenced by whether services are covered by insurance and whether providers are available at locations which accept a consumer's insurance plan.

Due to this mixed system, health care delivery in the United States is in fact only partially governed by free market forces of supply and demand (Shi & Singh, 2008). However, traditional market forces are still evident in the seeming consolidation among providers and institutions felt to be causing rising health prices which could exacerbate the already high pressure on third-party and private purchasers of health services. Ginsburg and Pawlson (2014) suggest that this consolidation can be mitigated by private and public-sector tools including redesigns of health system networks and stricter antitrust policies. It is worth noting that the Accountable Care Act was just being implemented when this study was conducted.

Dominant Health Innovation Focus

We now present the health innovation analysis across the eight jurisdictions in the study, noting linkages between country-level characteristics and the focus of domestic health innovation.

Australia

The geographic size of Australia and the distinct rural/urban split makes patient access to care a significant challenge. To improve patient access and population health outcomes, innovation in Australia has focused on shifting from acute care to a more decentralized, community-based care model. This has involved fostering innovation that strengthens primary and rural health care and leverages health information technology (IT) to achieve innovative ways to redesign health services.

From a health system perspective, Australia has been focused on the integration of health systems and care coordination largely in remote and rural locations. General Practice Networks (GPNs) receive funding from the Australian government and other sources with a specific mandate to improve the health of Australians by supporting local physician practices, improving care coordination, and facilitating national programs in health

promotion, early intervention and prevention, chronic disease management, mental health, and aged care. This is accomplished through a network-based approach to care coordination. There are now at least 111 GPNs covering all of Australia with a collective membership of over 90 percent of Australia's General Practitioners (GPs).

Rural health innovation has focused on attracting and retaining rural physicians to practice in remote communities by creating a practice infrastructure for physicians. Doctors practicing in these facilities are able to determine their hours of work, services, and fee policies, which is more attractive to GPs since it enables them to work as clinicians without having to own and manage their own medical center or make upfront financial investments. This model has succeeded in solving medical workforce issues in rural communities by both attracting and retaining doctors, as well as facilitating greatly expanded ranges of medical, nursing, and allied health services in the medical centers it supports.

Telehealth technology has facilitated the transition of a primarily acute care system to a decentralized health care delivery model in a number of international jurisdictions (Kazley et al., 2012). Australia has invested heavily in telehealth where medical consultations via video conferencing are fully funded by the Medicare system. Moreover, incentives are provided to practitioners for using telehealth technology in their practice including startup costs of installing the technology and compensation for physicians, nurses, midwives, or Aboriginal health workers. Services are available for patients at rural GP clinics and health facilities, as well as Aboriginal Medical Services locations and aged care facilities. Australia is striving for half of a million telehealth consultations by 2015 (Aged and Community Services Australia, 2011).

While enjoying one of the highest life expectancies in the world and strong health outcomes relative to expenditures, Australia's innovation efforts are enjoying success within a nationalistic health governance model.

Britain

British innovation has focused on the role of the GP as the central figure in managing care coordination and directing funds to achieve health service coordination. One of the most significant innovation strategies in Britain is the Unique Care program (Unique Care, 2011). This program supports frail, elderly, and high-risk populations to maintain health and independence at home, while reducing the rate of hospitalization and emergency department admissions. Unique Care is a case-management approach that coordinates social services and health care for citizens who are at-risk for

entering into a hospital for chronic illness management. In this model, all referrals are directed to a practice-based Unique Care team who manages all medical and social needs of the patients. If a patient is admitted for an acute medical problem, the hospital informs the Unique Care Team of the admission who works with the hospital to coordinate care for when the patient is discharged. Initial outcomes for this integrated care model have been documented at a pilot hospital and show a substantial reduction in the number of bed days for people over 65.

The Virtual Ward is another innovation initiative that supports the drive toward strengthening health services in communities as a strategy to manage chronic illness (Lewis, 2011). A Virtual Ward is a group of patients with long-term conditions and complex needs who receive care similar to that in a hospital ward, but at home. Each Virtual Ward has nurses, social workers, physiotherapists, occupational therapists, a pharmacist, and award administrator. According to The King's Fund's report on Avoiding Hospital Admissions, there is evidence that Virtual Wards have the potential to be cost-effective, reducing costs through lowering hospital admission rates (Ham, Imison, & Jennings, 2010); however, these findings are based on very preliminary results.

Practice-based commissioning (PBC) has been used in Britain since 2004 as a means to devolve responsibility for commissioning health care services for patient populations to frontline clinicians in general practice. This innovation strategy mobilizes the role of the GP as the "hub" for navigating and managing care in communities. GPs are empowered in decision-making roles to improve care coordination by managing patient pathways and referrals to hospital-based specialists as well as cross-sector collaboration between health and social services. GPs can use their commissioning process to challenge entrenched approaches to the provision of care and to reshape the boundaries between primary and secondary care to improve the patient's experience with the health system (Carr, Sangiorgi, Cooper, Buscher, & Junginger, 2010). Emerging criticisms of this approach include high management costs, concerns whether GPs have the appropriate leadership skills for effective commissioning, and the design of service processes.

Britain has also implemented web-based tools for consumers. The National Health Service (NHS) introduced the electronic Choose and Book service to enable patients to choose and book their first outpatient appointments at a time and date convenient for them (NHS Information Technology, 2009). The organizational impact of the Choose and Book service is linked to reduced wait times, fewer "no-shows," improved speed

of referrals, and improved quality of service delivery. They have reported a 75 percent reduction in turnaround times for consultations with specialists (NHS Information Technology, 2009); however, the system has had limited uptake due to the perceived time-consuming administration.

Britain has one of the lowest per capita rates of expenditure among all of the eight comparator countries, yet it also reports and exemplifies one of the most active records of innovation among the OECD group studied. The focus of innovation in Britain is the shift toward community-based management of chronic illness as a strategy for decreasing reliance on hospital-based services, which are more expensive and limited in capacity. The substantial focus on mobilizing health services to keep patients at home, improving quality of health care in the community, and avoidance of hospitalization is distinct among the eight OECD countries in this study.

Canada

In Canada, innovation as a strategy for health system reform ranks among the lowest of the comparator countries in this analysis (Conference Board of Canada, 2010; McKinsey and Company Canada, 2008). Thus, evidence of impact of innovation on health systems is limited to two strategies: strengthening primary care and managing access to care with the use of IT. Given Canada's devolution of health care to its provinces, we focused on innovations existing across Canada's largest provinces.

Primary care innovation is emerging in three Canadian provinces: Ontario, Quebec, and Alberta. In the two most densely populated provinces (Ontario and Quebec) innovative models of primary care have been implemented to support integration of care and strengthen primary health care more broadly. Since 2002, the Health Ministry of Québec has been implementing the Family Medicine Group model (Vedel, Monette, Beland, Monette, & Bergman, 2011) as a way to strengthen primary care in the province. These family medicine groups consist of 6–12 physicians supported by nurses and nurse practitioners and in some cases nutritionists, mental health professionals, and other allied health professionals. The groups take care of large patient populations of 1,000–2,000 patients per physician (Vedel et al., 2011).

Similarly, Ontario has implemented the Family Health Team (FHT) model to strengthen primary care services by improving access, encouraging continuity of care (as patients select and formally register with an FHT), and increasing the focus on health promotion (Rosser, Colwill, Kasperski, & Wilson, 2011). FHTs enhance access by providing evening and weekend clinics, after-hours on-call care, and establishing same day

appointment systems. Financial incentives in the form of bonuses encourage FHTs to provide preventative services such as immunizations and cancer screening (Rosser et al., 2011).

Challenges faced by both Quebec and Ontario include a slow uptake by physicians and its dominant fee-for-service payment scheme (in the Quebec approach) which presents barriers such as case management and care coordination. In addition, these models have experienced difficulty developing true interdisciplinary team work.

The province of Alberta has focused on chronic disease management programs (DMPs) as a way to move the health system away from acute, episodic care toward a proactive and multidisciplinary care approach. Alberta's program is built around an "expanded chronic care model" and places emphasis on developing structured care plans as a way to achieve quality outcomes. Patient pathways and workflow are carefully planned and service agreements are used to define roles and responsibilities for provider teams, patients, and their families. Patient self-management is an important part of the program and health professionals are provided with the training and tools they require to support self-management. There is emerging evidence of the program's success in Calgary, one of Alberta's two major urban centers with a 41 percent decrease in hospital admissions and a 34 percent decrease in emergency department visits at one-year of follow-up (Delon & Mackinnon, 2009).

Other Canadian innovations include telehealth applications similar to those in Australia. The use of Ontario's telemedicine network (OTN) is one of largest in the world with access available from all hospitals and numerous other health care facilities across the province. In addition to providing access to care in remote areas of the province, the network aids in providing access to distance education. Innovative applications of the network include stroke, chronic obstructive pulmonary disease (COPD), psychiatry, pediatrics, and dermatology programs offered through telephone and video-conferencing systems. The limitation of this innovation is that it has not been implemented across all of the province's health partners and there is limited evidence of the impact of telehealth on health outcomes or health system productivity.

Canada's innovation strategy to date has been restricted in its focus on creating strategies in communities for chronic illness management with limited attention to actively engaging consumers in managing their own care. Canada continues to subscribe to the "State as Owner-Operator" of health systems where the consumer is the primary recipient of care and not an active participant and manager of their own health and wellness.

France

France has focused its innovation approach on strengthening primary care service delivery models with 24/7 accountability for its entire population. The French initiative, “SOS Médecins,” is one of the longest running model of after-hours care operating since 1966. The service provides after-hours care for everything from emergency care to less urgent medical checkups. SOS Médecins call centers are open 365 days of the year, 24 hours a day. This is a private provider model of care but patients are later reimbursed depending on their social insurance benefits package. Most doctors employed by SOS Médecins are contracted GPs. They are held personally responsible for their actions and organize their “on-call” hours with colleagues in their area. When a call comes into SOS Médecins, a dispatcher will triage the patient before dispatching a physician, and care is delivered directly to patients in communities when needed. Each year, SOS Médecins’ 1,000 doctors answer 4 million calls and make about 2.5 million home visits across France.

France also has taken a number of steps in the management of patients with chronic conditions (Nolte, Knai, & McKee, 2008). Patients with chronic and long-term conditions are exempt from co-payments on treatments for their long-term diseases provided that appropriate care protocols are in place. This helps to ensure that care plans are made mandatory for chronic patients. GPs have responsibility for putting these care protocols in place and receive payments to provide this coordination. It is estimated that approximately 80 percent of people with diabetes in France receive care within these protocols.

The French system is one of the most extensive and productive primary care innovation strategies among all eight comparator countries. Chronic illness management has been implemented using financial models that incentivize and support consumer engagement in managing their health and wellness, particularly. France has one of the highest rankings on consumer satisfaction relative to health system costs per capita; however, the impact of innovation on health system outcomes is not well documented and health system innovation remains challenging given the strong culture of fee-for-service models of reimbursement among physicians.

Germany

Germany has focused its innovation initiatives on transforming chronic illness management in communities to support approaches that engage both providers and consumers. This has been primarily achieved through the use of financial incentives for providers and patients. It also has begun

to leverage IT as an innovation strategy to support the redesign of health services to achieve transformational change.

Disease management programs were introduced into the German health system in 2002 with the support of legislation that aimed to improve quality of care (Busse, 2004). There are currently DMPs for six major chronic conditions, each with recommendations that specify treatments according to evidence-based guidelines, quality assurance measures, procedures for patient enrollment, training for providers, and requirements for documentation and evaluation of outcomes. Participation in DMPs is voluntary but exemption from outpatient fees and co-payments encourages patient enrollment. Providers are also incentivized via lump sum payments.

Given that primary care physicians take on the role of coordinating care for enrolled DMP patients, the programs are helping to reinforce the focus on primary care and chronic disease management in the German health system. One of the DMPs is for the management of type 2 diabetes; since 2003, over 2.5 million patients have actively enrolled and participated in diabetes care. Szecsenyi, Rosemann, Joos, Peters-Klimm, and Miksch's (2008) study found that there were significant differences between patients who enrolled in this program compared to those who accessed traditional care. Enrolled patients reported significantly better involvement in decision-making, greater understanding of their care, improved goal setting, more confidence in their treatment plans based on their specific circumstance, and demonstrated improvements in follow-up and coordination of care. The next steps in the German DMP system is to adapt DMPs for multi-comorbidity, to gather more evidence of their impacts on clinical outcomes, and to determine how to balance DMP standards against the needs of local communities.

Innovation in the German system is consistent with other countries in the "State as Guardian" social insurance type of health care system. The focus of these countries is strengthening primary care and management of chronic illness in communities. The use of health IT in the form of Smart Cards in Germany engages consumers further in managing and communicating their own health information. Although the concept of the Smart Card is very innovative, the uptake and adoption of the card system in Germany faces challenges. Confidentiality and security features are currently undergoing review, and the range and extent to which health data is available on the card remains a limitation.

The Netherlands

The Netherlands underwent a major health system reform in 2006. Two strategies the Dutch have pursued in their innovation agenda include

shifting health systems from a dominant acute care model toward a community-based care models that engage consumers directly, and innovations that strengthen chronic illness management.

The consumer engagement strategy is referred to as “Dutch Personal Health Budgets,” which builds on the existing structure of the social insurance health system that relies on market mechanisms of competition and consumer engagement in purchasing and negotiating their own health care services (Kremer, 2006). Budgets help cover personal care and daily living, nursing care such as help taking medicines, support services such as daycare or rehabilitative care for managing a disability, and short stays away from home including respite care. There is some cost sharing involved but the benefits for patients include choice of carer(s) and increased adherence to their prescribed regimens. Consumers manage their personal health budget to plan and negotiate their own personal health care services. Low, Yap, and Brodaty (2011) suggest that consumer-directed coordination of care has been gaining attention as an alternative to the more common agency-directed care; it gives consumers greater control and responsibility for their own care coordination by allowing them to make their own choices in selecting service providers and hiring care staff using either spending vouchers/credits or the cash provided to them.

The second innovation strategy in the Dutch system focuses on strengthening primary care by restructuring accountability of physicians to offer care with 24/7 responsibility for their patients. After-hours care in the Netherlands is now organized in large-scale primary care physician cooperatives in which 40–250 GPs take care of patient populations ranging from 100,000 to 500,000 (Uden, Giesen, Metsemakers, & Grol, 2006). GPs are paid per hour while on-call to provide telephone consultations, supervise triage assistants, see patients, and make home visits (via chauffeured cars that are fully equipped with infusion drips and defibrillators) (Uden et al., 2006). However, one problem with the after-hours cooperatives is the wide variation in consultation fee prices, which have been reported as ranging from €35 to €184 (Westert, Van den Berg, Zwakhals, De Jong, & Verkleij, 2011).

The innovation strategy in the Dutch system acknowledges the importance of leveraging consumer engagement to support patients managing their own health care services and takes advantage of market competition to reduce costs and stimulate competitive approaches to health care service delivery. Quality outcomes following the Dutch reform have resulted in improved survival rates, reduced mortality rates, fewer hospital admissions,

high practitioner conformity with quality guidelines, and high satisfaction rating from Dutch citizens.

Switzerland

Innovation in the Swiss health care system is much more narrowly focused than other countries with social insurance models of health care, concentrating primarily on cost containment and consumer education. Evidence of the impact of innovation in Switzerland is limited; the Swiss health system is not as highly regulated as other countries and quality outcomes are not as well documented.

Swiss Physician-Pharmacist Quality Circles (PPQCs) commenced in 1997 as a pilot project; as of 2009, PPQCs were operating in eight different Swiss cantons. The primary goal of the quality-circle initiative is to improve prescription practices among GPs in order to achieve costs savings without compromising quality of care. Each quality circle has 3–10 prescribing GPs and is moderated by a specially trained community (retail) pharmacist. The PPQCs meet regularly, educating each other on practice guidelines, discussing risk/benefits of drugs in several drug classes, exploring their prescribing patterns together with issues of use and overuse, and sharing attitudes toward such practices as antibiotic use for common infections. An important part of the work of PPQCs is to use data from insurance companies and Sickness Fund billing offices to benchmark prescription data of their GPs for both internal comparison as well as comparison to other PPQCs. Niquille, Ruggli, Buchmann, Jordan, and Bugnon (2010) examined the impact of the Swiss PPQCs and demonstrated that the model has been successful in improving vigilance and awareness of pharmaco-economics among participants. They found that between 1999 and 2007, the average drug cost per patient had increased by 74 percent for nonparticipating physicians and only 32 percent in the PPQCs, translating into a saving of \$225,000 per GP. The study reported that if all Swiss GPs adopted the approach of the PPQCs, more than \$785 million in savings could be realized.

While the Swiss health system has achieved unique and impressive innovation in pharmacare management, the current challenge for Switzerland is to find a way to more successfully implement the patient education process in a system where governance is highly regionalized and where adoption of initiatives is almost entirely voluntary. To gain more insight into patient literacy, Switzerland created the Swiss Health Literacy Survey (HLS CH). The first of its kind in Europe, the HLS CH has been identified as a model for adoption in other jurisdictions and for a broader European Health Literacy Survey.

The Swiss health system has achieved unique and impressive innovation and savings in pharmacare management through the PPQC program. This innovation, combined with the Swiss system's strong support for consumer empowerment based on consumer choice, knowledge translation and trust, and health literacy creates a unique and important model from which other countries can learn.

United States

The unique private health care system of the United States limits access to health care based on the ability of the consumer to purchase health insurance. Innovation in the United States has focused primarily on system integration, continuity of care, and use of health IT to support innovation in health service delivery. Given that the U.S. system is largely consumer driven, it readily adopts new technologies as a strategy for attracting privately insured patients and generating revenue.

There are a number of states in the United States which have focused innovation efforts on integration of health care services to provide continuity from primary care through acute care hospital settings and to community settings following discharge. These include the Geisinger Health System in Pennsylvania, and the State of Vermont's Integrated Health Services (IHS) model. The Geisinger Health System (Geisinger) in Pennsylvania is considered an integration pioneer, operating on a hub and spoke model of 250 primary care physicians located within community (the spokes) and 450 specialists located in major hospital (the hubs) which streamlines communication between acute and primary care providers. Geisinger provides for round-the-clock primary and specialist care, nurse care coordinators, virtual care-management support, home-based monitoring, and a "personal care navigator" to respond to inquiries and manage care in the community. Performance improvement efforts remain ongoing for all parts of the system; however, there is little empirical evidence of health system outcomes of this model (Paulus, Davis, & Steele, 2008).

Similarly, the State of Vermont has implemented their IHS model supported by multidisciplinary Community Health Teams (CHTs) which engage health consumers and supplement the care typically offered in physician practices with nutrition counseling, health and wellness coaching, mental health services, home visits, and social service referrals. Coordination of community-based care support has used electronic health records, electronic prescribing, and patient tracking and registry functions to support the integrated approach to care in this model (Bielaszka-DuVernay, 2011; Seaver, 2009). The early effectiveness of this model was documented at one

pilot site and demonstrated impressive results including a 33.8 percent decrease in the rate of change for emergency department visits, a 23.9 percent decrease in the rate of change for inpatient admissions, and a 11.6 percent annual decrease in costs ([Vermont Blueprint for Health, 2011](#)).

Health innovation in the United States has also focused on IT including information sharing between patients and providers. One example is the Diabetes Connected Health (DCH) application developed at Massachusetts General Hospital. This is a remote blood glucose monitoring application which consists of a website that allows patients to upload glucometer readings from commercially available glucometers so that it can be viewed by their health practitioner. The website also allows patients to add comments to each reading (e.g., foods consumed). The glucometer readings are stored and graphically presented by the application so that the trends of the readings can be viewed and discussed between patients and health providers. Results of trials have shown that patients were more motivated knowing that providers were monitoring their results or even just acknowledging their efforts in managing their disease. Patients also reported increased awareness of their blood sugar levels and a better understanding of the effects of dietary intake on blood sugar, thus helping them to be more successful in self-management ([Watson et al., 2009](#)).

The focus of innovation in the United States is largely on the use of technology to integrate care from hospitals to communities, and to streamline communication and access to information for patients and families. Innovation efforts focused on integration of care services and the use of IT to engage consumers and streamline health services has offered little relief to the challenge of uninsured Americans with no access to health care. However, the integration of care may be achieving decreased demands on resource-intensive acute care services.

Health Governance Models and Health Innovation Linkages

An examination of the innovation focus across these 8 jurisdictions originally led to the creation of 16 categories that captured a broad range of health innovations. This preliminary list (as presented in [Table 1](#)) was further coded into seven themes that reflect the dominant areas of health innovation discovered in the countries in this study. These themes included: electronic/mobile technology tools and IT; health literacy; increasing access to health services and practitioners; collaboration among practitioners; performance metrics; cost efficiency; and choice in health coverage.

Following the creation of the seven innovation themes within countries, an analysis between countries was undertaken to determine whether there were patterns of innovation focus related to the three governance structures (guardian, owner-operator, and mixed) to create overarching between country innovation themes. The structure of the health systems in each comparator country revealed important features of these health systems that differ substantially in terms of whether the government “owns and operates” the system or simply “oversees” the health system in a guardian role to ensure all citizens have access to basic health care services. There were four overall themes identified through this between country analysis: the culture of consumer engagement in health systems; the integration of health services across the continuum of care; accountability for health care at the community; and financial models that drive competition across health systems. Each of these themes is described below.

Culture of Consumer Engagement

Consumer engagement in health care services was a defining feature of innovation in most countries. In “State as Owner-Operator” health systems (Australia, Britain, Canada), the focus of health system innovation was on the redesign of health services primarily to achieve cost savings and efficiencies. These systems tended to rely on more traditional provider-centric models where consumers were the recipients of care and had little choice regarding health services. In “State as Guardian” (social insurance) models of health systems (Germany, France, Switzerland, and the Netherlands), there was a substantial reliance on consumer choice to select health care services accessed through private insurance companies, with active consumer engagement driving competition. Social insurance models view consumers as decision-makers who are actively engaged in managing their own health and wellness. Provider-centric governance models do not have the benefit of leveraging consumer choice to achieve transformational change in the health system. Countries that strengthened the engagement of consumers in managing their own health and wellness directly were also countries that reported the lowest hospital occupancy rates and the lowest average lengths of stay in acute hospitals (Snowdon, Schnarr, Hussein, & Alessi, 2012). The power of consumer choice and competition may be a key driver achieving system redesign that is centered on consumers who are actively engaged in new and different ways to manage their personal health and wellness.

Integration of Health Services across the Continuum of Care

While there has been substantial progress toward shifting health care services toward more robust community-based models of care, the integration of health services across the continuum of care remains a challenge in every country in this analysis. A continuum approach was most highly developed in the countries with governance models based on social insurance such as Netherlands and Germany. In contrast, Australia and Canada focused more directly on strengthening access to primary health care in rural and remote populations with less focus on improved integration of health services across the health spectrum.

Increased Access to Health Services in Communities

In a number of countries, innovation approaches were focused on redesigning health services to provide access to care on a 24/7 basis. Britain, Australia, France, and the Netherlands have redesigned primary care accountability structures to mandate and fund primary care physicians to provide round the clock health services to all citizens, demonstrating impressive reductions in patient volumes of emergency room visits and specialist care from a more efficient use of health system resources. This innovation in 24/7 accountability is evident in social insurance based health systems (France, the Netherlands) and national (Australia) health systems alike, although there currently is no equivalent in Canada.

Financial Models that Drive Competition

Countries that demonstrated a substantial shift toward community-based health services were able to do so as a result of creating financial incentives and new financial models to drive innovation. For example, Australia incentivizes GPs to practice in remote settings and use telehealth services to manage remote population health needs. Germany uses incentives for both physicians and consumers to participate in DMPs in communities, and France incentivizes patients and their GPs to coordinate chronic illness management that is free from co-payment and incentivize physicians to achieve quality outcomes. Both the Netherlands and France have developed specialized financial models for primary care physicians to provide 24/7 access to care in communities. Indirectly, financial incentives may also play an important role in social insurance models where market competition for consumers drives new service delivery models that are attractive and desirable for consumers. In the United States, the primary competitive strategy to attract health consumers was the availability of high technology

Table 2. Summary of Governance Model and Key Innovations by Country.

Country	Governance Model	Key Innovations
Australia	State as Owner-Operator	• General Practice Networks • Telehealth
Britain	State as Owner-Operator	• <i>Unique Care</i> models to support frail, elderly, and high-risk populations at home • <i>Virtual Wards</i> • Practice-based commissioning has been used to mobilize the role of the GP as the “hub” for navigating and managing care in communities • <i>Choose and Book</i> web-based tool for appointment scheduling
Canada	State as Owner-Operator	• Family health teams that include health practitioners from a variety of practice areas • Shift from acute, episodic care toward a proactive and multidisciplinary care approach
France	State as Guardian	• Telehealth • Unrestricted access and choice of medical providers • 24/7 medical care through SOS Médecins • Co-payment exemptions for patients living with chronic illnesses and long-term conditions
Germany	State as Guardian	• Disease management programs • “Smart Cards”
The Netherlands	State as Guardian	• Personal health budgets • 24/7 primary care access • Chronic illness management
Switzerland	State as Guardian	• Physician-Pharmacist Quality Circles (PPQCs) • Swiss Health Literacy Survey
United States	Privatized Mixed Model	• Integrated Health Services model supported by multidisciplinary Community Health Teams that engage health consumers through nutrition counseling, health and wellness coaching, home visits, and social service referrals • IT applications including remote physiologic monitoring to record vital signs, patient portals to support patient data capture, virtual outreach and consulting, and on-site and remote scheduling

and advanced specialist care, most often associated with acute care services.

The degree to which the consumer can be active in decisions to select health services has important implications for the influence of competition underlying health system governance structures. Within universal health systems, consumers tend to have a more passive role as recipients of care as compared to social insurance models where consumers determine the health services they will access by purchasing the private insurance coverage that best suits their health needs. A more active consumer role may drive competition in the health service market place, potentially offering a distinct advantage to the health innovation agenda among these comparator countries. [Table 2](#) provides a summary of the eight countries in the study, their model of health governance and key innovations.

DISCUSSION

This cross-country comparative analysis has an early glimpse into linkages between health system governance models and health innovation in eight OECD countries. While no single country has managed to completely transform its health system to achieve sustainability (health system costs continue to outpace growth in GDP in every country), a number of countries have made impressive strides to improve the quality of care delivered and health outcomes for the population through national innovations. This research is intended to be a catalyst for dialogue among health system leaders, consumers, health professionals, and health stakeholders as a basis for better understanding of how governance frames could inadvertently limit the success of national innovation policies. It works to supplement the research done by organizations such as The Commonwealth Fund, the Conference Board of Canada, the Institute for Global Health Innovation in Australia, and the World Innovation Summit for Health (WISH) who support a global approach to exploring health innovation.

There are a number of insights that can be taken from this research. A consumer-driven culture may transform the current, traditional, highly “prescriptive” approach to health care in jurisdictions such as Canada, to one that places consumers at the center and drives change through consumer engagement. In a consumer-centric culture, the balance of power shifts from the health provider to the consumer. Consumers take charge of managing their own health and wellness, and health professionals assume

a supportive role of coach and mentor to focus on creating the environment and conditions for consumers to be empowered to achieve their personal health and wellness goals. Key strategies to achieve this cultural shift may include engaging consumers directly in the choice of providers and selecting health services that meet their personal health and wellness goals. Such a system must be supported by information technologies to track health care service utilization, spending at the individual level, and programs and tools that improve the health literacy of populations.

A consumer-centric culture in health systems will require the next generation of health professionals to be trained as expert coaches and mentors who use entrepreneurial thinking and leadership to drive change and innovation adoption to transform health care environments. This will require a transformation in health provider compensation to recognize and reward new ways of provider–patient engagement. Creating financial incentives using insurance programs or implementing personal health budgets (such as those in the Netherlands) may empower consumer decision-making to drive competition and innovation among health system stakeholders may influence the pace of health system change.

Finally, countries in this study who have introduced innovations that support a shift from a dominant focus on acute care to a community-based system focused on chronic illness management and prevention have been able to demonstrate substantial improvements in reducing the reliance on acute care services to manage chronic illness exacerbations, particularly among the elderly. Integrated models of care are well supported by accountability systems that incentivize or reimburse health providers based on achieving quality outcomes for their patients. Comprehensive care that is accessible 24/7 supports a coordinated and integrated approach to chronic illness management across the continuum in a seamless system of care delivery.

While each of the eight OECD countries in this study were examined for evidence of country-wide health system innovation as a means of meeting their unique health system challenges, a limitation of this analysis is the reliance on published literature that describes innovation initiatives in each comparator country. We selected developed nations as our sample to mitigate this limitation. As such, the system level profiles of innovation in each country have yielded a high-level view of patterns and themes across the comparator countries which may offer important evidence to inform and shape health innovation policy agendas and tangible actions in the future.

The choice to focus on highly developed nations is in itself a study limitation. There may be other countries, both developed and developing, that

would provide additional insight into the pattern between health governance structures and the focus of innovation. However, use of highly developed nations aids in keeping social determinants of health largely constant. Additional insight could be gained by looking at countries such as India with its largely cash-based, fee-for-service model and examples of low-cost yet highly effective innovations.

Another limitation of this study is the focus on patterns of innovation as opposed to tracking a specific innovation from country to country in order to ascertain differences that may be attributable to governance models. This choice was deliberate; the goal of this research was not to focus on specific innovations but rather to uncover country-wide innovations within countries and use that insight to find patterns across the three health governance models included in this study. A complimentary study could involve selecting a specific innovation that appears in multiple jurisdictions (e.g., the shift to 24/7 care by health practitioners) and performing an in-depth analysis of differences and similarities. This focus on a single innovation could also be performed within countries with devolved health governance accountabilities (such as Canada) or in jurisdictions where there is some regional autonomy in health choices (such as the United States). While this study used a country-level of analysis, future research could take the perspective of provider groups, community organizations, or institutions in order to determine the influence of the organizational level on innovation choice.

This study is an initial foray into understanding the relationship between health governance models and country-level innovations. An important next step will be to look for legislative and regulatory elements which are the building blocks of health governance systems that may directly impact the success of emergent innovations, or create path dependencies for innovation creation. This could include institutional elements such as health sector procurement. In addition, there is a need to continue to gather and share evidence on the existence of national innovations in managing the increasing demand for health care. An evidence-based approach will provide greater certainty around the value-add of health system innovations, leading to broader innovation translation and adoption globally as the return-on-investment in terms of clinical outcomes to country-level populations becomes more evident.

NOTE

1. We thank an anonymous reviewer for suggesting this clarification.

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GOOD PRACTICES IN HEALTH CARE “MANAGEMENT EXPERIMENTATION MODELS”: INSIGHTS FROM AN INTERNATIONAL PUBLIC–PRIVATE PARTNERSHIP ON TRANSPLANTATION AND ADVANCED SPECIALIZED THERAPIES

Maria Cristina Longo

ABSTRACT

Purpose – The research analyzes good practices in health care “management experimentation models,” which fall within the broader range of the integrative public–private partnerships (PPPs). Introduced by the Italian National Healthcare System in 1991, the “management

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experimentation models” are based on a public governance system mixed with a private management approach, a patient-centric orientation, a shared financial risk, and payment mechanisms correlated with clinical outcomes, quality, and cost-savings. This model makes public hospitals more competitive and efficient without affecting the principles of universal coverage, solidarity, and equity of access, but requires higher financial responsibility for managers and more flexibility in operations.

Methodology/approach – *In Italy the experience of such experimental models is limited but successful. The study adopts the case study methodology and refers to the international collaboration started in 1997 between two Italian hospitals and the University of Pittsburgh Medical Center (UPMC – Pennsylvania, USA) in the field of organ transplants and biomedical advanced therapies.*

Findings – *The research allows identifying what constitutes good management practices and factors associated with higher clinical performance. Thus, it allows to understand whether and how the management experimentation model can be implemented on a broader basis, both nationwide and internationally. However, the implementation of integrative PPPs requires strategic, cultural, and managerial changes in the way in which a hospital operates; these transformations are not always sustainable.*

Originality/value – *The recognition of ISMETT’s good management practices is useful for competitive benchmarking among hospitals specialized in organ transplants and for its insights on the strategies concerning the governance reorganization in the hospital setting. Findings can be used in the future for analyzing the cross-country differences in productivity among well-managed public hospitals.*

Keywords: Good practices; management experimentation models; health care system; international public–private partnership; hospital-level outcomes; biomedical advanced therapies

INTRODUCTION

This research aims to analyze good practices implemented by the so-called “management experimentation models,” which were adopted by the Italian National Healthcare Service to support the growth, research, and innovation in public hospitals.

Introduced by the law no. 412/1991, this model is a form of integrative public–private partnership (PPPs), where the risk is shared between health care public and private operators; the property is separated while the assets remain in public ownership. Such integrative partnership is a long-term collaboration, which concerns the clinical services delivery and pursues both economic and social goals; thus, it aims at improving the quality of the care in compliance with the budgetary constraints. It is based on a public governance system mixed with a private management approach, on the involvement of several partners with different functions and roles, and on payment mechanisms correlated with the outcomes achieved. Thus, the “management experimentation model” makes the public sector more competitive but requires higher financial responsibility for the managers and for administrative directors and more flexibility in the operations.

In Italy the experience of health care public–private partnerships is limited (there are currently 51 cases). The recent literature is mainly focused on the regulatory and legal systems more appropriate for their regulation, on the issues concerning their economical and financial sustainability, and on the good management practices associated with better hospital-level outcomes. In the attempt to identify significant good practices examples and better understand how their key components can be leveraged more broadly to achieve greater efficiency in health spending, this research examines an Italian hospital that first adopted the management experimentation model.

The study refers to the Institute for Transplantation and Advanced Specialized Therapies (ISMETT) headquartered in Sicily (Italy), which is an exemplary experience of mixed public–private partnership, well established nationally and internationally. Specifically, the center is a “management experimentation model,” which started in 1997 from the collaboration between the Italian “Civico” and “Cervello” hospitals and the University of Pittsburgh Medical Center (UPMC – Pennsylvania). The latter is among the most renowned universities in the United States in the field of clinical experimentation, regenerative medicine, and molecular biology.

This Institute is the first hospital in Italy entirely specialized in organ transplantation (liver, kidney, pancreas, heart, and lung) especially for pediatric patients, multi-organ transplants, treatment of end-stage organ failure, and advanced therapies. It is also 1 of the 11 Italian centers accredited by the Joint Commission International (JCI), a not-for-profit care accreditation organization, for its clinical excellence recognized locally and abroad.

Following recent trends in the health care management area, the strategic value of this integrative PPP lies in the adoption of good management

practices in ISMETT, which are associated with higher quality of care and patient safety, reduction in waiting list, lower mortality rates, and better clinical performances. Among the key components, there are: unique value proposition based on a patient-centered approach; specialization of treatment; departmental organization for intensive care; adoption of the limited liability company; public control reinforced by transparency in the procedures; annual monitoring and no financial responsibility of the SSN; more autonomy and responsibility for managers and administrative directors; and payment and reimbursement mechanisms, which take into account outcomes, quality, and cost-savings, in addition to the diagnostic-related groups (DRG).

The recognition of ISMETT's good management practices is useful for competitive benchmarking among hospitals specialized in organ transplants and for its implications in the policies of clinical governance reorganization in the hospital setting. Findings can be used in the future for analyzing the cross-country differences in productivity among well-managed public hospitals.

GOOD PRACTICES IN THE HEALTH CARE MANAGEMENT AREA

Previous studies (Bloom & Van Reenen, 2010) have shown how differences in management practices are associated with productivity differentials among organizations. In particular, what makes a good practice in the health care sector is the presence of a strong correlation between hospital-level management score (operations and personnel management) and hospital-level outcomes.

The attempt to derive good practices is valuable since there is a positive correlation between best managed hospitals and clinical outcomes in terms of higher levels of patient satisfaction, reduction in risk adjusted 30 days mortality rates, better financial performance in terms of increase in income or in Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA) per bed, or other productivity indices related to the average number of patients or to the hospital reputation (Dorn, Savoia, Testa, Stoto, & Marcus, 2007; EHCR, 1996; Livingood, Coughlin, Bowman, Bryant, & Goldhagen, 2007; Morss Dy, 2007; PricewaterhouseCoopers (PwC), 2011c; Thacker et al., 2006).

In their report, Bloom, Homkes, Sadun, and Van Reenen (2010a) have found that hospitals with good management recorded high scores even in

other areas of the organization. Statistically significant differences in management scores are registered across countries with the United States, Sweden, Japan, and Germany at the top; the United Kingdom, France, Italy, and Poland in the middle; Portugal, Greece, China, and India at the bottom, but also among hospitals within the same country it is possible to find excellent and poorly performing organizations (Fig. 1).

The literature (Bloom, Dorgan, Dowdy, Sadun, & Van Reenen, 2007; Bloom, Homkes, Sadun, & Van Reenen, 2010a; Bloom, Propper, Seiler, & Van Reenen, 2010b; Bloom & Van Reenen, 2010; Glied, 2008; McKinsey&Company, 2007, 2012; Porter & Teisberg, 2006) identifies a number of factors, such as competition, size, skills, autonomy, and ownership structure, which are associated with the adoption of effective management practices in health care (Fig. 2).

The presence of competitors stimulates the search for higher productivity of the hospitals through the introduction of managerial standards. Positive effects of competition are related to potential alternatives for patients to choose from and to the substitution effect (Bloom et al., 2010b). Scale and size matter for the hospitals' growth as a consequence of the scale effect. Better-managed hospitals, especially those with more than 100 employees, have a tendency to grow in size, even in the absence of managerial incentives (Bloom et al., 2010a; McKinsey&Company, 2007).

Human resources are critical to high performance since hospitals are knowledge-based organizations. A McKinsey&Company report (2007, pp. 14–15) showed that hospitals with clinically trained managers achieve higher productivity outcomes and influence positively the overall managerial quality. Clinically qualified managers develop not only the ability to understand deeply the medical challenges but also a number of communication skills, which allow them to use the same language as the clinical staff. Qualified training at a point in time and over time improves managers' level of credibility and authority.

Among good practices applied in human resources management, it is common to select people on their merit, to recruit potential top performers by providing a very attractive and unique value-proposition, and to use an evaluation system, which rewards individuals on the basis of their performance with financial and nonfinancial benefits. Individual and group outcomes are well defined and monitored over time (McKinsey&Company, 2012; PwC, 2011c). Autonomy makes managers more responsible and encourages them to carry out their activities in a patient-centered way. Therefore, hospitals that give managers higher levels of autonomy point out better performance than more bureaucratic organizations (McKinsey&Company, 2012).

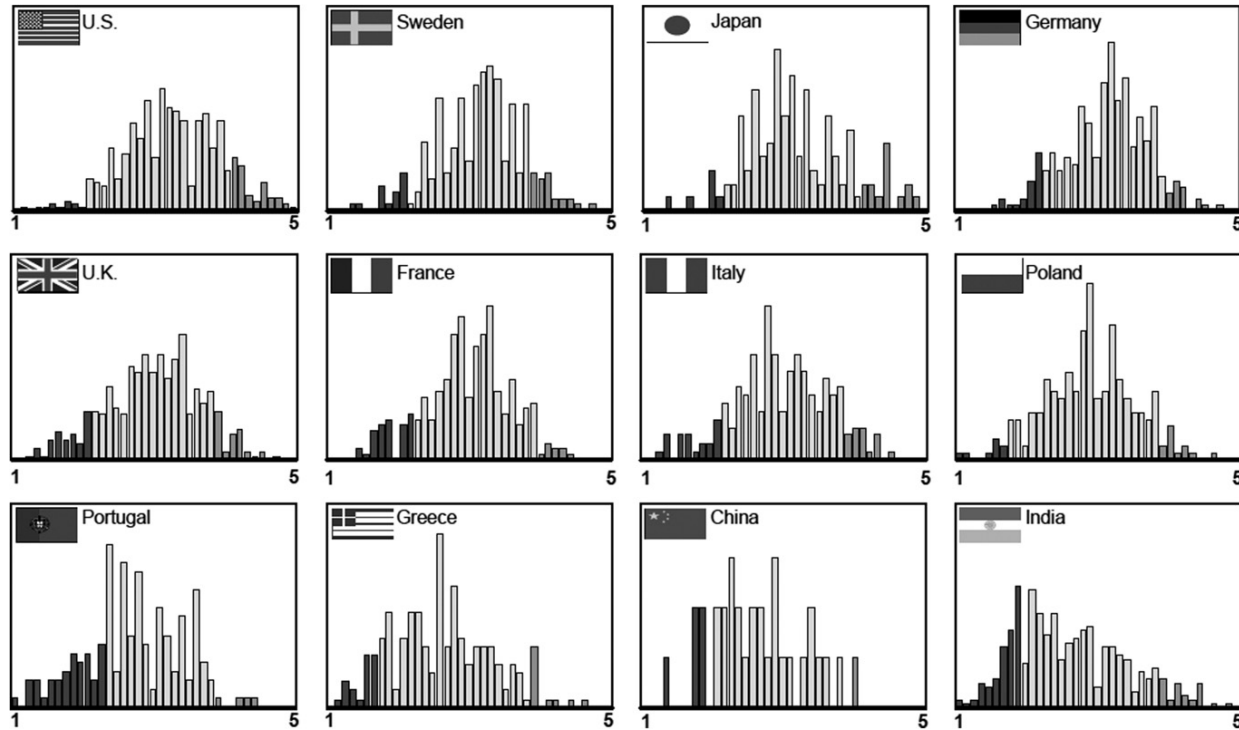
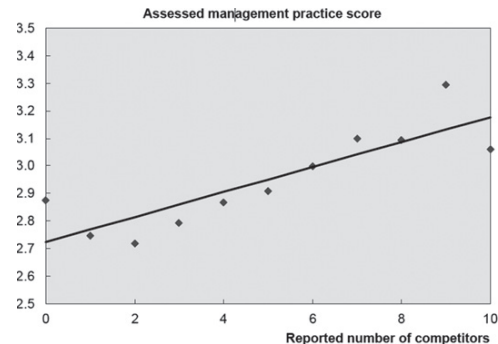


Fig. 1. Distribution of Firm Level Management Practice Scores — By Country. *Source:* Dowdy, Dorgan, Castro, and Kostuch (2010) (www.mckinsey.com/insights).

Competition vs. Management Practice Score



Labor Market Rigidity vs. People Management Practice score

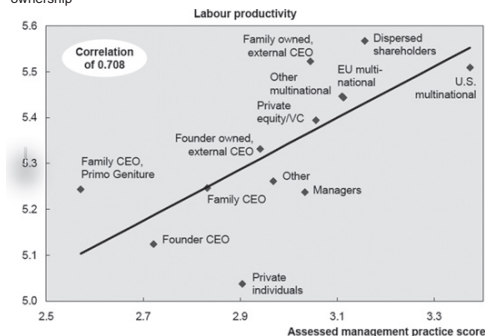


* World Bank "Employee rigidity index"

Source: World Bank; Management Matters dataset

*The rigidity of employment index measures the regulation of employment, specifically the hiring and firing of workers and the rigidity of working hours. The index ranges from 0 to 100, with higher values indicating more rigid regulations.
(source: <http://www.nationmaster.com/country-info/stats/Labor/Rigidity-of-employment-index>)

Productivity vs. Management Practice Score –by hospital ownership



Autonomy vs. Management Practice Score



Measured as the z-scored average of 4 questions: 1) Autonomy to hire a full time permanent nurse; 2) Autonomy to add more beds to the specialty; 3) Largest capital expenditures without prior authorisation from the CEO; 4) Autonomy to set own budget and make strategic investments

Fig. 2. Key Drivers Associated with Good Management Practice. *Source:* Elaboration from Dowdy et al. (2010) and McKinsey&Company (2007) (www.mckinsey.com/insights).

Private hospitals (including not-for-profit organizations) show generally better management scores compared to public hospitals (McKinsey&Company, 2007, pp. 19–20). This is due to the possibility for private hospitals of overcoming some of the restrictions applied to public hospitals regarding labor market regulation, staff recruitment and personnel management, supplier selection, price-fixing, performance management, economic and social goals, as well as internationalization of activities. Partnerships or multinational hospital corporations seem to generate better management scores and to promote cross-fertilization processes between international and domestic markets. Conversely, government-owned hospitals, which are more oriented to impartiality, uniformity, and transparency in the spending, report the worst performance (Bloom & Van Reenen, 2010).

Finally, several studies (Porter & Teisberg, 2006; Villa, Barbieri, & Lega, 2009; Vissers & Beech, 2005) have demonstrated the importance of logistic flows of patients, with regard to the need for planning, managing, and controlling both hospital areas and patient flows to ensure safety, effectiveness, and efficiency. During the diagnostic-therapeutic procedures, patients usually pass from one department to another: from emergency, to surgery, operating rooms, intensive care unit and area of hospital stay. The lack of control or an incorrect handling of incoming and outgoing flows can have a negative impact on the hospital performance as it can create delays, long waiting times, inappropriateness of the setting of care, prolonged hospital stays, waste of resources, staff activities overload, increase of the probability of error, as well as lack of integration between the acute and post-acute phases (Schneller, Smeltzer, & Burns, 2006).

Given the average annual growth rates of health spending for functions (Fig. 3), the organization of hospitals for intensive care is a critical element as well as an emerging good practice for a more effective management of the patient flows.

In this direction, recent hospital practices on operational management innovation take into account the following points:

- Reorganization of the hospital for intensive care;
- Redesign of the layout through the creation of centralized blocks or areas for the reception of the discharged patients (discharge the room);
- Adoption of the “lean thinking” approach for the processes redesign and the waste reduction;
- Activation of positions or offices for the control of operations;
- Reorganization of outpatient activity;
- Hospital-territory integration.

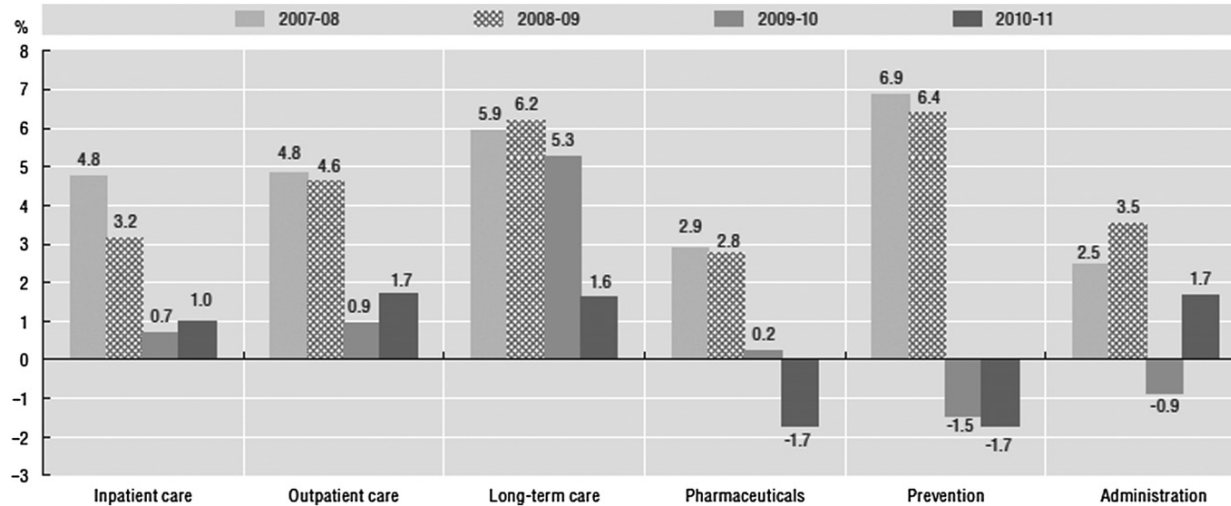


Fig. 3. Average Annual Growth Rates of Health Spending for Functions – OECD Average, 2008–2011. *Source:* OECD Health Statistics 2013 (<http://dx.doi.org/10.1787/health-data-en>).

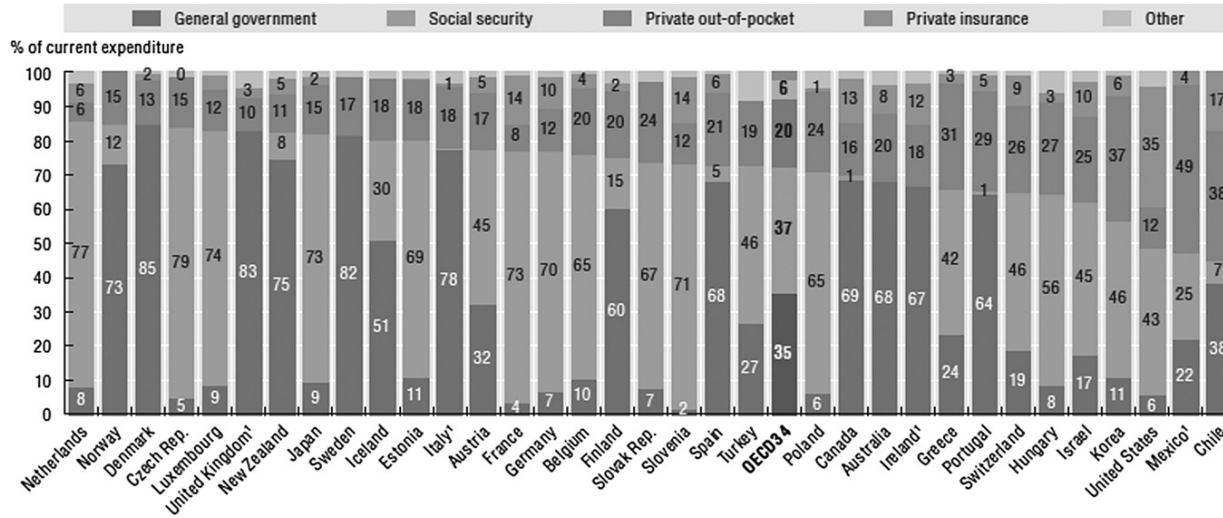
Therefore, there are significant areas where applying good practices may improve overall management scores of the public health system.

THE HEALTH SYSTEM CLASSIFICATION IN THE OECD COUNTRIES

According to the Organization for Economic Co-operation and Development (OECD, 2011), the health care system pursues a set of multi-level goals, not all of them reachable simultaneously. There is generally a trade-off between adequacy and equity; macroeconomic and microeconomic efficiency; quality and accessibility; acceptability and health care cost containment; opportunity for patients to choose from a range of service providers (doctors, hospitals), and autonomy of the service providers in defining terms of payment or access rules. The achievement of these objectives is related to the models used by each country to organize its national health system. There are several types of classifications deriving from one or more criteria (Bazzoli, Shortell, Dubbs, Chan, & Kralovec, 1999; Paccagnella, Rebba, & Weber, 2012). According to the ownership of health care providers (public, social, voluntary or charitable, private), the system can be public, private, for-profit, not-for-profit.

A second method provided from the OECD considers the nature (voluntary or mandatory) of funding and the primary source, which can be: general taxation to the state, country, or municipality; social health insurance or social contributions; voluntary or private health insurance; out-of-pocket payments; donations to charities. Fig. 4 shows the expenditure on health by type of financing.

By combining these criteria, it is possible to identify a number of models with different degrees of solidarity and financial risk: the “out-of-pocket” model; the “redemption” model distinguished itself in private (insurance companies) or public (mutual organizations); the “contract” model divided into private (mainly associations) and public (mutual); the “integrated” model subdivided into private financed prevalently by social contribution (insurance companies or associations), and public financed prevalently by taxation (the National Health System). Since the funding may follow different flows (from the citizens to the “third-party payer” to the providers of medical services, and vice versa), the level of financial risk can be transferred to an insurance institution (third-party payer), or to government or to citizens. Glied (2008) showed that all of these models are compatible with an



1. Data refer to total health expenditure.

Fig. 4. Expenditure on Health by Type of Financing, 2011. Source: OECD Health Statistics 2013 (<http://dx.doi.org/10.1787/health-data-en>).

efficient health system that is able to provide effective and fair services, as well as being consistent with the expectations of citizens.

Most of the OECD countries (OECD, 2011, 2013) adopt forms of mixed public–private financing as long as they are fair, adequate, not distorting, sustainable, and efficient. The choice of the right combination is normally influenced by the health policy purposes and is a function of the so-called “Six C’s” (Hopkins, 2007): Cost, Coverage, Consistency, Complexity, Chronic Illness, and Continuity.

The mix of public–private financing has evolved over time. According to OECD data 2011, since 2000 the share of the Italian public financing (77.5%) is similar to that of other European countries such as Germany (77%) and France (78%) and lower than that of the Anglo Scandinavian Countries (Denmark 85%, Norway and the United Kingdom 84%, Sweden 81%). However, the OECD countries are recording an increasing convergence in the mix of financing. With the exception of the United Kingdom, basically unchanged in its mix, Austria, Finland, Germany, and Switzerland are increasing their level of public financing, while Denmark, France, and Sweden are reducing it.

THE ITALIAN NATIONAL HEALTH SERVICE

The Italian health system is public on the financing side and mixed on the services production side, which is made by public institutions and by private enterprises or self-employed physicians. The Italian health system is marked by three periods. In the first period (until 1975–1980), the government adopted the mutualistic model, which was then abandoned because of the deficit produced by the high fixed costs. In the second period (1980–1994), the model of the National Health Service (SSN) was implemented; it was later revised and abandoned for its enormous inefficiencies. In the third period (1995–2000), Italy introduced the federal model, which was characterized by contractual relations and new mechanisms of reimbursement (DRG); regions become the new “mutual” and the insured people are divided according to the area of residence and not for their profession. The federal model, however, was in crisis in the early years of implementation (Legislative Decree 56/2000) and revised over time.

A distinctive feature of the federal model is the provision of a National Health Plan (NHP), which is adopted by agreement with the State-Regions Conference. It is not a detailed program but a strategic planning tool,

which defines what and why but not how. The latter is delegated to the Regions, involved in the NHP elaboration with proposals, formulated individually or in a coordinated manner. The NHP sets out the health care goals regarding the SSN system; it identifies both the guidelines for improving the quality of the care and the recommendations to support the development of research and training; finally, it defines the “Essential Levels of Care” (LEAs), founded on the principles of dignity, health needs, equity in the access and the criteria to measure the performance such as quality of care, therapeutic appropriateness, cost-effectiveness. Designed as a method of productivity control, the DRG is one of the possible classification procedures of hospital patients and one of the most successful prospective methods of payment. The idea underlying the DRG is to create homogeneous groups for costs of care or proxies (length of stay) but differentiated from one DRG to another. Each group should be clinically significant (similar clinical problems) and obtainable solely from information available in the hospital discharge records. The DRG is based on the iso-resources classification, that is, on the idea that the use of resources, and therefore their cost, is homogeneous within each group (or DRG), while it is differentiated among different groups (or DRG). So, the Italian public hospital is remunerated on the basis of fixed rates, corresponding to the services offered, and measurable with the monetary value of each DRG (www.agenas.it). Based on this set of principles, the NHP identifies a list of services that are included (which will satisfy them) or excluded (which will not satisfy them). Currently, only three macro areas of care are defined (collective assistance, district care services, and hospital care) and a limited negative list of services totally excluded (www.salute.gov.it).

The Italian National Health Service (the SSN) is funded 81% by taxation and 19% from private income and is equal to 7.1% of GDP (Mapelli, 2012). The SSN directly produces the services required by patients mainly through different types of public health organizations (ASL, AO, AOU-University hospitals, IRCCS – Institutes of Hospitalization and Care Scientific), while it purchases the remaining part from private sector. The delivery of services is carried out by the public administration and members of staff are subject to special regulations as part of administrative law (Mapelli, 2012). The public administration’s activity is guided by the principles of impartiality (nondiscrimination) to patients and providers, treatment uniformity, and transparency in spending. Instead, the private sector is subject to the common law. Its activity, based mainly on out-of-pocket payments and, to a lesser extent, on premium and insurance contributions,

is inspired by the principles of discretion (e.g., in the price-fixing or in the choice of suppliers), selectivity (of the users), and economic goals orientation. The private production is made up of independent physicians, outpatient facilities, nursing homes, and rehabilitation centers. The private sector is in competition with the SSN, especially when it provides the same services with greater speed, better comfort, and quality than the public sector. The areas of high competition are hospital services, diagnostic, and specialist rehabilitation. Conversely, the public sector holds the largest share in hospital admissions and health and social services for disadvantaged people. The specialist, medical, and diagnostic services are shared similarly between public and private, while in the service of prevention and public health, the SSN has a monopoly. Instead, private producers have the total control of basic medicine, the pharmaceutical industry, and prosthetic care. In addition to these, specialist and diagnostic services are the area of the greatest presence of private (Mapelli, 2012; OECD, 2011).

At the regional level, the average values of the financing and production differ between the North and the South of Italy and are a function of the individual incomes. Specifically, private health spending is high in the richest regions of the North, while in all the regions of the South, public funding of health is above 80%. In order to ensure the right to health for all citizens and the same opportunities for access to services, the State makes a lot of “equalizing” transfers to the regions with lower fiscal capacity. Overall, the region with the highest offer of private services is Lombardy (with 57% of the total), followed by Lazio, Piemonte, and Puglia. At the other extreme, the region with less presence of private services is Umbria, followed by Bolzano. Instead, Emilia-Romagna, Sicily, Veneto, and Campania have a balanced public–private mix (50–50%).

Despite the good levels of care delivery and quality of services, the SSN’s funding system requires new measures, in the form of heavier taxation or reduction of the guarantees and rights, to maintain or improve the current LEAs and to tackle the financial crisis (Cappellaro & Longo, 2011). The way out could be the implementation of innovative financing mechanisms, such as integrative public–private partnerships (PPPs), for scaling up and economical sustainability of the spending. The PPPs are characterized by public funding, mandatory insurance coverage, a public governance system (with a central control of prices, tariffs, contracts, and uniformity of rights) mixed with a private management approach. This model makes the public sector more competitive but requires new governance systems, with higher financial responsibility for the regional managers and administrative directors and a greater flexibility in the operational activities.

RECENT TRENDS IN HEALTH CARE PUBLIC–PRIVATE PARTNERSHIPS

Health care PPPs are models of collaboration that balance the role of public and private sectors in delivering high-quality care to patients at the lowest possible cost (Hodge & Greve, 2007; Linder, 1999; Marsilio, Cappellaro, & Cuccurullo, 2011; Osborne, 2000; Osborne & Gaebler, 1993; PwC, 2010, 2011a, 2011b; Savas, 2000).

As governments grapple with an increase in health spending caused by demographic changes, such as ageing populations, chronic diseases, longer life expectancy at birth, and technological development (European Commission, EU EPC, 2009), health care spending will grow much faster than GDP in the coming years (Table 1).

According to PwC (2010), health spending in the OECD countries, as a percent of GDP, will increase to 14.4% in 2020 (Table 2) while in the BRIC countries (Brazil, Russia, India, and China) even stronger growth is expected (Figs. 5 and 6).

To address these challenges, the government-owned hospitals are wrapped partnerships with private companies to finance care services and comply with budgetary constraints. According to PwC projections (2010), pressure on health spending promotes formation of public–private partnerships to solve long-term cost issues. In the United Kingdom, for example, PPPs produce a greater competition on the provider side, higher level of staff productivity, higher patient satisfaction, and lower mortality rates (PwC, 2011a).

Public–private partnerships are expanding in number and activities to support the public sector in providing sustainable clinical services to citizens through a patient-centric health system directed to improve quality, manage costs, and make health care more accessible to the maximum number of the population (PwC, 2011c).

The adoption of the PPPs model in the health care sector (the so-called Health PPPs) is evolving significantly over time, from a way for governments to build new or revamp crumbling hospitals, to an instrument for achieving public policy goals by exploiting skills, capabilities, and capital brought by the private companies. In fact, the Health PPPs are changing their scope from an infrastructure-oriented model to a clinical services-delivery model where the public organizations’ role turns from provider to regulator; the payment and reimbursement mechanisms are based on outcomes, quality, and cost-savings; the IT infrastructure and digital devices are used to improve efficiency and exercise more control over staff activities and primary care screening; and the hospitals offer highly customized

Table 1. Trend in Public Health Spending EU-27 Countries (Forecast to 2060).

	§ Level 2007 (% GDP)	Pure Demographic Scenario	High Life Expectancy	Constant Health	Death-Related Cost	Technology Scenario	AWG Reference Scenario
				Change 2007–2060 (% point of GDP)			
BE	7.61	1.48	1.95	0.34	1.17	4.15	1.24
BG	4.71	0.72	0.98	−0.02	0.63	1.69	0.74
CZ	6.20	2.28	2.78	1.13	1.97	4.17	2.16
DK	5.94	1.18	1.58	0.25	0.94	3.34	0.96
DE	7.40	2.00	2.52	0.89	1.49	4.74	1.78
EE	4.95	1.22	1.70	0.35	1.04	2.30	1.19
IE	5.83	1.98	2.40	0.96	1.66	4.24	1.76
EL	4.96	1.47	1.78	0.74	1.24	3.08	1.41
ES	5.55	1.75	2.09	0.96	1.47	3.76	1.65
FR	8.13	1.41	1.85	0.40	1.09	4.30	1.24
IT	5.85	1.23	1.53	0.49	1.00	3.37	1.09
CY	2.71	0.87	1.17	0.11	0.74	1.82	0.61
LV	3.45	0.65	0.92	0.06	0.58	1.36	1.36
LT	4.47	1.20	1.59	0.34	1.04	2.16	1.11
LU	5.76	1.34	1.73	0.43	1.01	3.11	1.22
HU	5.79	1.75	2.47	0.25	1.30	3.51	1.26
MT	4.71	3.79	4.42	2.24	2.63	6.03	3.34
NL	4.82	1.13	1.41	0.45	0.93	2.94	0.98
AT	6.49	1.73	2.14	0.74	1.36	4.17	1.52
PL	4.02	1.34	1.96	−0.55	1.20	2.39	0.96
PT	7.21	2.16	2.73	0.93	1.66	4.87	1.88
RO	3.51	1.39	1.83	0.67	1.23	2.20	1.37
SI	6.61	1.95	2.39	0.97	1.64	3.96	1.88
SK	4.97	2.28	2.67	1.23	2.02	3.46	2.26
FI	5.50	1.36	1.90	0.20	1.11	3.30	0.95
SE	7.20	0.93	1.29	0.03	0.70	3.31	0.79
UK	7.50	2.19	2.81	0.98	1.15	4.98	1.94
EU27	6.72	1.70	2.15	0.67	1.23	4.10	1.50

Source: European Commission, EU EPC “Ageing Report,” 2009.

solutions and tailored treatments obtained by bundling primary, secondary, and tertiary care (PwC, 2011c).

PPPs are different from outsourcing or contracting in terms of risk sharing and ownership. While the risk is shared between the public and private partners, the property is separate; so the PPPs are long-term collaborations where the assets remain in public ownership. The payment mechanisms are based on the contractual allocation of risk and on the nature of services, measured in terms of better health outcomes. With the capitation payment, the provider is paid according to the number of people to be served. In this

Table 2. PwC Projections for Health Spending by Country in 2010 and 2020.

Country	Health Spending as a % of GDP 2010	Health Spending as a % of GDP 2020	GDP Growth (%)	Health Spending Growth (%)
<i>OECD</i>				
Australia	8.8	9.7	37.4	51.5
Austria	10.6	11.2	20.4	26.5
Belgium	10.5	12.0	19.2	36.2
Canada	10.6	11.6	37.3	50.3
Czech Rep	7.2	7.5	47.2	55.9
Denmark	9.8	10.0	11.0	13.3
Finland	8.5	8.7	23.6	27.2
France	11.5	13.1	20.2	36.9
Germany	10.6	11.0	16.5	20.6
Greece	9.9	10.5	19.4	26.2
Iceland	9.2	9.7	33.5	41.1
Ireland	8.7	8.8	28.3	29.5
Italy	9.3	10.1	14.1	23.9
Japan	8.3	9.1	10.3	20.9
Luxembourg	7.6	8.6	18.0	33.6
Mexico	6.1	6.8	30.5	45.5
Netherlands	10.1	10.9	17.4	26.8
New Zealand	10.2	12.7	36.6	69.5
Norway	8.8	10.7	22.7	49.1
Portugal	10.7	12.6	11.6	31.5
Spain	9.2	10.4	18.8	34.3
Sweden	9.5	9.9	23.5	28.7
Switzerland	10.8	11.4	14.6	20.6
United Kingdom	8.9	9.9	26.6	40.8
United States	17.5	20.0	37.7	57.1
<i>BRICS</i>				
Brazil	8.7	9.7	45.3	62.0
China	4.6	5.7	114.9	166.5
India	4.4	5.2	100.2	140.0
Russia	5.5	5.8	44.9	52.2

Source: © 2010 PricewaterhouseCoopers, LLP.

way, there is a positive incentive to keep patients healthy and out of the hospital; besides part of the demand risk is transferred to the private sector (PwC, 2011a).

In PPPs infrastructure is measured by the difference in cost between the estimated cost of the public sector delivering the project minus the expected cost of private sector delivering the project while clinical services are

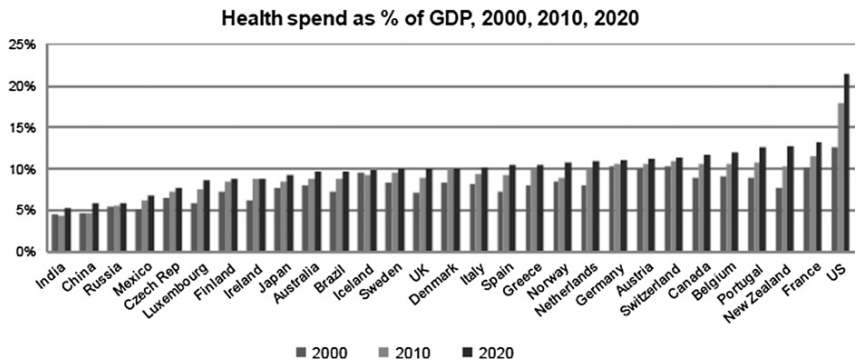


Fig. 5. Current and Projected Health Spending as Percent of GDP in OECD, BRIC Nations. *Source:* PwC Health Research Institute.

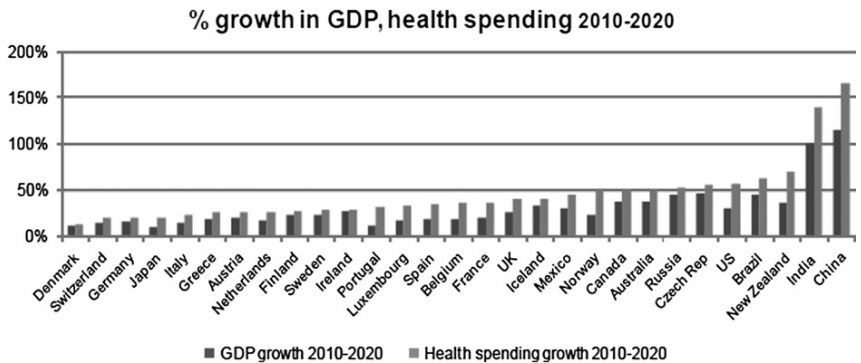


Fig. 6. Projected Growth in GDP, Health Spending in OECD, BRIC Nations. *Source:* PwC Health Research Institute.

evaluated through operational benchmarks, clinical benchmarks, workforce productivity, patient outcomes, waiting times, and patient satisfaction (Dorn et al., 2007; Hall & Chad, 2007; PwC, 2010).

THE EVOLUTION OF THE ITALIAN HEALTH PPPS INTO THE “MANAGEMENT EXPERIMENTATION MODELS”

Introduced in Italy by the law no. 412/1991 and, subsequently regulated by the Lgs D. n. 502/92 art 9/bis, Lgs D., n. 517/93, Lgs D., 229/99, L. n.

405/2001, the “management experimentation model” is a partnership between the National Health Service (SSN) and private operators concerning the management of the health system through public–private limited company, foundations, contracts and grant management, inter-institutional agreements.

It is subjected to a long process of authorization and monitoring, which is articulated into four or more steps: the proposal of constitution by the Region; the authorization to constitute the model by the State Conference of the Region; a period of experimentation submitted to annual monitoring by the Regions, the Conference of State of the Regions, the National Agency for Regional Health Services (AGENAS), and the [Ministry of Health](#); the conclusion with the stabilization of the partnership at the end of the experimental period or exit of the public institution.

The “management experimentation model,” which falls into the broader category of health care PPPs, follows an entrepreneurial approach to pursue simultaneously economic and social goals and makes public sector more competitive and efficient without affecting the universal coverage, solidarity, and equity of access.

It is characterized by balancing the role of public and private organizations, a shared financial risk, and a separation between property and governance. Partners play different roles: public institutions are engaged in the political issues directed to ensure equity, accessibility, acceptability of the treatments, and cost containment while private companies are involved in the strategic and operational activities in order to achieve high level of quality and adequacy of the care, innovativeness, reputation, economical, and financial sustainability.

The “management experimentation model” mixes the principles of the Public Administration (PA) activity more oriented to impartiality, treatment uniformity, and transparency in the spending, with those of the private sector mainly addressed to the discretion in the suppliers’ choice, selectivity in the staff management, economic goal orientation, financial raising, control of activities, and monitoring of performance.

In addition to the traditional hospital-level outcomes, formulated in terms of reduction or disappearance of disease, disability, or mortality rate, the “management experimentation models” give extremely relevance to the way in which the care is provided, the use of innovative techniques and advanced therapies, the patients satisfaction in terms of adequacy of facility and laboratory equipment, lower waiting times, effectiveness of the care offered, and appropriateness of the services provided to families during the hospital stay.

The payment mechanisms are associated with hospital-level performance; managers and administrative directors have more responsibility

but also greater autonomy in financing experimental projects, in the reorganization of the hospital for intensive care, in the layout redesign, in the supplier selection, or in the staff recruitment and personnel management; there is also more flexibility in the operations, in starting internationalization programs or in offering highly customized solutions and tailored treatments. However, this model suffers from a greater competitive pressure and substitution effect.

The “management experimentation models” are typically of the Italian context and their experience is very limited (in total 51).

Therefore, previous literature on the Health PPPs is unable to grasp the specificity of these forms of high integrative public–private collaboration, which mix the complexity of the Italian legislation on the public sector with the diversity of national and international health legislation, together with the dynamics of competition and internationalization, which require the use of effective and more competition-oriented management practices.

Even more, the literature on this topic is recent and is based primarily on national sources (AGENAS, 2013; Cappellaro & Longo, 2011; CERGAS, 2012, 2013). It explores various aspects through the case study methodology in order to reconstruct a large series where to test hypothesis and theoretical models. Several issues are open and require to be investigated in depth.

A central topic concerns the regulatory and legal systems more appropriate for the ownership-governance regulation; studies are addressed to evaluate the effectiveness of mixed public–private company, foundation, association, contracts and grants management, and sponsorships. Another important question concerns the institutional assets of the “management experimentation models” in terms of roles, autonomy, and responsibility of the partners, criteria to be used for selecting the private companies, charging policy, codes of conduct, and disciplinary roles.

Another issue regards the governance and control mechanisms, including duration of the partnership, level of financial risk, separation of property from the management, composition of the board of directors, president’s nomination, designation of the directors of departments, supervisors, and independent organizations.

Finally, the “management experimentation models” address the issue on the sustainability of economic and financial conditions compared to continuous innovation and to the control of the quality of the care delivery. Since they generally report better clinical results than public hospitals and nursing houses, an open issue regards the identification of good management practices, which are strongly associated with hospital-level outcomes.

OVERVIEW ON THE ITALIAN MANAGEMENT EXPERIMENTATION MODELS

In Italy the experience of health integrative PPPs is limited. In 2012 it was possible to observe 51 cases differently distributed in Italy: 42 in Northern Italy (68%), 8 in Central Italy (16%), and 8 in Southern Italy (16%). The regions with the higher number of management experimentations are Lombardy (21), Veneto (7), Emilia Romagna, Lazio, and Basilicata (4). On the total of 51, a small part is in the early stage of authorization (5), most of them are currently being implemented (27), while about one-third were completed or stabilized (19). Fig. 7 shows the distribution of the “management experimentation model” from 1997 to 2012.

Most of the management experimentation models are organized in the form of public–private liability company or limited liability company (39%), while others are constituted in association (27%), contracts (18%), foundation (14%), and other (2%) (CERGAS, 2012). Table 3 compares, for business ownership, the data on the production in value, the percentage of profit on revenues, and the average investment.

The regions regulate in a different way the model, especially with regard to the business ownership, level of public control on the partnership, number of partners, financial responsibility of the public, transparency, duration of the experimentation stage, monitoring of results, economical sustainability.

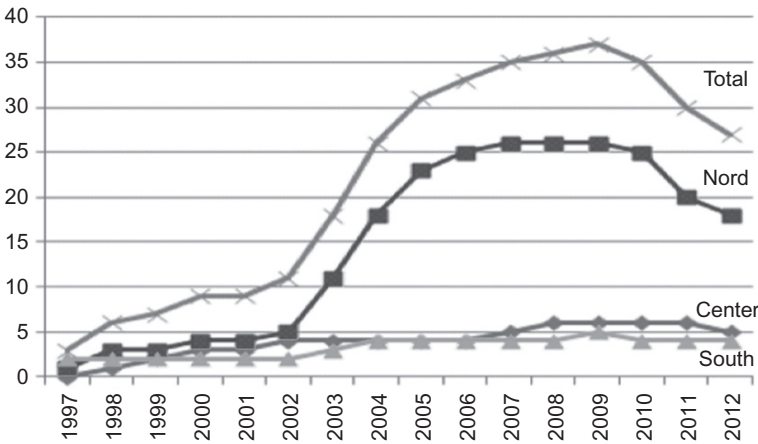


Fig. 7. Distribution of the “Management Experimentation Models” 1997–2012 – Italy. Source: CERGAS, Report 2012.

Table 3. Economic Performance of the Models of Experimental Management for Business Ownership.

	PP Company	Associations	Contracts	Foundation
<i>Production (Value)</i>				
>100 mil	—	—	—	25%
50–100 mil	12%	—	—	25%
20–50 mil	18%	0%	33%	—
10–20 mil	23%	0%	—	—
5–10 mil	29%	33%	33%	25%
1–5 mil	18%	50%	17%	25%
<1 mil	—	17%	17%	—
	No. of cases: 70% <20 mil	No. of cases: 67% <5 mil	No. of cases: 67% >10 mil	No. of cases: 50% >50 mil
<i>Profits/Revenues</i>				
5–10%	23%	33%	—	—
1–5%	12%	—	17%	—
(–)1% – 1%	35%	33%	50%	25%
(–)10% – (–) 1%	18%	34%	33%	25%
(–)30% – (–)10%	12%	—	0%	—
<–30%	—	—	0%	50%
	No. of cases: 70% between –1% and 10%	No. of cases: 33% between 5 and 10%	No. of cases: 50% balanced	No. of cases: 75% < –1%
<i>Average investment</i>	€11,488.793	€1,545.911	€10,266.163	€3,652.547

Source: Elaboration from CERGAS, Report 2012.

In some cases, the Regions (such as Abruzzo, Friuli Venezia Giulia, Liguria, Lazio, Sardinia) have adopted the national legislation without further specification; Basilicata and Tuscany have regulated the governance profiles, while Sicily has defined the financial aspects; Emilia Romagna has fixed the maximum duration of 5 years and Lombardy has introduced a very complex discipline, which excludes the use of the mixed company as well as the responsibility of local authorities from the financial results, but provides a specific committee for the monitoring and the use of economic-financial indexes and health parameters for reporting and measuring the clinical outcomes.

In order to gain more awareness about the managerial effectiveness of such experimental programs, this chapter examines one of the first medical centers, specialized in the transplantations and advanced therapies, which

has adopted the “management experimentation model,” in the form of a limited liability company. Given the improvements in the clinical outcomes registered over time, this center can be taken as a benchmark for its good management practices.

METHODOLOGY

This research adopts the case study methodology (Eisenhardt & Graebner, 2007; Yin, 1994, 2003) to identify what constitutes good management practices in health care. In particular, within a sample of Italian public hospitals specialized in transplantation located in different geographical areas, it examines ISMETT: one of the first and few examples of management experimentation model in health care.

The recognition of ISMETT’s good management practices allows to better understand the set of factors associated with higher clinical performance, especially with regard to life expectancy, quality of services, and effectiveness of care; moreover, it is useful for identifying the key components to consider for a benchmarking among organizations operating in the same field.

The study mainly relies on archival data including press releases, business publications, and other materials posted by ISMETT on its website; regional regulations on experimentation models and regional health plans; reports publishing on UPMC and UPMC Italy websites; data from the National Transplant Center (2013), Pittsburgh Region website (2001), from the Collaborative Transplant Study (CTS);, and from the United Network for Organ Sharing (UNOS); the OASI reports and other studies conducted by the Research Centre on Health and Social Care Management – CERGAS (2007, 2012, 2013).

These data are completed by internal documents, qualitative and quantitative data from semi-structured interviews to top management, Administrative Staff (Procurement, General Business, Communication and Press, Accounting and Finance, Education, Grants, and Project Management, Information Technology, Planning and Management Control, Quality, Recruitment, and Retention) and to the medical-surgical staff. These interviews were conducted within the hospital in the course of a broader research program conducted in 2007–2008 by the Economics and Business Management Area of the Department of Economics and Business – University of Catania. More details about ISMETT strategic approach, clinical outcomes, and value creation in the regenerative medicine can be found in Schillaci, Longo, and Romano (2008).

Unlike the previous study, this research focuses on the good management practices; data have been updated, revised, and enriched with new external sources and documents to take into account the evolution of this specific form of integrative PPPs. The main topics concern:

- *Clinical performances*: multilevel goals, way to set goals and measures to track outcomes (monitoring of information in real time and reduction of the errors, increase in the life expectancy even for border-line patients, confidence and hospital reputation, attractiveness for national and international patients);
- *Value proposition*: patient-centric orientation, centrality of the person, specialization in treatments, quality of the care, innovativeness in therapies and in the use of advanced techniques;
- *Governance system*: number of partners, balance of roles and responsibilities, financial risk sharing, board composition, leading principles, partnership duration, exit mechanisms;
- *Organizational profiles*: size, nature, and level of care, rules for investments, criteria for suppliers' selection and for inputs acquisition, funds raising;
- *Operations management*: "lean thinking" approach to redesign the departments, standardization of clinical procedures, quality management (QM), clinical staff training to protocols;
- *Staff management*: recruitment systems, selection and evaluation mechanisms of employees, rewards, promotions, and incentives based on performance;
- *Personnel training*: clinical qualified managers, theoretical and in-hospital training programs, internships abroad, and exchange of expertise.

According to Bloom and Van Reenen (2010, p. 24), the "combination of many of these indicators reflects 'good management practice'." For example, the standardization of procedures reveal good practices when protocols are known, used by all the staff, and are regularly followed up; patients are well informed about their treatment.

CASE STUDY: THE MEDITERRANEAN CENTER FOR TRANSPLANTATION AND ADVANCED SPECIALIZED THERAPIES

ISMETT is a leading center in the Mediterranean area whose mission is to treat patients with complex diseases in vital organs, by increasing their

expectancy and improving the quality of life of individuals that are affected by serious pathologies. In particular, this center is specialized entirely in the organ transplantation (liver, kidney, pancreas, heart, and lung), especially those in pediatric patients, by living donor and with the split liver technique. It also performs combined liver-kidney transplants, heart-kidney, kidney-pancreas, and isolated pancreas transplantation, treatments of end-stage organ failure, and advanced therapies in the field of regenerative medicine and molecular biology directed to avoid or delay transplantation when it is possible ([Bioengineering Graduate Student Council, 2007](#); [Institute for the Future, 2003](#); [PTEI, 2006](#)).

Liver and kidney transplantation programs started in 1999; the heart transplant in 2004; pancreas and lung transplant programs in 2005. Less than 7 years ago (in May 2013), ISMETT has performed its 100th lung transplant. In addition, it has developed program on abdominal surgery in high-risk patients, cardiothoracic surgery, including heart failure surgery and an artificial heart program (ventricular assist devices – VADs), pediatric hepatobiliary surgery, treatment of multi-organ transplants, use of laparoscopy for living donor transplantation and pediatric living-related liver transplants. These innovative programs aim at fostering the use of minimally invasive surgical techniques, making the procedure safer and faster.

ISMETT hosts annually about 2,300 patients in an area of about 12,000 square meters, 78 beds, plus 7 beds for day hospital and 12 for post anesthesia care; with approximately 636 units of staff including 70 physicians, it has 4 operating rooms, a radiology department, analysis, microbiology and pathology labs, a pharmacy and a multi-specialty outpatient clinic; while it has no emergency unit.

The center adheres to the International Association for Humanitarian Medicine and uses tele-consultation, telemedicine, and e-learning for providing medical care to remote areas; it has developed some relationships in about 22 countries spread across Europe, Africa, Asia, and America. Although, the presence of foreign patients is still influenced by the long waiting list and by the priority given to the Italian patients for transplants due to nationality of the organ donors, one patient out of four is foreign and comes mainly from Albania, Argentina, Bulgaria, Ecuador, Greece, Israel, Jordan, Kosovo, Libya, Morocco, Palestine, Peru, Poland, Romania, Saudi Arabia, Spain, Tunisia, and Ukraine.

Created in 1997 by the collaboration between the [Region of Sicily](#) and the [UPMC](#) in Pennsylvania, ISMETT is a successful innovative model among the public–private partnerships, which falls within the health care management experimentation programs, authorized by the SSN.

The initiative was launched to rationalize the network of the regional health services and to fill a void in the SSN's offer on the organ transplants and treatments of complex diseases with cutting-edge therapies. Since its inception, it has contributed both to the scientific advancement in the biomedical science and to the local growth, triggering economic and social virtuous circles, along the health care supply chain (Burns, 2002; McFadden & Leahy, 2000; Porter & Teisberg, 2006; Schneller et al., 2006), known in literature as social entrepreneurship (Alvord, Brown, & Letts, 2004; Cho, 2006; Drayton, 2006; Granados, Hlupic, Coakes, & Mohamed, 2011; Longo, 2013).

ISMETT is a limited liability company, the only one authorized in Sicily to participate in experimental programs in the field of public health. It has a capital of €2,000,000, a private international partner (UPMC) and two local partners, the ARNAS "Civico" and AO "Cervello" Hospitals in Palermo. Although it's now in the final stage of the experimental program, its duration has been extended.

The ISMETT's governance system is characterized by a balance in charge between public and private members, a separation of property with a majority of public assets (about 60%), inputs acquisition according to the private law legislation and the code of public contracts, a public control reinforced by transparency, annual monitoring, and financial responsibility transferred to the private partner. The management experimentation model makes ISMETT more competitive than other public hospitals as it can exploit the scale effects and specialization advantages, the managerial and clinical skills from UPMC, the flexibility in the organization and autonomy of administrative directors associated with more responsibility in the decision-making process. Besides, the combination of the federalist model – inspired by the principles of impartiality, equal treatment, transparency in spending, universal coverage, solidarity, and equity of access – with the entrepreneurial approach more oriented to the economic and financial sustainability, allows this center to achieve simultaneously the efficiency and effectiveness goals, summarized in the so-called "Six C's": Cost, Coverage, Consistency, Complexity, Chronic Illness, and Continuity. In 2013 the number of transplants made by ISMETT was 108 out of a total of 2,841 transplants in Italy. This value is influenced by the rate of regional donation. As Fig. 8 shows, in Sicily the number of donors was 62 in 2012 and only 55 in 2013 (National Transplant Center, 2013).

Compared to other Italian transplant centers (Figs. 9–13), most of which are not made in the form of management experimentation models, the data show a good position of ISMETT, which is 7th for liver

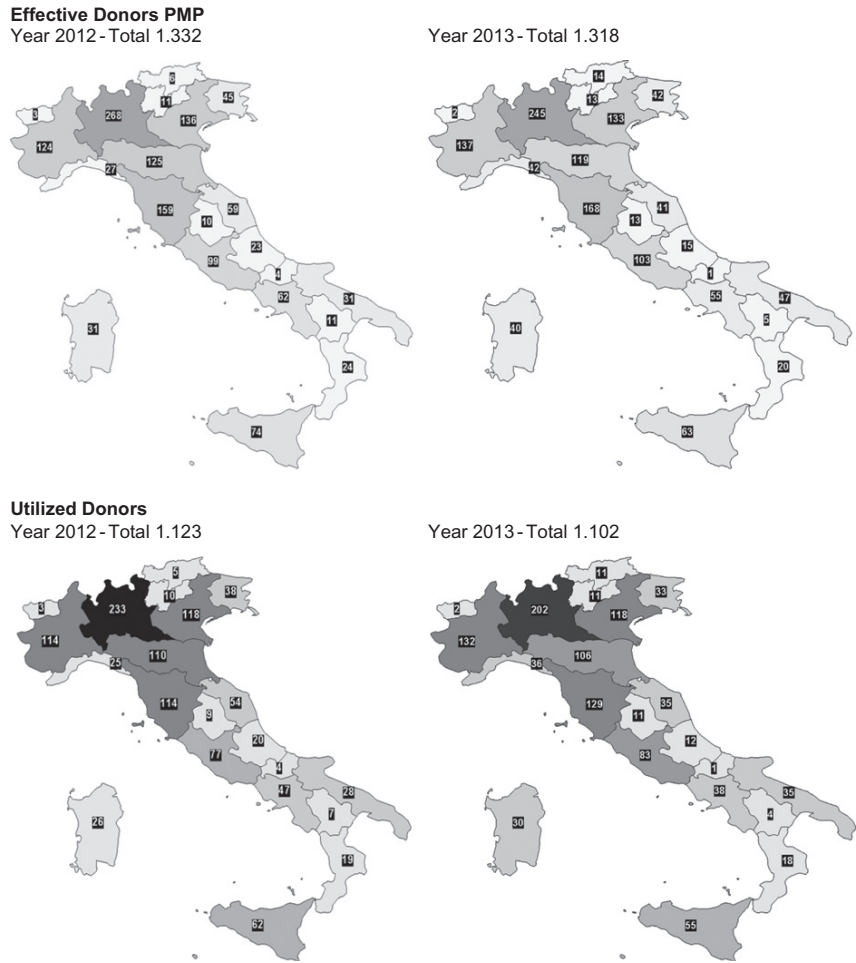


Fig. 8. Effective Donors PMP versus Utilized Donors (Number) 2012–2013 – Italy. Source: Italian National Transplant Center (2013).

transplants (n. 61), 27th for kidney transplantation (n. 27), 11th for heart transplants (n. 8), 8th for lung transplants, and 8th for pancreas transplants (n. 2).

With reference to the liver transplants performed on pediatric patients from 2002 to 2013, ISMETT is placed in the second position with 140

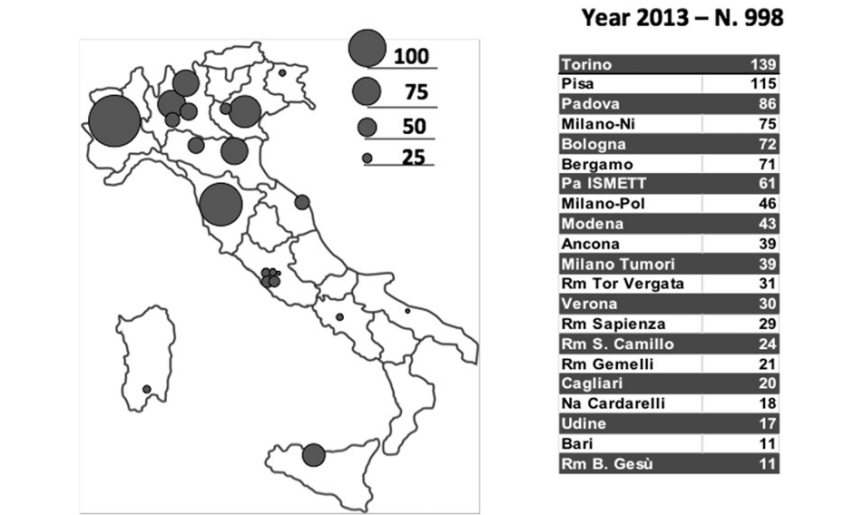


Fig. 9. Number of Liver Transplantations (Included Combinations) 2013 – Italy. Source: Elaboration from the Italian National Transplant Center (2013).

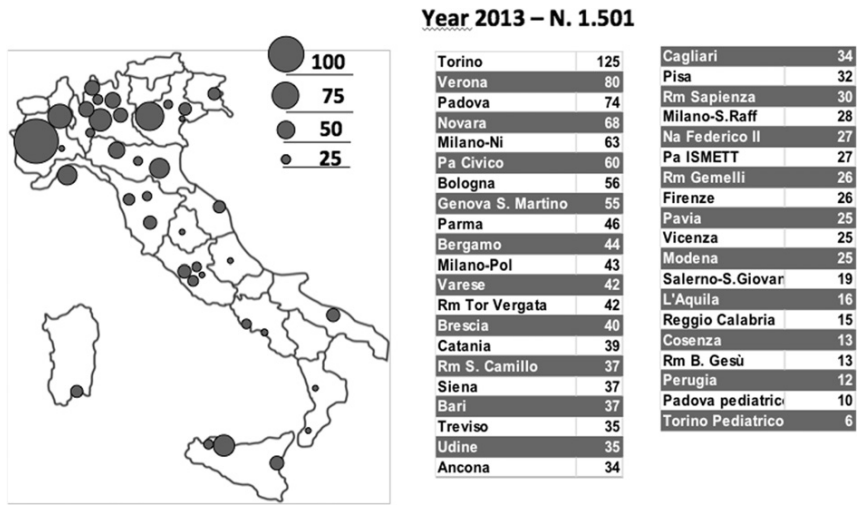


Fig. 10. Number of Kidney Transplantations (Included Combinations) 2013 – Italy. Source: Elaboration from the Italian National Transplant Center (2013).

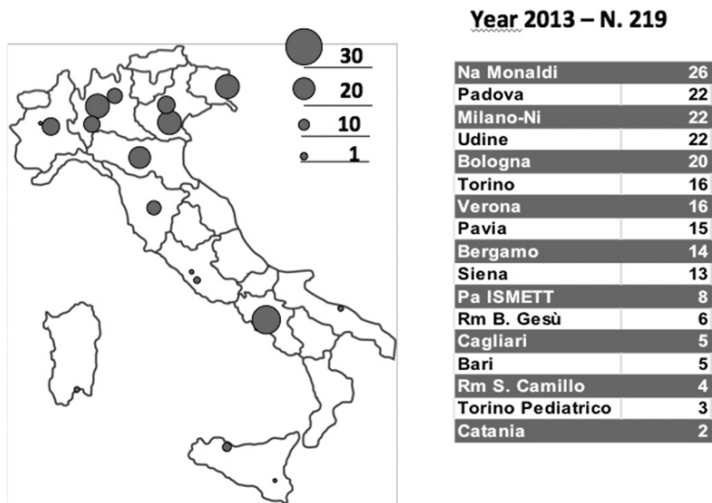


Fig. 11. Number of Heart Transplantations (Included Combinations) 2013 – Italy. *Source:* Elaboration from the Italian National Transplant Center (2013).

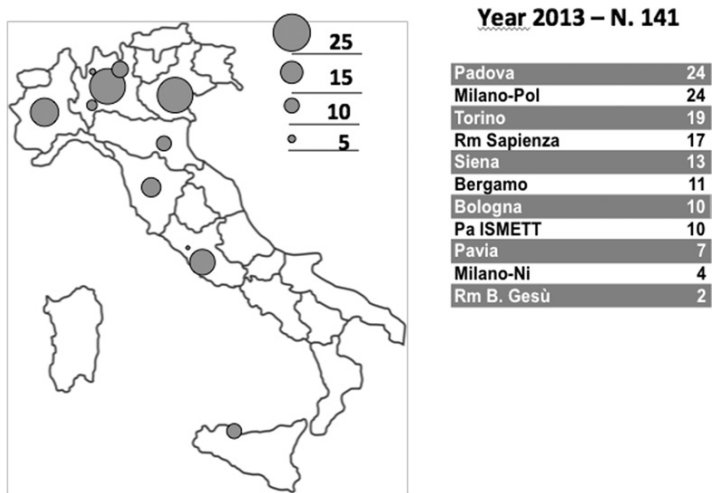


Fig. 12. Number of Lung Transplantations (Included Combinations) 2013 – Italy. *Source:* Elaboration from the Italian National Transplant Center (2013).

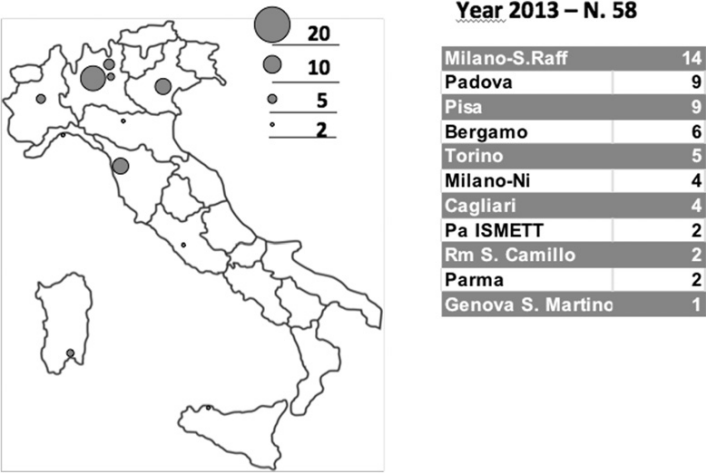


Fig. 13. Number of Pancreas Transplantations (Included Combinations) 2013 – Italy. *Source:* Elaboration from the Italian National Transplant Center (2013).

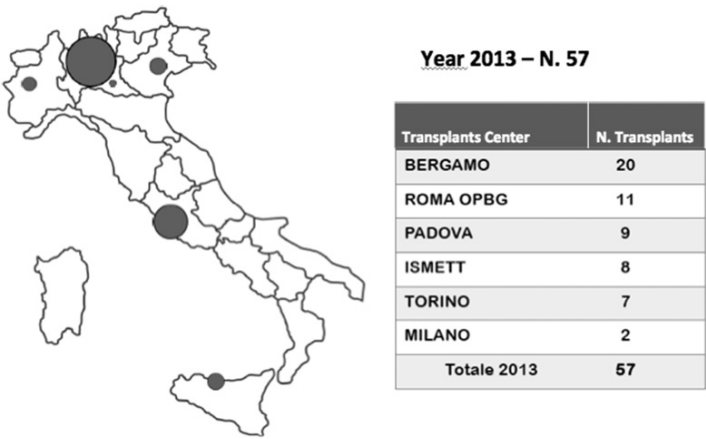


Fig. 14. Number of Liver Transplantation on Pediatric Patients 2013 – Italy. *Source:* Elaboration from the Italian National Transplant Center (2013).

interventions, after the Ospedali Riuniti di Bergamo, a historic public hospital, with a large building of 30,000 m², extended over an area of 150,000 m², with about 1,000 beds, and active in organ transplants since 1985; limited to 2013, it is 4th (Fig. 14 and Table 4).

Table 4. Number of Liver Transplantation on Pediatric Patients
2002–2013 – Italy.

Region	Transplant Center	No. of Transplants
Lombardy	Ospedali Riuniti – Bergamo	339
Sicily	ISMETT Partnership Dip. Interazienda	140
Piedmont	Azienda Osped. S. Giovanni Battista Di Tor	103
Veneto	Azienda Ospedaliera Di Padova	85
Lazio	Ospedale Pediatrico Bambino Gesù	73
Lombardia	Maggiore Policlinico – Milano	13
Lazio	Azienda Policlinico Umberto I	7
Lombardia	Istituto Naz.Le Per Cura Tumori – Milano	5
Campania	A.O.R.N Cardarelli – Napoli	4
Emilia Romagna	S. Orsola-Malpighi – BO	4
Lazio	Policlinico A. Gemelli E C.I.C.	3
Liguria	Az. Osp. Ospedale S. Martino E Cl.Iniv.Conv	3
Tuscany	Azienda Ospedaliera Pisana	2
Lazio	Az. Osp. Univ. Policlinico Tor Vergata	1
Lazio	Ospedale S. Eugenio	1
Sardinia	A. O. G. Brotzu (Ospedale San Michele)	1

Source: Elaboration from the Italian [National Transplant Center \(2013\)](#).
Total transplants: 784.

GOOD MANAGEMENT PRACTICES: LESSONS FROM ISMETT

This section aims to highlight the good management practices adopted in the case study under observation in order to understand whether and how the management experimentation model can be implemented on a broader basis, both nationwide and internationally.

Lesson No. 1: Defining a Unique Value Proposition Clearly

Setting the value proposition means to fix clearly and precisely the PPP’s vision and mission; in other words, this means to define the hospital’s business model, the elements of uniqueness, and the competitive position nationally and internationally.

ISMETT’s value proposition is based on a set of values, which are: a patient-centric approach, centrality of the person, specialization in treatments and advanced therapies combined with a multidisciplinary approach

and aptitude for innovation. The center is specialized in the fields of medicine, transplant surgery, and deficiencies of vital organs (liver, kidney, heart, lung, pancreas) organized in multidisciplinary and complementary team. All activities are divided into departments, such as Anesthesia and CCM, Surgery, General Medicine, Therapeutic and Diagnostic Services, Clinical services, Outpatient Clinic, which in turn are subdivided for areas. But, given the complexity of the therapies, the departments are organized on the basis of a multidisciplinary approach, which allows exploiting the complementarity of the expertise, by ensuring the maximum effectiveness of the care and the appropriateness of the services. For example, the programs of organ transplants involve the departments of hepatology, radiology, and interventional endoscopy, abdominal surgery, nephrology, cardiology and cardiac surgery. And yet, the back-office coordinates the patients flow among the clinical areas and oversees the synchronization between patients and availability of organs, upon notification by the Centre National and Regional Transplant, handling of equipment in operating rooms, staff assignment, and management of information flows.

The relationship with the patient is characterized by customized solutions and tailored treatments, cutting-edge therapies and advanced diagnostic services, responsiveness, complementary services, and space for family members. The aptitude for innovation is essential for ISMETT. The current researches are in the field of regenerative medicine, tissue engineering, molecular biology, biomedicine, and biotechnologies. They are focused on pancreatic cells transplantation, stem cell therapy for heart disease, and bariatric surgery for morbid obesity, and superior techniques of transplantation from living donors and organ repair. Since 2006 ISMETT has started a program for the transplantation of islets of Langerhans (from Latin “*insulae pancreaticae*”) and created a laboratory of stem cell, the so-called “Cell Factory,” which is among the largest and most advanced in Europe. In 2012 it performed the first transplant of islet cell in Sicily and one of the few made in Italy with the “Ricordi’s method”: a technique invented in the late 1980s by Prof. Camillo Ricordi, Director of the Diabetes Research Institute in Miami and Chairman of the ISMETT Board of Directors since 2004.

Lesson No. 2: Developing a Solid Long-Term Partnership

ISMETT is not a privatization but an example of a successful long-term collaboration based on a number of key factors, described below.

Choosing the right private partner is essential for pursuing simultaneously economic and social goals in the public health, bending the cost curve, and offering high quality but at affordable prices for all. ISMETT is a public–private limited liability company with few partners involved in a long-term commitment and cross-fertilization process. The UPMC is endowed with resources, international networks, clinical and technical expertise in the contract management, procurement, and regulatory affairs while public organization behaves as a regulator.

Balancing the roles and responsibilities is a way to compete efficiently and effectively on the market without affecting impartiality, treatment uniformity, and transparency in the spending. In the separation of ownership from management, the set of rules and procedures is defined in such a way as to avoid overlaps between public and private partners and to integrate, on the other hand, administrative, scientific, and clinical expertise. So in ISMETT, for example, the [Region of Sicily](#) defines the political issues directed to ensure equity, accessibility, acceptability of the treatments and cost containment, the short-time plans, and the LEA to be delivered; it is also engaged in the organ procurement organization, in financing clinical activities and services using funds from general taxation and social contribution, and in annual monitoring of results. Conversely, the UPMC is involved in the operation management and in the strategic coordination of the departments in order to ensure high level of quality and adequacy of the care, innovativeness, reputation, and economic and financial sustainability. UPMC provides the Director of the Institute, sets the goals, resources recruitment policies, and performance metrics; it promotes clinical and scientific research, intellectual properties, and patenting; it runs staff training programs; it supports networking, internationalization, and spinning-off processes; it gives administrative assistance for the daily activities; it makes available capital and financial resources, IT devices, and QM systems; it prepares the draft of the annual budgets. The governance structure includes a Shareholders’ Meeting, a Board of Directors, a Chairman of the Board of Directors, a Director of the Institute, operations managers (Administrative and Financial Director, Medical Director, Director of Nursing and Quality Control Activities), a Board of Auditors, a Supervisory Board, and Independent Auditors.

Lesson No. 3: Giving Managers More Responsibility

Giving administrative directors and managers more responsibility but also greater autonomy and discretion in the suppliers’ choice, for example, or in

the staff management selection is a way, for ISMETT, to enhance the organizational flexibility and to face the substitution effects and the potential alternatives for patients.

Lesson No. 4: Independent Monitoring and Capitation Payment

Independent monitoring and capitation payment make the hospital more competitive. While the objective and impartial control enhances credibility, the payment and reimbursement mechanisms sustain the efficiency; they are based on outcomes, quality, and cost-savings rather than on a maximum number of patients to serve, which can generate over-treatment when the third part is paid per patient, or under-treatment if an annual charge is fixed for the entire services.

Lesson No. 5: Connecting the Hospital with an International Network of Expertise

Developing a Health PPP with an international partner allows accessing to a network of external professionals from which to learn and refurbish when necessary. ISMETT staff can enter into contact with the network of UPMC for assistance, research programs, advanced diagnostic services, which are not otherwise available locally. The network includes, particularly, the School of Medicine (also known as *Pitt Med*); the Pittsburgh Tissue Engineering Initiative (PTEI); the center of Innovation and TT at the University of Pittsburgh; the Donald D. Wolff, Jr. Center for Quality, Safety, and Innovation; the Diabetes Research Institute at the University of Miami; the McGowan Institute For Regenerative Medicine; and the Carnegie Mellon University.

Lesson No. 6: Applying the “Lean Thinking” Approach to the Public Hospital

ISMETT adopts the “lean thinking” approach to the entire hospital structure. Lean approach suggests public hospitals to reorganize the processes for care delivery in order to reduce waste, human, and clinical errors. It is not necessarily an instrument for cost-cutting rather a way to rationalize the activities in order to keep costs in line with the hospital’s economic

capacity, to sustain financial sustainability, and increase the patients’ satisfaction and safety.

First, following the “lean thinking approach” the departments’ organizational structure is redesigned on the basis of the complexity of the care. Patients are classified according to the nature and level of care they need in outpatient, inpatient, sub-intensive therapy, intensive care, and pediatric inpatient. In ISMETT the number of patients for each nurse is assigned according to the complexity of the treatment: from 5:1 for inpatient, to 3:1 for sub-intensive therapy, 3:2 for intensive care, and 2:1 for pediatric inpatient.

Second, it is a good management practice that hospitals adopt an action plan to eliminate the sources of waste or human errors. Among the aspects that fall under the reorganization are timeliness in the information transfer, medication registrations, imaging diagnostics, interventional radiology, patient preparation, average length of stay for ambulatory.

In compliance with UPMC standards, ISMETT uses the electronic medical record (EMR) as a part of the lean approach. EMR is an IT tool, which allows accessing directly to other hospitals’ electronic system, from anesthesia, to laboratory equipment and other devices. Through the EMR, physicians and staff may obtain real time information, program and monitor therapies, run clinical information, access laboratory tests quickly and easily, visualizing a “summary view.” The EMR makes use of Radio Frequency Identification (RFID) technology, which is a wireless reader of electronically store information contained in a tag through read/write devices with a front-end radio frequency. The use of EMR reduces human errors and risk of losing data on patients; facilitates clinical workflows; allows access to data promptly; and the exchange of information among staff in real time (Garets & Davis, 2006). Besides, the transplant center is equipped with three-dimensional radiology instrumentations, which provide visualization of an organ from all perspectives, and of a telepathology device through which the Italian physicians can send digitalized images and clinical data to Pittsburgh for real time consultation.

Lesson No. 7: Standardizing Procedures

Monitoring the quality of the process can lead to improve efficiency as it allows reducing or preventing human and clinical errors resulting from improper handling of materials, equipment, or waste, security issues, patient misidentification. ISMETT is 1 of the 11 Italian centers, first in the

south, to have been accredited by the JCI Chamber for its continuous commitment to quality improvement and patient safety in order to create a more humane hospital. In the risk management policy, the error is not seen just as the result but a moment to learn from adverse events. For this reason, the quality system focuses on the processes that lead to the occurrence of a potentially dangerous situation. To this end, all employees are encouraged to report adverse events and near-misses (i.e., a situation of potential expected error before its occurrence). In accordance with the model implemented by the UPMC, the quality system is based on an ongoing process of monitoring, which involves the whole hospital at several levels: organizational structure; skills, areas; clinical process; results. The processes of drafting and implementation of Standard Operating Procedures (SOPs) follow the European standards, the Pharmaceutical Inspection Cooperation Scheme, the International Conference of Harmonisation, FDA (USA). The procedures comply also with the UNI EN ISO 9001 "Quality Management Systems." The individual skills are evaluated through the SOPs compilation while the performance evaluation is carried out through the "competency check list," the analysis of deviations, and batch records. The performance of the staff is also assessed on the basis of individual attitudinal skills (accuracy, quality of work, problem solving, time management, autonomy, self-control, punctuality, appearance) and interactive capabilities (such as behavior in teams, communication, patient orientation). The areas where QM is applied are: rights, ethics, responsibility, service, security, services, and patient satisfaction; drugs administration; clinical risk management; patient education; infections prevention and control; emergencies and cardiopulmonary resuscitation; information on the care and monitoring, even after discharge.

The quality process consists of analyzing problems; planning for improvements; conducting a pilot test and, therefore, implementing improvements on a large scale; drawing up guidelines and allocating resources to achieve the planned objectives. The evaluation criteria are based on the principles of suitability, availability, effectiveness, efficiency, timeliness, continuity, security, respect, and attention.

In line with the standards of the JCI for the voluntary certification of quality, the Quality Department and a multidisciplinary committee, called the Quality & Patient Safety (Q&PS) have been created. The departmental directors and unit coordinators take part in it. The committee, supported in turn by other subcommittees, has the responsibility to promote a favorable context to performance improvements; revise the previous year's results and set priorities for quality improvement and patient safety; monitor quality indicators trends; evaluate programs of clinical risk, safety in

the workplace, training; adapt the system to JCI standards; claims management and drug administration; review the QM systems in accordance with ISO standards; revise the structure of the QPS program, if necessary, and its methodology.

The QM in the clinical risk management is enhanced by the use of software, electronics devices, and user-friendly online platforms that connect the reporting system, with the hospital information system (HIS) and the administrative system. This is in compliance with the CCOW and HL7 standards.

Lesson No. 8: Attracting and Retaining High-Qualified Staff

Human resources management is a priority for ISMETT since personnel is crucial to ensure high-quality standards for patients, especially those with complex diseases. High standards of clinicians, nurses, and managers also reduce the out-coming flow of local patients and increase the in-coming flow represented by patients from other regions or countries. ISMETT draws great attention to the policies for staff recruitment. The staff is mostly graduates; they cover both traditional profiles (such as administrative, auxiliary, biologist, nurses, pharmacists) as well as innovative roles (patient transplant coordinator, patient flow coordinator, clinical educator, clinical specialist information, critical care highly specialized nurses, respiratory therapists, clinical psychologists, and interpreters). However, since certain geographical areas including Sicily are often not considered attractive for the overall working conditions, it is difficult for hospitals to attract and retain highly qualified physicians from abroad. To overcome this barrier, ISMETT provides advanced facilities and equipment, international exchange programs between UPMC and ISMETT, theoretical and in-hospital training, exciting professional context, performance-based incentives and awards. This makes the center a highly desirable place for physicians from various parts of the world and from prestigious universities.

Lesson No. 9: Training Clinically Qualified Managers and Technicians Continuously

The Institute allows its staff to grow up in the organization. Training is part of ISMETT’s “food for brain” philosophy since continuous updating of knowledge, competencies, and skills allows the human resources

development. The center holds seminars, conferences, weekly meetings, and courses, in and outside the hospital, for physicians, nurses, nonmedical personnel, university students, fellows, PhD students, and also patients and families on the themes of health and clinical methodology, medical research, leadership and organizational climate, Arabic and English course, software programs. Long- and short-term courses are organized according to the provisions of the Continuing Medical Education (CME) program of the Italian [Ministry of Health](#). Unlike public hospitals, nurses take part both in theoretical seminars, practical activities, and on-the-job training at UPMC hospitals.

Cross training of staff is offered also for nonmedical personnel and managers who are not in close contact with patients. In 2009 ISMETT received from DNV Italy the UNI EN ISO 9001:2008 Certificate of Compliance with Quality Management Systems Regulations for its “*Design and provision of professional training, corporate education projects, e-learning, simulation courses, conferences, seminars, and workshops.*” Over the last two years, over 2,800 hours of educational events were held for over 28,000 internal and external participants. In addition, external physicians, students, and nonmedical staff have the opportunity to make an internship at ISMETT followed by an internal project supervisor. In the last two years 389 internships were hosted at ISMETT.

In order to quickly develop skills but ensuring maximum patient safety and reducing the human errors, ISMETT is equipped with a skill lab, known as “the Renato Fiandaca Simulation Center” which provides five high-tech life-size mannequins, capable of simulating faithfully various symptoms and severity of disease, even borderline contexts. Simulation education aims at reproducing rare and complex clinical scenarios designed to train staff for critical situations, to adopt safety-inspired behaviors, and to reduce medical errors, especially during emergencies and first aid. The scenarios can be repeated several times to allow staff to improve performance, by implementing high-risk procedures in an environment without danger and without involving the patients. Simulation also allows the development of nonmedical skills in patient management, namely communication, leadership, team working, clinical decision-making capacity, organizational capabilities, time and risk management. The Simulation Center is composed of two rooms, each of which is connected to a control room, equipped with a system of audio and video. The local WISER center is supported by the collaboration with [The Peter M. Winter Institute for Simulation Education and Research](#) (WISER Institute – Pittsburgh), which has a long experience in the robotic simulations and medical-surgical

training programs, and is among the best in the world. The WISER Institute is equipped with: 16 mannequins simulating the behavior of adult patients, pediatric patients, and infants; a classroom with 60 workstations; 13 simulators of operating rooms, intensive care units, patient rooms for hospitalization, emergency rooms, ambulances or helicopters, and outdoor disaster sites. The courses offered are: Central Venous Cannulation Training, Crisis Team Training, Difficult Airway Management Anesthesiology Training Program, Fiberoptic Bronchoscopy Training Program, iSIM: Improving Simulation Instructional Methods, MOCA – Simulation Course for Part IV of Maintenance of Certification in Anesthesiology, WISER Preceptor Program, Operational Best Practices.

Lesson No. 10: Sustaining the Funds Raising

The entrepreneurial approach is also adopted in the funds raising, necessary for covering the costs of surgery, including organ transplants and cutting-edge therapies. The mixed public–private limited liability company is sustaining programs for corporate spin-offs in the biomedical field (Schillaci, Romano, & Longo, 2008). The spinning-off process follows the standards used by the Strategic Business Initiatives (SBI) Unit, the Intellectual Property Office, the Office of Technology Management, and the Jones Center for Entrepreneurship at Pittsburgh. Besides, the new companies can access both into the UPMC network of institutional investors and venture capitalists, including The Pittsburgh Life Sciences Greenhouse, Strategic Investment Fund, PA Early Stage. Other financial sources come from the national and international programs, including PON, POR, EU framework programs, grants with public and private partners, and donations.

CONTRIBUTION AND FUTURE RESEARCH

The chapter addresses the issue of good practices in the health care management experimentation models, which fall within the broader range of the integrative public–private partnerships. The research, in particular, tracks the recent trends in the health care PPPs and provides an overview of such models in Italy. The study explores what makes good management practices and how they can be applied more broadly by public sector to improve the efficiency of the health spending. The topic of variation in

productivity across firms has been treated extensively in the literature, especially in the field of trade, market labor, industrial organization. In the health sector, previous studies have found that hospitals with good management are correlated with higher clinical outcomes (higher levels of patient satisfaction, better life expectancy, quality of services, reduction in the risk mortality rates, increase in EBITDA per bed, in the average number of patients, or in hospital reputation) and differences in productivity are registered also among hospitals within the same country. However some variables, such as competition, size, specialization, skills autonomy, ownership structure, need further investigation in order to build a theoretical model able to explain differences in quality and productivity in public hospitals. Current researches are focusing, for example, on the construction of a large series of best management practices, which highlight the mentioned above factors.

In line with this purpose, this chapter examined the case of the Mediterranean Institute for Transplantation and Advanced Specialized Therapies (ISMETT), which is one of the first and few examples of management experimentation models, in the treatment of complex diseases in vital organs. This successful case shows briefly the key elements characterizing this particular form of integrative PPP. The chapter raises the question about what lessons can be learned from ISMETT and how other organizations that want to follow the same path can benefit from this experience.

At a glance, the lessons learned are: defining a unique value proposition clearly; developing a solid long-term partnership by balancing the roles and responsibilities between public and private partners; giving managers more responsibility but adopting independent monitoring and capitation payment; connecting the hospital with an international network of expertise; applying the “lean thinking” approach and standardizing procedures; attracting high-qualified staff and training clinically qualified managers and technicians; sustaining the funds raising.

The findings are consistent with previous research on good management practices in the health care and previously described. However, it is not always possible to implement the good management practices observed in literature within other organizations, although operating in the same field and country of origin. All management practices are contextualized on the environment where the hospital is located; they are contingent on certain circumstances and firm-specific. In addition, the implementation of the integrative PPPs is a challenge for the hospital, as it requires strategic, cultural, and managerial changes in the way a hospital operates; these transformations are not always sustainable.

The recognition of ISMETT’s good management practices can be used as a competitive benchmark for better understanding the key factors that lead to higher outcomes; to diagnose potential changes in the organization of the departments; to compare variation in productivity among public hospitals of different geographical areas or nations; to make comparisons among similar organizations about economic and financial results, measures, process, or set of services or against the leading hospital.

The results point out some implications in the policies of the clinical governance reorganization and are useful for the policy makers, hospitals, and health science centers. The experience of the management experimentation models has showed their usefulness to sustain the achievement of the public policy goals; they, in fact, allow respecting the principles of universal coverage, solidarity, and equity of access but make the public sector more competitive and efficient. Due to the progressive diffusion of the “management experimentation models” and the success they have got over time, the contributions of this research are meaningful.

First, the study deals with an emerging and under-explored issue in the international literature on the mixed public–private partnerships. The main literature, based primarily on national sources, identifies some streams of research, concerning regulatory and legal systems more appropriate for the PPPs regulation; the economic and financial sustainability of this model; and the mechanisms of governance and control. However, empirical studies are very limited and don’t delve into the experiences of partnership nor statistically measure the strategic factors that lead their growth and performance. Given the data available in the literature are limited, it is not possible to assert the real nature of the experimentation management models. Empirically, the case recognizes the good management practices used in ISMETT and gives some strategic insights to apply them on a wider basis. So, the study has been useful to fill the theoretical gaps on this topic.

Second, this analysis shows the importance of defining a unique value proposition, based on a patient-centered approach, multidisciplinary, expertise, centrality of the person, and aptitude for innovation.

Third, the study identifies the contribution of public–private partnerships to improve health care quality and efficiency. The model enables the organization to achieve both economic and social purposes. It is based on the complementary of the activities and on the balance of roles and responsibilities among partners according to their goals, nature, skills, and financial resources.

Since theories and researches on the integrative PPPs are very limited, we need further studies directed to investigate under which conditions the

management experimentation models are effective, which costs and benefits are related to such solutions; this also through cross-sectorial analysis and comparative studies. Another issue that deserves investigation is the identification of a set of indicators to measure clinical performance, economic outcomes, and logistical flows of patients as resulting from the “lean thinking” approach; then, the set of indicators can be used for making a competitive benchmarking. Finally, a further topic is the evaluation of the appropriateness and cost-effectiveness of the management experimentation model with regard to the choice of the level of coverage over time provided to citizens, which always remains a political choice.

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RISING LABOR COSTS, EARNINGS MANAGEMENT, AND FINANCIAL PERFORMANCE OF HEALTH CARE PROVIDERS AROUND THE WORLD ☆

Gang Nathan Dong

ABSTRACT

Purpose — Amid increasing interest in how government regulation and market competition affect the cost and financial sustainability in health care sector, it remains unclear whether health care providers behave similarly to their counterparts in other industries. The goal of this chapter is to study the degree to which health care providers manipulate accruals in periods of financial difficulties caused, in part, by the rising costs of labor.

Methodology — We collected the financial information of health care providers in 43 countries from 1984 to 2013 and conducted a pooled cross-sectional study with country and year fixed-effects.

☆ No potential conflict of interest relevant to this chapter was reported.

Findings – The empirical evidence shows that health care providers with higher wage costs are more likely to smooth their earnings in order to maintain financial sustainability.

Originality/value – The finding of this study not only informs regulators that earnings management is pervasive in health care organizations around the world, but also contributes to the studies of financial book-tax reporting alignment, given the existing empirical evidence linking earnings management to corporate tax avoidance in this very sector.

Keywords: Earnings management; health care provider; financial sustainability; tax avoidance

Health care spending in the United States totaled nearly \$2.6 trillion in 2010. Of total spending, half goes to pay the cost of medical services provided by hospitals and physicians. (The Facts About Rising Health Care Costs, Aetna Health Insurance)¹

In any market economy, including the United States, if labor costs rise relative to the prices of machinery, firms will reduce their use of labor and substitute more capital goods in production. However, health care providers are special, providing services that are essential and lifesaving in nature, and traditionally relying on human, rather than physical, capital. From a macro perspective, if labor wages in hospitals and physician clinics keep up with those in other sectors, the costs of providing health care will rise as well. Rising labor costs will cut into the profit margins of health care providers unless the price of providing health care can rise in proportion to its costs. As argued by [Himmelweit \(2007\)](#), firms in the health care sector are limited in how far they can pass on rising costs in higher prices to customers whose income are constrained by their own earning power and many of whom will only stay in employment and purchase care if the gain from doing so makes employment worthwhile. Therefore, to stay profitable or simply to cope with rising costs, health care providers need to resist wage rises or reduce staffing levels. Alternatively, especially when facing short-term uncertainties in revenue and competition, they can purposely manipulate firms' accounting accruals to maintain their financial sustainability, or sometimes, to meet external benchmarks ([Eldenburg, Gunny, Hee, & Soderstrom, 2011](#)) and to assure that they will have working capital on their accounting statements temporarily ([Leone & Van Horn, 2005](#)). This phenomenon of earnings management is pervasive not

only in investor-owned for-profit corporations but also in nonprofit organizations (Petrovits, 2006).

While prior literature in economics and management has examined how labor and its cost affect firm performance in general, the study of how labor costs affect health care providers and whether health care providers use earnings management to smooth profits and costs over time is rare. Brown, Sturman, and Simmering (2003) provide evidence that labor costs in hospitals are a much greater portion of total costs than they are for many other industries. Fisher, Krishnan, and Netessine (2006) suggest that executives see labor more as a cost than a profit-driver. Vitaliano and Toren (1994) attribute the inefficient operation of health care providers to excessive managerial and supervisory personnel and diseconomies of size. In an early study to understand whether hospitals attempt to achieve a target level of earnings that satisfies the budget constraint, Hoerger (1991) finds that nonprofit hospitals minimize the variance in reported earnings. More interestingly, nonprofit hospitals have no incentive to avoid reporting earnings decreases as long as current period earnings are above zero. The author attributes this phenomenon to the lack of monitoring by the equity market because for-profit firms always manage their earnings to avoid market punishment; however this market does not exist in the not-for-profit health care sector.

From the perspective of finance theory, health care service firms are indeed special. Their primary objective may not be solely profit maximization (e.g., also providing uncompensated care) and they may not afford higher wages for their employees relative to firms in other service industries (e.g., financial or energy services), yet they must at least motivate employees to work hard and break even over time to continue as a going concern. How do managers in health care service firms cut labor costs and motivate employees, and provide uncompensated care to the poor and uninsured and show constant growth to the investors? The answer is, in a large part, to manage labor costs and corporate earnings while increasing efficiency and productivity. Prior literature has documented the use of higher wage to incentivize workers and the phenomenon of managing profits to a range that satisfies not only shareholders but also stakeholders such as patients, societies, the media, and the regulator. The labor intensiveness of the health care sector creates a valuable environment in which to test the effects of labor costs and profit manipulation on firm performance because health care providers are a work environment where even the lowest-level employees can have a notable impact on patient care (Langland-Orban, Gapenski, & Vogel, 1996) and their failure can have negative impacts on the society as a whole. The interest to investigate the relationship among

employee wages, earnings management, and firm profitability in this sector naturally arises.

From the Bureau van Dijk (BvD) database we collected labor costs and company financial statements of for-profit health care service providers all over the world. Several unique features of this data set facilitate the current study. First, the sample covers various types of service providers in the health care sector: hospitals, medical clinics, dentists, osteopaths, chiropractors, optometrists, podiatrists, nursing facilities, home care services, dialysis centers, specialty outpatient facilities, and medical laboratories. Second, these firms reside in 43 countries of both developed and emerging economies, which distinguishes our study from previous ones that focus on individual nations. Third, the sample period from 1984 to 2013 covers three economic recessions (July 1990–March 1991, March 2001–November 2001, and December 2007–June 2009),² which enables us to study the phenomenon not only across countries but also over time. The data set has detailed financial information on firm size, financial condition, costs, and profitability, providing additional statistical controls and robustness checks for our study.

Using this unique data set this chapter attempts to provide empirical evidence of the coexistence of rising labor costs and earnings management as the economic determinants of firm performance in the health care sector. The finding reported in this chapter can inform regulators that earnings management is pervasive not only in industrial and service firms but also in health care organizations around the world. In addition, they can help policymakers to improve the understanding and increase the effectiveness of public policies that aims at reducing the cost of health care provision while relying on for-profit private sector providers whose sustainability depends on their profitability.

DATA AND METHODOLOGY

Analyzing the relation between financial performance and labor wage costs and earnings management practices requires collecting firm-level data from the financial statements. We use the OSIRIS dataset from BvD. OSIRIS is a database containing financial information on globally listed public companies from over 190 countries. It contains standardized financial statements for up to 20 years on over 55,000 companies. The focus of our study is on the health care providers; therefore we identify these firms by using

industrial identification code from 8000 to 8099 which covers hospitals, medical clinics, dentists, osteopaths, chiropractors, optometrists, podiatrists, nursing facilities, home care services, dialysis centers, specialty outpatient facilities, and medical laboratories. The final sample includes firms residing in 43 countries of both developed and emerging economies: Australia, Belgium, Bermuda, Brazil, Canada, Cayman Islands, Chile, China, Colombia, Cyprus, Denmark, France, Germany, Greece, India, Indonesia, Israel, Italy, Japan, Jordan, Luxembourg, Malaysia, Mexico, Netherlands, New Zealand, Nigeria, Oman, Pakistan, Palestinian Territories, Poland, Qatar, Republic of Korea, Romania, Singapore, South Africa, Sri Lanka, Sweden, Switzerland, Taiwan, Thailand, Turkey, the United Kingdom, and the United States. [Table 1](#) lists the number of health care providers in each country, population in millions, and number of firms per million population. It is noted that nearly half of the firms are U.S.-based health care service firms; however the number of firms per million population of the United States (6.35) is not too far from the median value of the entire sample (1.64). Bermuda and Cayman Islands have the highest number of firms per million population in the sample although they only represent about 2% of the sample observations. On the other hand, firms in Brazil, China, India, and Indonesia are clearly underrepresented in our sample. This is due to the fact that most health care providers in these countries are not publicly traded firms and the BvD OSIRIS database is only able to collect their financial data if they are listed on the stock exchanges. To control for potential bias we will use country fixed-effects in our cross-sectional OLS regression analysis.

To determine the extent to which labor cost and earnings management are affecting the financial sustainability of a health care provider, we first need to construct a variable that describes a firm's financial performance. Profit Margin (PM) or net margin is a measure of profitability, how much out of every dollar of sales a company actually keeps in earnings, and it is calculated as net income divided by total revenues. Similar to PM as a profitability measure, Return-on-Assets (ROA) measures to how efficient management is at using its assets to generate earnings. ROA is calculated by dividing a firm's earnings by its total assets. The quantity characteristic of these two variables should capture the fact that the higher return on sales (PM) or the higher return on investment (ROA) in the first period, the more likely the firm will survive in the next period, and potentially the more investments and business activities that will take place. To compute the firm's labor cost, we take the wage cost from the firm's financial statement and scaled it by its total cost of goods sold.

Table 1. List of Countries in the Sample.

Country Name	Number of Firms	Population (in Millions)	Number of Firms per Million Population
Australia	143	23.56	6.07
Belgium	21	11.20	1.88
Bermuda	41	0.06	638.26
Brazil	15	202.87	0.07
Canada	99	35.43	2.79
Cayman Islands	56	0.06	1,009.81
Chile	24	17.77	1.35
China	32	1,365.65	0.02
Colombia	74	47.68	1.55
Cyprus	11	0.87	12.70
Denmark	43	5.63	7.63
France	202	65.93	3.06
Germany	185	80.72	2.29
Greece	33	11.12	2.97
India	7	1,246.80	0.01
Indonesia	6	252.16	0.02
Israel	63	8.19	7.69
Italy	13	60.77	0.21
Japan	422	127.09	3.32
Jordan	12	6.61	1.82
Luxembourg	7	0.55	12.73
Malaysia	14	30.20	0.46
Mexico	17	119.71	0.14
Netherlands	6	16.86	0.36
New Zealand	8	4.54	1.76
Nigeria	7	178.52	0.04
Oman	8	4.02	1.99
Pakistan	5	188.02	0.03
Palestinian Territories	4	4.42	0.90
Poland	9	38.50	0.23
Qatar	7	2.17	3.22
Republic of Korea	19	50.42	0.38
Romania	4	19.94	0.20
Singapore	36	5.40	6.67
South Africa	13	52.98	0.25
Sri Lanka	5	20.28	0.25
Sweden	100	9.68	10.33
Switzerland	7	8.16	0.86
Taiwan	19	23.39	0.81
Thailand	106	64.46	1.64
Turkey	8	76.67	0.10
United Kingdom	357	64.11	5.57
United States of America	2021	318.41	6.35

Prior studies of earnings management examine the manipulation of discretionary accruals to produce financial reports that may over- or understate a company's business activities and financial position. The models used in these studies range from the simple, in which the change in total accruals is used as a measure of discretionary accruals to the relatively sophisticated, which decompose accruals into discretionary and nondiscretionary components using regression analysis. The total accruals can be defined as:

$$\text{Total Accruals}_{i,t} = \frac{\Delta \text{Current Assets}_{i,t} - \Delta \text{Current Liabilities}_{i,t} - \Delta \text{Cash}_{i,t} - \Delta \text{Short-Term Debt}_{i,t} - \text{Depreciation}_{i,t}}{\text{Total Assets}_{i,t-1}}$$

where the Δ sign denotes the change in the variable. By definition total accruals include both nondiscretionary (involuntary) and discretionary (voluntary) portions.

Managers cannot alter nondiscretionary accruals to manage earnings because they reflect the fluctuation of business operations.

Healy (1985) proposes a simple method to estimate nondiscretionary accruals by comparing mean total accruals (scaled by lagged Total Assets) across the earnings management partitioning variable. Similarly, DeAngelo (1986) computes first differences in total accruals and assumes that the first differences have an expected value of zero under the null hypothesis of no earnings management. It is noted that both Healy (1985) and DeAngelo (1986) are built on the assumption that nondiscretionary accruals are constant. Jones (1991) relaxes this assumption by controlling for the effects of changes in a firm's economic circumstances on nondiscretionary accruals. The so-called Johns Model estimates nondiscretionary accruals for firm i in year t as:

$$\begin{aligned} \text{Nondiscretionary Accruals}_{i,t} = & \alpha_1 \frac{1}{\text{Total Assets}_{i,t-1}} + \alpha_2 \frac{\Delta \text{Revenues}_{i,t}}{\text{Total Assets}_{i,t-1}} \\ & + \alpha_3 \frac{\Delta \text{Property Plant Equipment}_{i,t}}{\text{Total Assets}_{i,t-1}} \end{aligned}$$

Discretionary accruals are calculated as the residual of the difference between total accruals and the predicted level of nondiscretionary accruals:

$$\text{Discretionary Accruals}_{i,t} = \text{Total Accruals}_{i,t} - \text{Nondiscretionary Accruals}_{i,t}$$

The Jones Model implicitly assumes that revenues are nondiscretionary and therefore extracts the discretionary components of accruals; however, this assumption biases the estimate toward zero earnings management. Recognizing this limitation, [Dechow, Sloan, and Sweeney \(1995\)](#) modify the Jones Model to eliminate the estimation error by deducting account receivables from revenues:

$$\text{Nondiscretionary Accruals}_{i,t} = \alpha_1 \frac{1}{\text{Total Assets}_{i,t-1}} + \alpha_2 \frac{\Delta \text{Revenues}_{i,t} - \Delta \text{Receivables}_{i,t}}{\text{Total Assets}_{i,t-1}} + \alpha_3 \frac{\Delta \text{Property Plant Equipment}_{i,t}}{\text{Total Assets}_{i,t-1}}$$

Rather than assuming that earnings management is not exercised over revenues, this modified Jones Model implicitly assumes that all changes in credit sales actually resulted from earnings management.

In this chapter, nondiscretionary accruals are computed using both the [Jones \(1991\)](#) Model and the modified Jones Model of [Dechow et al. \(1995\)](#). We estimate discretionary accruals by running annual cross-sectional regressions for firms in each country separately because each country has different accounting regulations and business practices.

To control for firm characteristics, we include other covariates like firm size, risk-taking behavior, geographic location, and time. We use two variables to measure the size of a health care provider: Total Assets and the number of employees. The standard measure of firm size in most of the relevant literature is total assets, which is reported in the balance sheet of a hospital's financial statements. To avoid the problem of skewed distribution of firm size and potential outliers that may bias the regression results, we use a natural logarithm transformation of the Total Assets to normalize its distribution:

$$\text{Asset Size}_i = \log(\text{Total Assets}_i)$$

Alternatively, the number of employees can be used as a measure of firm size. While Total Assets measure a firm's financial and fixed capital, the number of employees reflects a firm's human capital, and it is commonly used in the economics literature when alternative measures of firm size such as the Total Assets is not available ([Cabral & Mata, 2003](#)).

Financial leverage is the degree to which a firm (or shareholders) is taking risk by utilizing borrowed money, mainly in the form of debt financing. Leverage magnifies increases in earnings during periods of rising operating income due to the tax benefits of debt, but adds significant risks for stockholders and creditors because of added interest obligations. Because companies that are highly leveraged may be providing better return to investments and having higher probability of bankruptcy at the same time, leverage has been commonly used in the corporate literature as a measure of a firm’s risk-taking behavior. For example in the public finance literature, [Yan and Denison \(2009\)](#) show that nonprofit organizations, particular arts institutions, issue more debt and have higher leverage ratios. For hospital *i*, we define the financial leverage as its debt-to-asset ratio:

$$\text{Leverage}_i = \frac{\text{Debt}_i}{\text{Total Assets}_i}$$

The detailed definition of each dependent and independent variable can be found in [Table 2](#).

It must be recognized that the data availability of financial information of health care providers is limited in many countries and this inevitably restricts the number of countries in our final sample.

This chapter focuses upon assessing the statistical association between firm performance and labor and management behavior by conducting cross-sectional OLS regressions that relates financial returns to wage cost

Table 2. Variable Definitions.

Variable Name	Definition
Number of Employees	Total number of employees of a firm
Total Assets	Total assets in dollar term from the balance sheet
log(Total Assets)	Natural log of total assets
Financial Leverage	Total assets divided by total shareholder equities
Profit Margin	Net income divided by total sales
Return-on-Assets	Net income divided by total assets
Labor Wage	Labor wage divided by total costs
Earnings Management 1	Jones (1991)
Earnings Management 2	Modified Jones (1991)

and earnings management. In the first set of baseline analysis, the regression model takes the following form:

$$\begin{aligned} \text{Financial Performance}_{i,t} = & \beta_0 + \beta_1 \text{Firm Size}_{i,t} + \beta_2 \text{Financial Leverage}_{i,t} \\ & + \beta_3 \text{Wage Cost}_{i,t} + \beta_4 \text{Earnings Management}_{i,t} \\ & + \beta_5 \text{Wage Cost}_{i,t} \times \text{Earnings Management}_{i,t} \\ & + \text{FE(Year)} + \text{FE(Country)} + \varepsilon_{i,t} \end{aligned}$$

The dependent variable is the financial performance of firm i in year t . Here the financial performance is measured by two different variables: PM and ROA. The main predictor variables are labor wage and earnings management. The value of earnings management is estimated using the [Jones \(1991\)](#) model. To account for firm-specific effects, we employ control variables to account for firm size and risk-taking behavior. These control variables include the natural logarithm of the number of employees, the natural logarithm of total assets, and financial leverage. Still, there might be differences across countries and time that are not captured by the control variables and that affect firm performance, labor cost, and earnings management behavior simultaneously. This may lead to biased and inconsistent parameter estimates; therefore, we add both country and year fixed-effects to the regression models to address this concern. In the second set of regression analysis, we reestimate the firm's earnings management by using the model of [Dechow et al. \(1995\)](#). The regression model including all dependent variables, variables of interest, and other control variables remain the same as the baseline model.

RESULTS

The summary statistics for all variables are shown in [Table 3](#). The average number of employees is 4,326 and the average total assets is \$0.79 million. The total assets of an average firm is about 2.83 times of its total equities. The profitability is negative in both measures of PM and ROA, -0.57 and -0.11 respectively. More interestingly, labor cost constitutes only a relatively small portion, roughly 14%, of the total cost of goods and services.

The Pearson's correlations are reported in [Table 4](#). An examination of the correlation matrix indicates that correlations between independent

Table 3. Summary Statistics.

Variable	Mean	Standard Deviation
Number of Employees	4,326	8,245
log(Number of Employees)	6.35	2.48
Total Assets (million \$)	0.79	1.46
log(Total Assets)	11.7	2.48
Financial Leverage	2.83	2.25
Profit Margin	-0.57	1.71
Return-on-Assets	-0.11	0.31
Labor Cost	0.14	3.12
Earnings Management 1	0.003	1.89
Earnings Management 2	0.005	0.18

Table 4. Correlation Matrix.

	log(Number of Employees)	log (Total Assets)	Financial Leverage	Labor Wage	Earnings Management 1	Earnings Management 2	Profit Margin
log(Total Assets)	0.6271						
Financial Leverage	0.1468	0.0549					
Labor Wage	0.4332	0.3214	0.0699				
Earnings Management 1	0.4296	0.4161	-0.0259	0.7287			
Earnings Management 2	-0.3994	-0.3224	-0.1085	-0.3732	-0.2798		
Profit Margin	-0.0561	-0.0660	-0.0409	-0.0075	-0.0227	-0.0165	
Return-on-Assets	-0.0530	-0.0636	-0.0373	-0.0060	-0.0191	-0.0191	0.9730

variables are generally smaller than 0.5 except the variables for firm size (0.6). This low correlation among the covariates helps prevent the problem of multicollinearity that causes high standard errors and low significance levels when both variables are included in the same regression. Further diagnostics indicate no obvious evidence of serious multicollinearity among the covariates.

Table 5 provides the results of the coefficient estimates for the statistical relationship between financial performance and labor cost and earnings management. The dependent variable in all specifications is the firm's PM which is the ratio of the firm's net income and its total sales. The variable of interest is the firm's labor cost and earnings management which is measured by the Jones (1991) model. Across all specifications, firms with more earnings management tend to be more profitable, whereas firms with higher

Table 5. Profit Margin and Earnings Management of Jones (1991) Model.

Dependent Variable: Profit Margin	(1)	(2)	(3)	(4)	(5)	(6)
log(Number of Employees)	1.147*** (18.25)	1.148*** (16.51)	1.134*** (16.32)	1.136*** (16.37)		1.127*** (9.594)
log(Total Assets)					0.976*** (13.11)	0.0170 (0.137)
Financial Leverage	0.0394 (1.469)	0.0224 (0.756)	0.0253 (0.855)	0.0259 (0.877)	0.0443 (1.481)	0.0260 (0.878)
Labor Wage	-0.00627*** (-3.419)		-0.00925*** (-3.838)	-0.00938*** (-3.897)	-0.0109*** (-4.473)	-0.00938*** (-3.892)
Earnings Management		1.077*** (3.612)	1.071*** (3.600)	0.819*** (2.604)	0.759** (2.380)	0.812*** (2.582)
Labor Wage × Earnings Management				0.0185** (2.463)	0.0188** (2.475)	0.0186** (2.475)
Constant	-7.297 (-0.814)	-8.263* (-1.840)	-7.853* (-1.752)	-7.918* (-1.768)	-12.67*** (-2.752)	-8.056* (-1.766)
Year Fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes
N	4,205	3,145	3,145	3,145	3,144	3,144
Adj. R ²	0.096	0.096	0.099	0.101	0.075	0.101
F-Test	6.26***	8.89***	9.06***	9.01***	6.74***	8.83***

The dependent variable is Profit Margin (PM). The independent variables include the natural log of the number of employees, natural log of total assets, financial leverage, labor cost, earnings management, and an interaction term of labor cost and earnings management. The earnings management variable is estimated using the model in Jones (1991). All specifications use OLS regressions with year and country fixed-effects. z-statistics are shown in the parentheses with ***, **, and * indicating its statistical significant level of 1%, 5%, and 10% respectively.

Table 6. Return-on-Assets and Earnings Management of Jones (1991) Model.

Dependent Variable: Return-on-Assets	(1)	(2)	(3)	(4)	(5)	(6)
log(Number of Employees)	0.129*** (25.78)	0.124*** (22.51)	0.123*** (22.31)	0.123*** (22.50)		0.0333*** (3.639)
log(Total Assets)					0.146*** (25.72)	0.117*** (12.13)
Financial Leverage	0.00555** (2.523)	0.00431* (1.794)	0.00447* (1.864)	0.00497** (2.085)	0.00552** (2.374)	0.00494** (2.124)
Labor Wage	−0.000589*** (−4.012)		−0.000603*** (−3.141)	−0.000642*** (−3.368)	−0.000779*** (−4.180)	−0.000732*** (−3.928)
Earnings Management		0.155*** (6.715)	0.154*** (6.698)	0.0883*** (3.599)	0.0864*** (3.595)	0.0879*** (3.661)
Labor Wage × Earnings Management				0.00365*** (7.196)	0.00366*** (7.377)	0.00366*** (7.389)
Constant	−0.615 (−0.832)	−0.858*** (−3.203)	−0.830*** (−3.101)	−0.841*** (−3.169)	−1.769*** (−6.653)	−1.639*** (−6.121)
Year Fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes
N	4,205	3,145	3,145	3,145	3,144	3,144
Adj. R ²	0.161	0.162	0.164	0.177	0.211	0.214
F-Test	10.8***	15.7***	15.6***	16.7***	20.4***	20.3***

The dependent variable is Return-on-Assets (ROA). The independent variables include the natural log of the number of employees, natural log of total assets, financial leverage, labor cost, earnings management, and an interaction term of labor cost and earnings management. The earnings management variable is estimated using the model in Jones (1991). All specifications use OLS regressions with year and country fixed-effects. z-statistics are shown in the parentheses with ***, **, and * indicating its statistical significant level of 1%, 5%, and 10% respectively.

Table 7. Profit Margin and Earnings Management of Modified Jones (1991) Model.

Dependent Variable: Profit Margin	(1)	(2)	(3)	(4)	(5)	(6)
log(Number of Employees)	1.147*** (18.25)	1.147*** (16.49)	1.133*** (16.31)	1.136*** (16.35)		1.126*** (9.583)
log(Total Assets)					0.976*** (13.10)	0.0174 (0.140)
Financial Leverage	0.0394 (1.469)	0.0226 (0.764)	0.0255 (0.862)	0.0261 (0.884)	0.0445 (1.486)	0.0261 (0.885)
Labor Wage	-0.00627*** (-3.419)		-0.00923*** (-3.832)	-0.00938*** (-3.894)	-0.0109*** (-4.469)	-0.00938*** (-3.889)
Earnings Management		1.055*** (3.432)	1.046*** (3.412)	0.771** (2.364)	0.716** (2.164)	0.764** (2.342)
Labor Wage × Earnings Management				0.0188** (2.487)	0.0190** (2.499)	0.0189** (2.499)
Constant	-7.297 (-0.814)	-8.259* (-1.838)	-7.850* (-1.751)	-7.915* (-1.767)	-12.66*** (-2.751)	-8.057* (-1.766)
Year Fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes
N	4,205	3,145	3,145	3,145	3,144	3,144
Adj. R ²	0.095	0.095	0.099	0.101	0.074	0.101
F-Test	6.26***	8.85***	9.03***	8.98***	6.71***	8.80***

The dependent variable is Profit Margin. The independent variables include the natural log of the number of employees, natural log of total assets, financial leverage, labor cost, earnings management, and an interaction term of labor cost and earnings management. The earnings management variable is estimated using the modified Jones (1991) model. All specifications use OLS regressions with year and country fixed-effects. z-statistics are shown in the parentheses with ***, **, and * indicating its statistical significant level of 1%, 5%, and 10% respectively.

Table 8. Return-on-Assets and Earnings Management of Modified Jones (1991) Model.

Dependent Variable: Return-on-Assets	(1)	(2)	(3)	(4)	(5)	(6)
log(Number of Employees)	0.129*** (25.78)	0.124*** (22.50)	0.123*** (22.29)	0.123*** (22.49)		0.0332*** (3.625)
log(Total Assets)					0.146*** (25.71)	0.117*** (12.14)
Financial Leverage	0.00555** (2.523)	0.00435* (1.810)	0.00451* (1.879)	0.00500** (2.098)	0.00555** (2.385)	0.00498** (2.136)
Labor Wage	−0.000589*** (−4.012)		−0.000602*** (−3.133)	−0.000642*** (−3.368)	−0.000779*** (−4.179)	−0.000733*** (−3.928)
Earnings Management		0.153*** (6.426)	0.152*** (6.405)	0.0815*** (3.196)	0.0806*** (3.231)	0.0819*** (3.288)
Labor Wage × Earnings Management				0.00370*** (7.270)	0.00371*** (7.436)	0.00371*** (7.451)
Constant	−0.615 (−0.832)	−0.858*** (−3.200)	−0.829*** (−3.098)	−0.841*** (−3.167)	−1.769*** (−6.651)	−1.640*** (−6.121)
Year Fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes
N	4,205	3,145	3,145	3,145	3,144	3,144
Adj. R ²	0.160	0.161	0.163	0.176	0.211	0.212
F-Test	10.8***	15.6***	14.5***	16.6***	20.3***	20.3***

The dependent variable is Return-on-Assets (ROA). The independent variables include the natural log of the number of employees, natural log of total assets, financial leverage, labor cost, earnings management, and an interaction term of labor cost and earnings management. The earnings management variable is estimated using the modified Jones (1991) model. All specifications use OLS regressions with year and country fixed-effects. *z*-statistics are shown in the parentheses with ***, **, and * indicating its statistical significant level of 1%, 5%, and 10% respectively.

labor cost are more likely to be associated with lower profitability. As a robustness check, we use the number of employees in specifications (1)–(4), total assets in specification (5), and both variables in specification (6) to measure the size of the firm. The five out of six coefficient estimates are positive at 1% significance level, suggesting that larger firms are more profitable in our sample. In specifications (5)–(6), the positive coefficient estimates for the interaction term of labor cost and earnings management indicate that, after controlling for firm size, time, and country, health care providers with higher labor cost also manage their earnings to improve their financial performance.

Next, we use ROA as a measure for financial performance, and the results of the coefficient estimates are reported in Table 6. In addition to firm size, financial leverage, a proxy for risk-taking behavior, is also a significant and positive factor driving the performance. Again, across all countries and in all years, health care providers with more earnings management tend to be more profitable whereas those with higher labor cost are more likely to be associated with lower profitability as the results from specifications (2) and (3), and based on the coefficient estimates from specifications (4)–(6), those with higher labor cost also manage their earnings to improve their financial performance.

It should be recognized that the Jones (1991) model might bias the estimate of earnings management toward zero as we discussed in the previous section. To address this concern, we construct a new variable of discretionary accruals based on Dechow et al. (1995) who modified the Jones Model to eliminate the estimation error by deducting account receivables from revenues. The coefficient estimates reported in specifications (1)–(6) confirm our previous findings that health care providers who face rising labor cost manage their earnings to improve their PM in Table 7 and ROA in Table 8.

DISCUSSION AND CONCLUSION

Policymakers in many countries have been concerned with growing health care costs since the 1970s, and seeking to contain costs by adopting new regulations to control hospital rate, restrict investment, and limit medical procedures (Antel, Ohsfeldt, & Becker, 1995; Davis & Rowland, 1990). Many policymakers began to advocate for health care systems that are market based and responsive to competitive pressure and, in fact, many countries have started implementing market-based health care reforms

since then (Herzlinger, 1997). However, contrary to what happens in other goods and services markets, increased competition in the market of health care provision actually increased costs, according to early studies on the effects of competition. Faced with decreasing government payments and subsidies and intense market competition, health care providers had to resort to other cost cutting measures, for example, cutting back wages and employment downsizing, to increase their earnings to expand operations or merely avoid financial insolvency.

Prior research has shown an asymmetry in the effect of revenue changes on cost cutting measures among health care providers (Brown et al., 2003; Fisher et al., 2006). Specifically, managers who want to avoid a loss will be more willing to cut labor costs when revenues decrease and to limit the increase in labor costs when revenues increase. However, we suspect that given the incentives to keep their profits above zero as suggested by Leone and Van Horn (2005), managers of health care providers might offset the rising cost of labor wage by using a new financial technique, earnings management, which enabled managers to improve their ability to cope with uncertainties in revenue and competition. Despite a large body of papers on accruals manipulation and smoothing in financial accounting literature (e.g., DeAngelo, 1986; Dechow et al., 1995; Healy, 1985; Jones, 1991; Petrovits, 2006), prior studies investigating this phenomenon in health care organizations are scarce (Eldenburg et al., 2011), and little research has been done into the coexistence of rising labor costs and wide use of earnings management among health care service firms. Indeed, the empirical evidence presented in this chapter shows that health care providers with higher wage costs are more likely to manipulate accounting accruals to maintain their financial sustainability.

The finding of this study not only informs regulators that earnings management is pervasive in publicly traded health care service firms around the world, but also contributes to the studies of financial book-tax reporting alignment, given the existing empirical evidence linking earnings management to corporate tax avoidance (Desai & Dharmapala, 2009). There is still one question that interests standard setters left unanswered, however. Is earnings management commonplace or relatively infrequent among not-for-profit health care providers that are not listed on stock exchanges? Such information is likely to be helpful for regulators to assess the pervasiveness of accounting manipulation and the overall integrity of financial reporting in this very special sector. We encourage future research to pay more attention to examining earnings management among nonprofit hospitals and clinics.

NOTES

1. Retrieved from <http://www.aetna.com/health-reform-connection/aetnas-vision/facts-about-costs.html>
2. Business cycle expansion and contractions is retrieved from NBER: <http://www.nber.org/cycles/cyclesmain.html>

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BEST PRACTICES TO PROMOTE OCCUPATIONAL SAFETY AND SATISFACTION: A COMPARISON OF THREE NORTH AMERICAN HOSPITALS

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ABSTRACT

Purpose – Hospitals in North America consistently have employee injury rates ranking among the highest of all industries. Organizations that mandate workplace safety training and emphasize safety compliance tend to have lower injury rates and better employee safety perceptions. However, it is unclear if the work environment in different national health care systems (United States vs. Canada) is associated with different employee safety perceptions or injury rates. This study examines occupational safety and workplace satisfaction in two different countries with employees working for the same organization.

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Methodology/approach – *Survey data were collected from environmental services employees (n = 148) at three matched hospitals (two in Canada and one in the United States). The relationships that were examined included: (1) safety leadership and safety training with individual/unit safety perceptions; (2) supervisor and coworker support with individual job satisfaction and turnover intention; and (3) unit turnover, labor usage, and injury rates.*

Findings – *Hierarchical regression analysis and ANOVA found safety leadership and safety training to be positively related to individual safety perceptions, and unit safety grade and effects were similar across all hospitals. Supervisor and coworker support were found to be related to individual and organizational outcomes and significant differences were found across the hospitals. Significant differences were found in injury rates, days missed, and turnover across the hospitals.*

Originality/value – *This study offers support for occupational safety training as a viable mechanism to reduce employee injury rates and that a codified training program translates across national borders. Significant differences were found between the hospitals with respect to employee and organizational outcomes (e.g., turnover). These findings suggest that work environment differences are reflective of the immediate work group and environment, and may reflect national health care system differences.*

Keywords: HR practices; employee turnover; employee injury; occupational safety; training programs

Hospitals in North America consistently have employee injury rates ranking among the highest of all industries, even when compared to the industries of mining, construction, and manufacturing (Pyper, 2004; Statistics Canada, 2005; Trinkoff, Johantgen, Muntaner, & Le, 2005; United States Department of Labor, 2012). High occupational injury rates among health care workers have been associated with poor workplace safety climate perceptions, job stress, high employee turnover intent, low job satisfaction, and low quality of care (Castle, Engberg, Mendeloff, & Burns, 2009; McCaughey, DelliFraine, McGhan, & Bruning, 2013). Occupational safety studies have emphasized the importance of supervisor and management safety commitment in promoting employee compliance with safe work practices (Gershon et al., 2000; Hofmann & Morgeson, 1999; Vrendenburgh,

2002). Organizations that mandate workplace safety training and emphasize safety compliance tend to have lower injury rates and better employee safety perceptions (Drach-Zahavy, 2010; Gershon et al., 2000; Vrendenburgh, 2002). The effectiveness of safety training has been shown to vary by national culture and organizational climate (Burke, Chan-Serafin, Salvador, Smith, & Sarpy, 2008), suggesting that employee safety perceptions, job satisfaction, and occupational injury rates could reflect larger contextual differences between national health care systems. However, little (if any) evidence is available to determine if the work environment in different national health care systems (e.g., United States vs. Canada) promotes different employee safety perceptions or is related to employee injury rates or turnover. The purpose of this study is to examine safety perceptions, occupational injury rates, job satisfaction, and turnover intent among health care support services workers in two different countries, who are managed by the same organization and were exposed to the same occupational safety training.

BACKGROUND

Organizational climate reflects employee perceptions of the organizational culture, and experiential factors such as being injured on the job can lead to the development of varying perceptions of organizational safety climate among workers (Carr, Schmidt, Ford, & DeShon, 2003; Parker et al., 2003). In the occupational health and safety literature, safety climate is identified as a broad concept encompassing perceptions of safety practices, safety knowledge, organizational safety policies, and safety training, among other factors (James & James, 1989; Neal, Griffin, & Hart, 2000). A substantial body of research has accumulated examining the structure of a safety climate, and it has been established that individuals who perceive that their organization values safety are more likely to comply with safety standards and practices (Christian, Bradley, Wallace, & Burke, 2009; Clarke, 2006; Colley, Lincolne, & Neal, 2013). Safety climate is experienced at both the individual as well as the group level. These are sometimes differentiated as a psychological safety climate and group safety climate. Psychological safety climate for the individual stems from perceptions of safety-related policies, procedures, and practices pertaining to occupational safety matters that impact individual well-being (Christian et al., 2009; James & James, 1989). A group-level climate emerges as individual perceptions of work

environment characteristics are shared among a group of individuals (Christian et al., 2009). Unlike organizational characteristics such as geographic location and size, a health care organization's climate and culture can be changed with time and effort (although climate is easier to change than culture) thus providing an avenue for intervention (Schein, 1992).

Health care organizations have many environmental and experiential antecedents (e.g., being injured on the job) that can negatively impact employee perceptions about the workplace. Many health care employees are regularly exposed to hazards such as verbal and physical assaults by colleagues and patients (Danna & Griffin, 1999; Gates, Fitzwater, & Succop, 2003; McPhaul & Lipscomb, 2004; Taylor & Rew, 2011), and are routinely exposed to direct health risks (e.g., needle sticks) and back injuries through their work in direct patient care (National Institute for Occupational Safety and Health (NIOSH), 2014; Taylor & Rew, 2011). In Canada, the occupations of nursing and health care aid rank as two occupational groups with the highest number of work days lost due to disability or illness at rates that are nearly twice the national average (Pyper, 2004; Statistics Canada, 2005). In the United States, health care providers working in acute care hospitals and long-term care facilities have higher numbers of injury and illness incidents on average than workers in the mining, manufacturing, and construction industries (United States Department of Labor, 2012).

Research on nursing and allied health personnel indicates that workplace-derived injury and illness are associated with negative perceptions of the safety culture within the organization (MacDavitt, Chou, & Stone, 2007; McCaughey et al., 2013). Consequently, poor perceptions of the safety climate have an effect on the relationship between workplace illness and injury and employee outcomes, such as job stress, turnover intention, and job satisfaction (McCaughey et al., 2013). Research indicates that health care workers injured on the job are also less likely to recommend the organization as a place to work or to seek health care (McCaughey et al., 2012), and those who feel unsafe or are exposed to violence on the job experience increased levels of stress that can lead to job-related burnout (Evers, Tomic, & Brouwers, 2002; Gates, Ross, & McQueen, 2006). Monitoring working conditions for health care employees and improving the organizational climate for safety is likely to improve workplace safety and positively impact the organization through improved employee outcomes (e.g., lower turnover rates) as well as directly and indirectly improve the quality of care (Stone & Gershon, 2006).

Numerous studies have shown that supervisor support is associated with positive employee occupational safety outcomes (Mullen & Kelloway, 2009;

Nahrgang, Morgeson, & Hofmann, 2011). Barling, Loughlin, and Kelloway (2002) found that leadership support is associated with positive safety climate perceptions, and that positive safety climate perceptions have been empirically linked to fewer injuries (Zohar, 2000). A multi-industry meta-analysis examined antecedents to safety outcomes and found that leadership support was associated with engagement, job satisfaction, and safety compliance (Nahrgang et al., 2011). These constructs were also related to lower levels of occupational injury, adverse events, and unsafe behavior (Nahrgang et al., 2011). Other studies have shown that supervisor support was associated with lower occupational injury rates among workers (Barling et al., 2002; Gershon et al., 2000; Vrendenburgh, 2002; Zohar, 2002) and increased safety compliance among health care workers (Gershon et al., 2000; McCoy et al., 2001). In contrast to leadership support, other studies have found that an absence of leadership support is associated with decreased job satisfaction and increased turnover intent among direct care workers (McCaughey et al., 2012). Despite the relationship between leadership support and occupational outcomes, there is limited evidence supporting the efficacy of safety training programs on the prevention of injuries sustained by health care workers. Results from these studies were mixed and offered no consistent training/injury relationships (Craib, Hackett, Back, Cvitkovich, & Yassi, 2007; Massy-Westropp & Rose, 2004). However, a study by Drach-Zahavy found that mandatory safety training for nurses moderately reduces workplace injuries (2010).

One possible reason for the lack of evidence linking safety training with occupational injury and safety outcomes is the role the larger organizational and contextual variables may play in safety and accidents. One study found that perceived organizational support was significantly related to safety communication, and that leader–member exchange was significantly related to safety communication, safety commitment, and accidents (Hofmann & Morgeson, 1999). In addition, general organizational climate exerts a significant impact on safety climate, and safety climate is related to compliance with safety regulations, procedures, and participation in safety-related activities within the workplace (Neal, Griffin, & Hart, 2000). These studies suggest that organization-specific contexts, such as organizational climate and organization-specific leadership exchanges with employees, may override the uniform safety training efforts of one company across multiple locations. Organizational factors have also been shown to have direct and indirect effects on worker safety and outcomes such as accidents and injuries (Smith-Crowe, Burke, & Landis, 2003; Zacharatos, Barling, & Iverson, 2005). These contextual effects between organizations could be further

influenced by international and/or cultural differences between safety perceptions, training effectiveness, and employee outcomes. However, with only one notable exception, the effects of national cultural differences on safety training effectiveness or safety climate perceptions have been overlooked (Burke et al., 2008), even though there are many studies which have shown strong effects of national culture on organizations and organizational climate (Huang & van de Vliert, 2004; Nelson & Gopalan, 2003). Burke and colleagues (2008) argue that uncertainty avoidance is different among cultures, and may moderate the effectiveness of safety training interventions. They found modest support that national culture does influence the effectiveness of safety training, as explained by the variation in uncertainty avoidance between nations (Burke et al., 2008). However, this study was a meta-analysis using 68 organizations from a variety of industries in 14 nations, with different safety training programs, and differences in safety training effectiveness could have been due to industry differences or differences in training. In addition, Burke et al. did not examine safety outcome differences after the training (2008). As such, the influence of national culture differences on safety perceptions, occupational injury rates, job satisfaction, and turnover intent remains unclear.

Our study addresses this gap in the literature by examining safety perceptions, occupational injury rates, job satisfaction, and turnover intent among health care support service workers in two different countries, who are managed by the same organization and were exposed to the same occupational safety training. The following hypotheses were developed from the preceding review of the literature, and will be tested using data from a survey of health care support workers from one US and two Canadian hospitals.

H1a. Supervisor safety leadership actions are positively related to individual perceptions of personal safety and unit safety.

H1b. Organization safety leadership actions are positively related to individual perceptions of personal safety and unit safety.

H1c. Safety training perceptions are positively related to individual perceptions of personal safety and unit safety.

H2a. Job satisfaction is related to individual perceptions of supervisor support, coworker support, personal safety, and unit safety.

H2b. Turnover intentions are related to individual perceptions of supervisor support, coworker support, personal safety, and unit safety.

H3. Individual perceptions of personal and unit safety are related to experiencing a workplace injury.

In addition, this study will examine whether safety practices and perceptions differ between US and Canadian hospitals.

METHODS

Data were obtained from a study examining the safety perceptions of hospital employees from two support service departments (environmental services and food and nutrition). A nonexperimental survey design was utilized to test the proposed conceptual model. Written approval to conduct the study was obtained from the researchers' University Institutional Review Board as well as the relevant Ethics/IRB Committees of the hospitals involved in the study.

Participants

The participants are a convenience sample that includes support services workers from three acute-care hospitals, two located in Vancouver, Canada, and one in Trenton, New Jersey, USA. These service workers are all employed by a single large international company that manages the food services departments for hospitals. These employees all work for the same company and have received the same safety training regardless of the employee nation or location. Each employee undergoes a training session that is focused on work practices that promote employee safety and well-being and receives regular feedback from supervisors on their follow through of these practices. At the request of the participating organization, the three hospital sites were selected by them for inclusion in the study.

Approximately 435 paper and pen questionnaires concerning workplace perceptions were distributed with 352 employees (81% response rate) returning completed questionnaires. All department employees were invited to participate in the survey by the study's research investigators. Recruitment was done in each department and survey dates were set that facilitated employees completing the surveys while at work. There were 111 respondents at the New Jersey hospital and 241 respondents at the two Vancouver hospitals; 165 at one hospital and 76 at the other hospital.

Approximately 31% of the sample is male and 69% female. With regard to employment length, 12% reported less than 1 year, 40% reported 1–5 years, 35% reported 6–10 years, and 14% reported greater than 10 years. Next, 3% of participants are under 26 years old, 9% are 26–35 years, 31% are 36–45 years, and 57% are over 45 years. With regard to level of education, 41% have a high school or less education, 23% have some college or technical education, and 36% have a degree from a postsecondary institution. Finally, 36% report their health as excellent, 37% reported very good, 23% reported good health while 4% rated their health as fair/poor.

Measures

Survey items used in the questionnaire were derived from the Agency for Healthcare Research and Quality (AHRQ) (2014) *Patient Safety Culture Survey* and the United States Department of Health and Human Services' (2012) *National Health Care Surveys*. Employee, supervisor, and management safety items were adapted from the *Patient Safety Culture Survey* to reflect employee safety. Supervisor and coworker support items were derived from *National Health Care Surveys*. Unless otherwise noted, all items were scored on a five-point, Likert-type scale from strongly disagree (1) to strongly agree (5). Mean values, standard deviations, and measures of internal consistency (Cronbach's alpha) for the dependent and independent variables are depicted in Table 1.

Supervisor Safety Leadership

Two items derived from the *Patient Safety Culture Survey* were used to examine supervisor safety leadership actions and were adapted to reflect employee safety (Agency for Healthcare Research and Quality, 2014). A sample item was "My supervisor says a good word when he/she sees a job done according to established worker safety procedures." Cronbach's alpha = .74.

Organization Safety Leadership

Two items derived from the *Patient Safety Culture Survey* were used to examine organizational safety leadership and were adapted to reflect employee safety (Agency for Healthcare Research and Quality, 2014). A sample item was "The actions of hospital management show that worker safety is a top priority." Cronbach's alpha = .75.

Table 1. Descriptive Statistics, Zero-Order Correlations, and Scale Reliabilities.

Variable	<i>M</i>	<i>SD</i>	α	1	2	3	4	5	6	7	8	9	10
1. Supervisor safety leadership	3.79	.90	.74										
2. Organization safety leadership	3.88	.85	.75	.57**									
3. Safety training	3.99	.87	—	.36**	.49**								
4. Individual safety perceptions	3.87	.96	—	.48**	.46**	.31**							
5. Unit safety grade	3.71	.86	—	.48**	.49**	.47**	.31**						
6. Supervisor support	3.67	.88	.87	.62**	.48**	.44**	.38**	.49**					
7. Coworker support	3.50	.90	.78	.55**	.49**	.38**	.29**	.52*	.63**				
8. Job satisfaction	3.89	1.10	—	.32**	.27**	.32**	.20**	.42**	.45**	.45**			
9. Turnover intent	2.54	1.21	—	-.13*	-.12*	-.21**	-.20**	-.22**	-.17**	-.15*	-.25**		
10. Employee injuries	.30	.46	—	-.04	-.04	-.04	-.05	-.06	-.03	-.04	-.06	.03	

Note: * $p < .05$; ** $p < .01$ (two-tailed test). Dichotomous variable—Employee injuries: 0 = none, 1 = injured. $N = 352$.

Safety Training

A single-item measure was used to evaluate safety training. The item “In general, how useful are these safety programs in helping you be safe at work” was measured on a five-point, Likert-type scale as follows: failing (1), poor (2), acceptable (3), very good (4), and excellent (5).

Supervisor Support

Four items derived from the *National Health Care Surveys* were used to examine supervisor support (United States Department of Health and Human Services, 2012). A sample item was “My supervisor tells me when I am doing a good job.” Cronbach’s $\alpha = .87$.

Coworker Support

Three items derived from the *National Health Care Surveys* were used to examine coworker support (United States Department of Health and Human Services, 2012). A sample item was “People support one another in this unit.” Cronbach’s $\alpha = .78$.

Individual Safety Perceptions

A single-item measure from the *Patient Safety Culture Survey* was used to examine individual safety perceptions (Agency for Healthcare Research and Quality, 2014). The item was “Our procedures & systems are good at preventing injuries from happening.”

Unit Safety Grade

A single-item measure from the *Patient Safety Culture Survey* (Agency for Healthcare Research and Quality, 2014) was used to examine unit safety grade and was adapted to reflect employee safety. The item “Please give your work area/unit in this hospital an overall grade on worker safety” was measured on a five-point, Likert-type scale as follows: failing (1), poor (2), acceptable (3), very good (4), and excellent (5).

Job Satisfaction

A single-item measure from the *National Health Care Surveys* was used to examine job satisfaction (United States Department of Health and Human Services, 2012). The item “Overall, how satisfied are you with your current job?” was measured on a five-point, Likert-type scale as follows: (1), not at all satisfied; (2), somewhat dissatisfied; (3), neutral; (4), somewhat satisfied; and (5) very satisfied.

Turnover Intention

A single-item measure from the *National Health Care Surveys* was used to examine turnover intent (United States Department of Health and Human Services, 2012). The item, “How likely is it that you will leave your job in the next year?,” was measured on a five-point, Likert-type scale as follows: (1), not at all likely; (2), probably not likely; (3), undecided; (4), somewhat likely; and (5) definitely likely.

Employee Injuries

Occupational injuries were self-reported as number of injuries experienced at work (none, 1–2 injuries, 3 injuries, 6–10 injuries, greater than 10) during the previous six months. As 93% of the sample reported 1–2 injuries, the responses were then recoded into two categories in order to facilitate data analysis: (a) no injuries (0) and (b) 1 or more injuries (1).

Control Variables

Five control variables were included that could impact the interpretation of the results: years of experience, age, gender, education level, and overall self-rated health status. The scarcity of research investigating workplace safety perceptions of hospital support service employees was the impetus to control for potentially influential factors. We controlled for years of experience with the organization, with the belief that an employee who had worked at the organization longer would feel safer and be more likely to hold positive views of their personal, unit, supervisor, and organization’s commitment to safety. Age was controlled for with the belief that older workers are more likely to be safety conscious and thus more alert to the safety environment. Gender was also controlled for, with the belief that men, given their typically larger stature than women, would likely feel safer and believe their safety culture to be greater. Education level was included as employees with higher levels of education are more likely to view support services positions as an interim position and be seeking other employment (Belman, Dale, & Golden, 2000). Finally, overall health status was included as a control factor given the study’s purpose is to examine the factors that are related to employee occupational health with the exploratory goal of determining if positive self-health has a relationship with employee occupational safety perceptions.

Data Analysis

The data were analyzed using SPSS Version 22 and employed both hierarchical regression and binary logistic regression. Hierarchical regression is

well suited to the analysis of the direct effects of the independent variables in addition to examining the effects of the control variables. Binary logistic regression is the appropriate analytic technique to use with a binary categorical dependent variable (employee injuries) and served to analyze the relationship of the variables individual safety perceptions and unit safety grade on employee workplace injuries (Field, 2009; Tabachnick & Fidell, 2007).

RESULTS

Zero-order correlations, sample means, standard deviations, and internal consistency alphas for the study variables and the selected control variables are given in Table 1. An analysis of the descriptive table identified no multicollinearity issues (Tabachnick & Fidell, 2007). In terms of the number of injuries, 104 of the respondents (30%) reported injuries in the previous 6 months. As indicated in Table 2, a series of four regression models was used to examine the hypothesized relationships between supervisor safety leadership/organization safety leadership/safety training (independent variables) and support service employees' individual safety perceptions and unit safety grade (dependent variables). Next, we examined the hypothesized relationships between supervisor support/coworker support/individual safety perceptions/unit safety grade (independent variables) and support service employees' job satisfaction and turnover intentions (dependent variables). Finally, binary logistic regression was used to evaluate the relationship between safety perceptions (individual and unit) and reported injury rates.

Model 1A (Table 2) examined the direct effect relationships between supervisor safety leadership, organization safety leadership, and safety training on individual safety perceptions. Results for Model 1A ($R^2 = .326$, $p < .001$) show that individual safety perceptions are positively related to supervisor safety leadership ($\beta = .306$, $p < .001$) and positively related to organization safety leadership ($\beta = .268$, $p < .001$). Safety training, however, was not significant. Collinearity statistics show that no variables in Model 1A have variance inflation factor (VIF) score greater than 3 or tolerance below .30, so multicollinearity among the independent variables was not found (Field, 2009). None of the control variables were found to be significant in this model.

Model 1B (Table 2) examined the direct effect relationships between supervisor safety leadership, organization safety leadership, and safety

Table 2. Relationship of Safety Leadership and Workplace on Safety and Occupational Wellness.

	Dependent Variables			
	Model 1A and B: Effect of safety leadership on		Model 2A and B: Effect of workplace perceptions on	
	A: Individual safety perception	B: Unit safety grade	A: Job satisfaction	B: Turnover intentions
	Model 1			
	β	β		
<i>Independent variables</i>				
Supervisor safety leadership	.306**	.286**		
Organization safety leadership	.268**	.158*		
Safety training	.075	.243**		
<i>Control variables</i>				
Years of experience	-.109	.020		
Age	.009	-.029		
Sex	-.084	-.012		
Level of education	-.047	-.217**		
Self-rated health	.012	.170*		
	Model 2			
			β	β
<i>Independent variables</i>				
Supervisor support			.244*	.036
Coworker support			.235*	.015
Individual safety perception			-.019	.073
Unit safety grade			.155*	-.173*
<i>Control variables</i>				
Years of experience			-.065	.041
Age			.080	-.002
Sex			.001	.055
Level of education			-.235**	.172*
Self-rated health			.034	-.034
	Final Model Results			
$R^2 \Delta$ with independent variables	.275	.275	.237	.040
R^2	.326	.470	.378	.108
F-value	35.87**	45.43**	23.55**	2.76*
DF	3,264	3,263	4,247	4,246

Note: ** $p < .01$, * $p < .05$. $N = 250$.

training on unit safety grade. Results for Model 1B ($R^2 = .470$, $p < .001$) show that individual safety perceptions are positively related to supervisor safety leadership ($\beta = .286$, $p < .001$), positively related to organization safety leadership ($\beta = .158$, $p = .008$), and positively related to safety training ($\beta = .243$, $p < .001$). Collinearity statistics show that no variables in Model 1B have VIF score greater than 2 or tolerance below .50, so multicollinearity among the independent variables is not an issue (Field, 2009). Employee level of education was found to be negatively related to unit safety grade ($\beta = -.217$, $p < .001$) while self-rated health was positively related to unit safety grade ($\beta = .170$, $p = .001$). Overall, these results offer support for H1a and H1b that both supervisor safety leadership and organization safety leadership have positive relationships with individual safety grade and unit safety rating while, in partial support of H1c, safety training was found to be significantly related to unit safety grade only.

Model 2A (Table 2) examined the direct effect relationships between supervisor support, coworker support, individual safety perceptions, and unit safety grade on job satisfaction. Results for Model 2A ($R^2 = .378$, $p < .001$) show that job satisfaction is positively related to supervisor support ($\beta = .244$, $p = .001$), positively related to coworker support ($\beta = .235$, $p = .001$) and positively related to unit safety grade ($\beta = .155$, $p = .023$). Individual safety perceptions were not significant. Collinearity statistics show that no variables in Model 2A have VIF score greater than 2 or tolerance below .50, so multicollinearity among the independent variables is not an issue (Field, 2009). Employee level of education was found to be negatively related to job satisfaction ($\beta = -.235$, $p < .001$).

Finally, Model 2B examined the direct effect relationships between supervisor support, coworker support, individual safety perceptions, and unit safety grade on turnover intentions. Results for Model 2B ($R^2 = .108$, $p = .028$) show that turnover intention is only negatively related to unit safety grade ($\beta = .173$, $p = .036$). However, supervisor support, coworker support, and individual safety perceptions were not significant. Collinearity statistics show that no variables in Model 2B have VIF score greater than 2 or tolerance below .50, so multicollinearity among the independent variables is not an issue (Field, 2009). Employee level of education was found to be positively related to turnover intention ($\beta = .172$, $p = .009$). Overall these results offer mixed findings for H2a and 2b. In partial support of H2a, supervisor and coworker support as well as unit safety grade were significantly related to job satisfaction, while individual safety perceptions was not. H2b was also only partially supported, only unit safety grade was found to be negatively related to turnover intent.

Binary logistic regression was used to examine the relationships between individual safety perceptions and unit safety grade on employee workplace injury. Results of the individual safety perceptions and unit safety grade on employee workplace injury analysis are given in Table 3; note the referral group for the analysis is the noninjured group. The regression results show that individual safety perceptions are not significantly related to being injured at work. However, in partial support of H3, the regression results found that unit safety grade is significantly related to being injured at work ($\beta = -.278$, $\exp\beta = .757$, $p = .030$). This means, as unit safety perceptions decrease by one unit, the odds of being injured at work (compared to not being injured) increase by 1.32 ($1/\exp\beta$). In other words, as employees' unit safety perceptions decline by unit of safety, they are one and a third times more likely to report being injured at work.

Finally, post hoc ANOVAs were run to determine the differences in safety climate, turnover intent, satisfaction, and support between the three hospitals in the sample (see Table 4). Organization safety leadership was found to have significant differences ($F = 4.0$, $p = .019$); the New Jersey hospital had significantly higher means than either of the Vancouver hospitals. Unit safety perceptions was also found to have significant differences ($F = 21.16$, $p < .001$); the New Jersey hospital again had significantly higher means than either of the Vancouver hospitals. Supervisor ($F = 7.30$, $p = .001$) and coworker support ($F = 7.30$, $p = .049$) were also both significantly different; the smaller Vancouver hospital had significantly higher means on supervisor support than the large Vancouver or New Jersey hospitals and a higher mean on coworker support than the large Vancouver hospital. Both job satisfaction ($F = 9.35$, $p < .001$) and turnover intent

Table 3. Binary Logistic Regression: Injury Odds Ratios per Ratings of Individual Safety Perceptions and Unit Safety Grade.

Independent Variables	Employees Reporting Workplace Injury (Reference Is No Injuries)				
	β (SE)	<i>p</i> -value	95% CI for odds ratio/ $\exp\beta$		
			Lower	Odds ratio	Upper
Individual safety perceptions	-.072 (.121)	.551	.734	.930	1.18
Unit safety grade	-.278 (.128)	.030	.589	.757	.973
Constant	.222 (.544)	.683		1.249	

Note: $R^2 = .013$; .020. Model $\chi^2 = 6.83$, $p = .033$.
Those results that are significant have been bolded.

Table 4. Analysis of Hospital Differences.

Dependent Variable	<i>F</i> (DF)	Sig.*	Mean Hospital A (New Jersey)	Mean Hospital B (Vancouver-Lg.)	Mean Hospital C (Vancouver-Sm.)	LSD ^{*†}
Supervisor safety leadership	2.83 (2, 325)	.060	3.87	3.68	3.95	N/S
Organization safety leadership	4.0 (2, 311)	.019	4.09	3.79	3.82	A > B, C*
Safety training	2.92 (2, 326)	.055	4.15	3.88	4.00	N/S
Individual safety perceptions	1.34 (2, 330)	.262	3.96	3.78	3.95	N/S
Unit safety perceptions	21.16 (2, 3.23)	<.001	4.22	3.54	3.72	A > B, C [†]
Supervisor support	7.30 (2, 318)	.001	3.68	3.52	4.00	C > A, B ^{*†}
Coworker support	3.06 (2, 321)	.049	3.59	3.37	3.65	C > B*
Job satisfaction	9.35 (2, 313)	<.001	4.29	3.69	3.79	A > B, C ^{†*}
Turnover intent	8.79 (2, 308)	<.001	2.11	2.72	2.73	B, C > A ^{†*}
Workplace injury	6.28 (2, 349)	.002	.18	.32	.41	A < B, C ^{†*}

Note: [†] $p < .01$, * $p < .05$.

Those results that are significant have been bolded.

($F=8.79$, $p<.001$) were also significantly different; the New Jersey hospital had significantly higher job satisfaction than the two Vancouver hospitals, while the two Vancouver hospitals both had significantly greater (poor) turnover intention means than the New Jersey hospital. Finally, the ANOVA found significant differences ($F=6.28$, $p=.002$) between the New Jersey hospital and the two Canadian hospitals on injury rates; the New Jersey hospital having lower injury rate means. These differences were compared across hospitals to examine organizational differences in safety climate, turnover intent, satisfaction, and support, and to observe whether there are differences in US and Canadian hospitals.

DISCUSSION

While previous research has examined the relationship between supervisor/coworker support on safety perceptions (Barling et al., 2002), occupational injury rates (Zohar, 2000), job satisfaction, and turnover intent (McCaughey et al., 2012; Nahrgang et al., 2011), the potential influence of contextual differences between countries remains unclear. There has been little research in health care comparing safety perceptions in similar organizational contexts in different countries (Burke et al., 2008). The purpose of this study was to examine safety perceptions, occupational injury rates, job satisfaction, and turnover intent among health care workers in two different countries, who are managed by the same organization and were exposed to the same occupational safety training.

Results of this study indicate that individual safety perceptions were positively related to supervisor safety support, and positively related to organization safety support. This finding is consistent with previous literature in other health care settings (McCaughey et al., 2012). Safety training, however, was not related to individual safety perceptions of the overall organization, but was positively related to unit safety grade, indicating an overall cohort effect on safety perceptions. This finding is supported by previous research which has found mixed results on the overall effectiveness of safety training (Craib et al., 2007; Massy-Westropp & Rose, 2004). The results of this study also indicate that job satisfaction is positively related to supervisor support, positively related to coworker support, and positively related to unit safety grade. This finding is consistent with a meta-analysis which demonstrated that supervisor and coworker support are positively related to job satisfaction (Nahrgang et al., 2011). However, individual

safety perceptions of the overall organization were not associated with job satisfaction, which is inconsistent with previous research that has found a positive relationship between the two constructs (McCaughey et al., 2013). However, job satisfaction was positively related to unit safety grade, supporting previous research that has found a relationship between job satisfaction and safety climate perceptions of the unit among hospital nurses (Hofmann & Mark, 2006). These findings can be interpreted to mean that individuals may have more positive perceptions of the safety climate within their proximal group (as indicated by unit-level safety grade), as opposed to the broader organization. This discrepancy in our findings can be explained by previous research on team climates in hospitals, which has demonstrated that health care workers are more likely to have similar perceptions of their immediate environment or group when compared to the less immediate and unknown organizational environment (Anderson & West, 1998). Similarly, our results also show that turnover intention is only negatively related to unit safety grade, and not individual safety perceptions.

The results of this study also show that individual safety perceptions of the organization are not significantly related to being injured at work, but that unit safety grade is significantly related to being injured at work (the lower the grade, the higher the rate of injury – meaning people who have been injured at work are more likely to perceive the unit as less safe). Again, this finding is consistent with previous research when one considers the group unit safety grade to be more reflective of the proximal safety climate, as opposed to the overall organizational safety climate. Previous research has found a relationship between positive unit or team safety perceptions and low occupational injury rates among nurses in intensive care units (Stone & Gershon, 2006). The results of the current study also indicate that there were differences between hospitals. Organizational safety leadership and support, and unit safety perceptions, were significantly higher in the New Jersey hospital. Correspondingly, the New Jersey hospital also had significantly higher job satisfaction than the two Vancouver hospitals, while the two Vancouver hospitals both had significantly higher turnover intent. The New Jersey hospital also had lower occupational injury rates than the Vancouver hospitals. Supervisor and coworker support were inconclusive about international differences, as one Vancouver hospital was not significantly different from the New Jersey hospital. However, size may be an explanatory factor – the smaller Vancouver hospital had higher ratings of supervisor and coworker support. Given that the workers in all three hospitals were exposed to the same safety training and that supervisor support was similar among the New Jersey hospital and one Vancouver hospital, it

is possible that there may be larger contextual differences, such as culture, national and organizational policies, and overall employee attitudes, between the hospitals. In addition, worker education was significantly related to job satisfaction and turnover intent. Workers with more education had higher job satisfaction and lower turnover intent. This finding is consistent with a meta-analysis of hospital-based nurses that generally found higher education level to be associated with higher job satisfaction and lower turnover intent (Coomer & Barriball, 2006).

This research is one of the first studies to examine safety perceptions, occupational injury rates, and job satisfaction among health care support services workers with an international context. One strength of this study is that the support services workers in our sample are all managed by the same organization and were exposed to the same safety training. However, this study has several limitations which should be considered. First, there are only three hospitals in our sample, which means we cannot draw any definitive conclusions about potential international contextual differences based on three hospitals. However, our findings do raise further questions about the possibility of larger contextual effects and international differences on safety perceptions and occupational injury rates. More research with a more robust and representative international sample is needed to fully address this question. Second, this study is based on survey data, which is subject to individual bias. Employees were asked to self-report injury data, and employee recall is likely less accurate than actual occupational injury claims (Landen & Hendricks, 1995). In addition, the constructs in this study use only one to two items to measure a construct. Although these items are from previously validated instruments, the use of single and double item measures limits the reliability of the survey. This is a significant limitation of this study, but was done to keep the survey short and increase participation rates. Finally, while perceptions of safety culture and climate have been studied in numerous occupational settings, these findings may not be applicable to all health care workers, or workers in other occupational settings. Future research should include hard measures of occupational injury rates across a variety of health care workers.

CONCLUSION

For health care managers aiming to reduce occupational injury rates, this study offers some support for occupational safety training as a viable mechanism to reduce employee injury rates, and that a codified training

program may translate across national borders. In addition, organizational and supervisor support are another effective means of reducing occupational injury rates, and may have an added benefit of increased job satisfaction and reduced turnover intent. Given the high turnover rate of some occupations in the health care setting (Brannon, Barry, Kemper, Schreiner, & Vasey, 2007), this may be a relatively low cost but high impact solution to a pervasive turnover problem. Significant differences were found between the hospitals with respect to employee and organizational outcomes, and these findings suggest that work environment differences are reflective of the immediate work group and environment, and health care managers have the ability to influence safety perceptions and outcomes of their immediate work group despite organizational influences. These differences may also reflect national health care system differences, which need further research to thoroughly understand.

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INTERNATIONAL COMPARISON OF PREOPERATIVE TESTING AND ASSESSMENT PROTOCOLS AND BEST PRACTICES TO REDUCE SURGICAL CARE COSTS: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

Purpose – Health care institutions in many Western countries have developed preoperative testing and assessment guidelines to improve surgical outcomes and reduce cost of surgical care. The aims of this chapter are to (1) summarize the literature on the effect of preoperative testing on clinical outcomes, efficiency, and cost; and (2) to compare preoperative testing guidelines developed in the United States, the United Kingdom, and Canada.

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Design/methodology/approach – *We reviewed the literature from 1975 to 2014 for studies and preoperative testing guidelines.*

Findings – *We identified 29 empirical studies and 8 country-specific guidelines for review. Most studies indicate that preoperative testing is overused and comes at a high cost. Guidelines are tied to payment only in one country studied. This is the most recent review of the literature on preoperative testing and assessment with a focus on quality of care, efficiency, and cost outcomes. In addition, this chapter provides an international comparison of preoperative guidelines.*

Keywords: Preoperative testing; preoperative guidelines; perioperative surgical home; cost; clinical outcomes; operating room efficiency

INTRODUCTION

Most Western nations have an abundance of expensive medical specialties and accompanying technologies, modern procedures and high-tech options, state of the art diagnostic testing and screening tools, and various treatment options for the sick, very sick, and the terminally ill. However, these advanced economies are faced with accelerating per capita health care costs and the need to control health care spending while assuring access to necessary and appropriate medical care and treatment. The United States spends about 180 billion dollars per year on inpatient surgical procedures in non-federal hospitals alone. Furthermore, the average cost of surgery continues to climb – from \$13,000 per hospitalization in 2000 to \$18,000 (inflation adjusted) in 2010 – and patient safety, outcomes, and readmissions are ongoing concerns ([National Center for Health Statistics \(US\), 2013](#)). Some countries, including the United States, the United Kingdom, and Canada, are continuously looking for models of care and best practices that result in meaningful cost savings. The purpose of this chapter is to (1) summarize the literature on the effect of preoperative testing on clinical outcomes, efficiency, and cost; and (2) to discuss and compare preoperative testing guidelines developed in the United States, the United Kingdom, and Canada. Results from this review of literature clearly indicate opportunities for reducing surgical care costs by reducing or eliminating unnecessary preoperative testing and assessments; these practices, at one time acceptable and viewed as necessary, are no longer contributing value to patients, surgical outcomes, and health care systems as a whole.

Advances in surgical outcomes research, standardization of surgical care processes, reductions of medical errors, and improved surgical care coordination have marked much of the last 30 years in medical and surgical history trends (Lee, Kerridge, Chui, Chiu, & Gin, 2011). We are, better than ever before, able to track and study surgical outcomes as we are able to affect and adjust specific patient characteristics, preoperative testing and preparation procedures, and even skip preoperative tests and assessments that have been part of traditional surgical care and practice (Frost, 2012). Today, both medical practitioners and health care policy makers are faced with a considerable amount of information based on empirical studies of surgical outcomes, efficiencies, and costs related to alternative preoperative care options. Results from these published studies have triggered discussions about opportunities for reducing the cost of surgical care in many Western countries engaged in research about clinical outcomes and cost of care (Chung, Yuan, Yin, Vairavanathan, & Wong, 2009). Policy makers at the state and national level, medical specialty associations, graduate medical education, and payors are engaged in improving and updating the preoperative testing and assessment protocols used by surgeons and anesthesiologists, which, in a few countries, have resulted in national surgical care guidelines and best practices (Chung et al., 2009). All these efforts aim to reduce the cost of surgical care while ensuring expected clinical outcomes and improving the patient experience. In this chapter we aim first to summarize the results of surgical care studies that measure the effect of preoperative testing practices on clinical outcomes, surgical efficiency, and cost; and second to offer insights about resulting preoperative surgical care guidelines that have evolved and been implemented in selected countries as a result of this research.

BACKGROUND

The broad concept of a perioperative surgical system, which includes coordinated and evidence-based preoperative testing and assessment initiatives, has been evolving, described, studied, and recorded, mostly in North America, Europe, and Australia, in the last 40 years. This observed paradigm shift in surgical care processes has been explained as part of a general international trend of surgical specialties and capabilities moving from the inpatient to the ambulatory care setting (Reed & Ford, 1976), and by increased market expectations for high quality surgery outcomes, reductions

in the cost of surgery, and expected government payment and incentive programs. A recent article by Vetter and colleagues identified potential benefits of a coordinated perioperative surgical system, including improved patient safety and surgical outcomes, by moving from the traditional reactive and sequential surgical process to a more proactive, coordinated, and team-based approach (Vetter et al., 2013).

Key features of such coordinated surgical care processes are often referred to as the “Perioperative Surgical Home” in the United States, as it resembles several of the elements and the purpose of the well-known patient-centered medical home initiatives for chronic disease management and primary care coordination (Vetter et al., 2013). In many other countries, the “perioperative process” of surgery is often referred to and studied as one of the components of the surgical home, such as patient-centered coordinated surgery programs or fast-track protocols (Kehlet & Wilmore, 2005). All of these surgical care coordination initiatives depend heavily on advancements in knowledge about necessary and relevant preoperative testing and assessment practices.

One of the most frequently implemented components of surgical care coordination programs is the use of some form of systematic preoperative testing. These efforts may take the form of a standardized set of testing guidelines, a centralized and integrated virtual or bricks-and-mortar preoperative testing clinic, or an effort to reduce expensive repeated testing and assessments by improving information sharing capabilities or even integrating surgery and anesthesiology practice health information systems with the hospital’s electronic medical record system. Preoperative testing and assessment practices can include (American Society of Anesthesiologists, 2012):

- Preanesthetic history and physical examination
- Electrocardiogram (ECG)
- Cardiac stress testing
- Chest radiography
- Pulmonary evaluation
- Hemoglobin measurement
- Coagulation studies
- Serum chemistries
- Urine testing
- Pregnancy testing
- Other procedure-specific tests

Excessive preoperative testing continues despite convincing evidence of opportunities for improved or same surgical outcomes and cost savings by

reducing testing. Researchers from the University of Arizona identified five key factors related to unnecessary preoperative tests through provider surveys (Brown & Brown, 2011). They found that “practice tradition, belief that other physicians want the tests done, medicolegal worries, concerns about surgical delays or cancellation, and lack of awareness of evidence and guidelines” prompted the excessive testing (Brown & Brown, 2011, p. 388). Another study looked at preoperative testing by surgical specialty and found that certain specialties, including ophthalmologic, orthopedics, and urology patients are more likely to undergo preoperative testing than general surgical patients (Thilen et al., 2013). The literature also indicates that preoperative testing practices vary widely across hospitals, and that the individual hospital, rather than patient or surgeon characteristics, was the primary factor in determining whether or not patients will undergo preoperative testing.

The purpose of this systematic review of the literature is to better understand the appropriate role of preoperative testing in the surgical process, summarize evidence-based preoperative testing and assessment initiatives in different countries, and compare approaches to preoperative care in selected countries that have reported improved clinical outcomes, efficiencies, and reductions in cost of care as a result of the preoperative testing and assessment interventions. Other literature reviews on preoperative testing practices have focused on a certain procedure, such as lung cancer resection, or a subset of patients, such as elderly patients or children (Duncan & Leffell, 1997; Lerman, 2013; Salati & Brunelli, 2012). The ultimate goal of this synthesis is to supply a set of internationally vetted best practices for preoperative surgical assessment across multiple procedures and patient profiles.

METHODS

To establish a foundation in the literature of current research on preoperative testing in the perioperative surgical care continuum, we performed searches between June 2013 and February 2014 of the English-language literature indexed in PubMed (1975–2013), JSTOR, and Google Scholar using a broad set of terms to maximize sensitivity. This project incorporated three means of article retrieval: (1) a comprehensive search of available literature using PubMed, JSTOR, and Google Scholar, (2) reference crawling of all selected articles, and (3) searching national health care

websites for relevant preoperative guidelines. The search parameters for the comprehensive literature review included empirical studies, review articles, and other materials that directly relate to the concept of preoperative testing and assessment practices in a perioperative surgical system. Search terms used included “perioperative surgical home” and “reduced preoperative testing” which retrieved 21 results, “preoperative” and “cost” or “outcome” which retrieved 15 results, “unnecessary testing” or “duplicative testing” and “cost” or “outcome” which retrieved 59 results, and “preoperative testing” which retrieved 44 results. Seventeen additional records were identified through reviewer suggestions, two of which were duplicates of articles previously retrieved, bringing the total number of potentially relevant studies to 154.

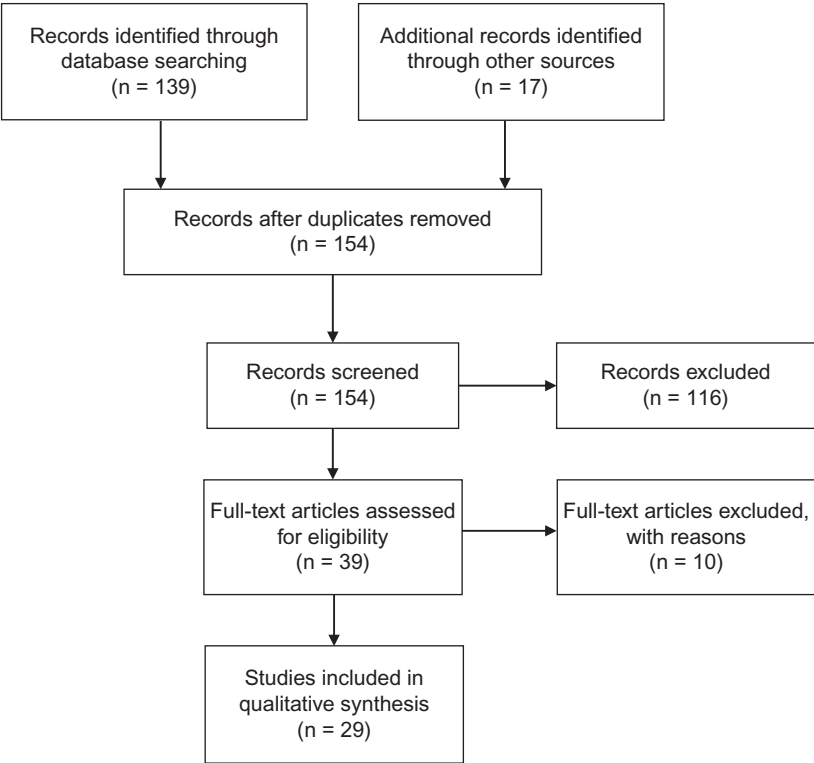


Fig. 1. PRISMA Diagram of Search Strategy.

Researchers reviewed the abstract and methods section of each paper to determine if the contents of the paper fit the primary inclusion criteria; namely, a focus on provision of appropriate preoperative assessment and testing. Exclusion criteria were driven by publication date, methodology, and subject matter; in general, researchers excluded articles published prior to 1975 and studies pertaining to other elements of preoperative care, such as prehabilitation practices or lifestyle counseling. In addition, editorials and literature reviews were excluded as this chapter focuses on results of original research studies. The final number of peer-reviewed studies included came to 29 (Fig. 1).

RESULTS

Of the 29 peer-reviewed studies included in the literature review, 16 were conducted in the United States, 5 in Canada, and 1 each in France, Italy, the United Kingdom, Ireland, Austria, the Netherlands, Thailand, and Brazil. Most of the studies were retrospective reviews of patient records; however, two were randomized controlled trials and two were surveys. An overview of the articles, including setting and key findings of the 29 empirical studies, is presented in Table 1.

Effect of Preoperative Testing on Clinical Outcomes

A total of 12 studies look at the effect of preoperative testing on clinical outcomes. Four of these studies compared outcomes for patients receiving standard preoperative testing to those who did not receive preoperative testing and found that outcomes were similar (Chung et al., 2009; Falcone et al., 2003; Nepomnayshy et al., 2013; Schein et al., 2000). For example, Canadian researchers investigated the possibility of eliminating preoperative testing without an escalation of “the perioperative incidence of adverse events” in an ambulatory surgery setting. They found that patients who did not receive standard preoperative tests showed no increase in adverse perioperative events compared to those who did (Chung et al., 2009, p. 467). Three studies looked at the effect of selective testing or use of testing guidelines on clinical outcomes and found that implementing guidelines for testing did not increase adverse events and that a significant proportion of tests conducted were not compliant with institutional

Table 1. Summary of Included Studies.

Source	Sample/Setting	Type of Study	Findings: Clinical Outcomes	Findings: Efficiencies	Findings: Costs
Almanaseer et al. (2005)	638 patient records from a hospital in the United States	Retrospective pre/post review of patient records		After implementation of American College of Cardiologists/ American Heart Association (ACC/ AHA) guidelines, stress testing decreased by 14.6% and average length of stay by 0.9 days, while use of beta blockers increased 18.8%. Using an ACC/AHA appropriateness algorithm, the appropriate use of testing increased 8.1%.	
Badner et al. (1998)	370 patient records in a preoperative clinic at a hospital in Canada	Retrospective review of patient records		The screening assessment, completed by the patient and screened by a preadmission clinic nurse anesthetist, yielded appropriate physician decisions 84% of the time; 71%	

			of the inappropriate decisions resulted in unnecessary testing. The remainder resulted in a lack of necessary testing.
Brown and Brown (2011)	23 physicians and nurse administrators involved in perioperative decision making in a US hospital	Semi-structured interview	Unnecessary preoperative tests are ordered as a result of (1) practice tradition, (2) the belief that other physicians require them, (3) medicolegal worries, (4) concerns about surgical delays and cancellations, and (5) lack of guidelines.
Charpak et al. (1988)	3,886 patient records in a hospital in France	Prospective review of patient records	30% of performed tests were abnormal. Based on these results, - o Surgery was delayed, canceled, or modified in 20 cases. - o Treatment or anesthetic management was modified in 347 cases (9%). - o Blood component therapy was instituted in 652 cases (17%).

Table 1. (Continued)

Source	Sample/Setting	Type of Study	Findings: Clinical Outcomes	Findings: Efficiencies	Findings: Costs
				At least one test per patient was useful in an automated analysis of 890 patient records (23%). On a per-test basis, automated analysis indicated 9% were useful.	
Chung et al. (2009)	1,061 surgical patients at a hospital in Canada	Randomized controlled trial	There was no significant difference in the rate of adverse events during or 30 days after surgery between the group receiving suggested preoperative testing and the control group that did not receive preoperative testing.		
Cinello et al. (2007)	330 patient records from a hospital in Italy	Retrospective pre/post review of patient records	Coronary revascularizations, all-cause death, AMI, and acute myocardial ischemia all remained	After implementation of ACC/AHA guidelines, preoperative cardiac consultations decreased 21% and	

			unchanged after implementation of guidelines.	noninvasive testing decreased 11%. Beta blocker use increased by 13%.	
Cooper et al. (2013)	101 patient records in pancreatic cancer clinic in the United States	Retrospective review of patient records		Preoperative tests were associated with longer time to surgical intervention.	Patients underwent an average of three preoperative tests, when research indicates that only one may be necessary. Excessive preoperative testing on pancreas masses increased cost by \$3,371.
Correll et al. (2006)	5,083 patient records in a preoperative clinic in a US hospital	Retrospective review of patient records		12.7% of patients had a medical issue identified in the preoperative clinic: - o 83% were needed information on known medical problems. - o 17% were new problems identified in the clinic. Most old problems (84.3%) were solved by retrieval of external information. Most new problems required a new test or consultation (80.3%). New problems were	

Table 1. (Continued)

Source	Sample/Setting	Type of Study	Findings: Clinical Outcomes	Findings: Efficiencies	Findings: Costs
				associated with a greater chance of delay (10.7%) or cancellation (6.8%) than old; 647 cases required additional information and testing.	
Czoski-Murray et al. (2012)	Eight cost-effectiveness studies and 17% of NHS hospitals in the United Kingdom	Systematic literature review and mailed survey		Most ASA Physical Status I elective surgery patients did not undergo preoperative testing, presumably for the purpose of efficiency.	
Falcone et al. (2003)	99 patient records in a US hospital	Retrospective comparative review of patient records	There was no significant difference in number of nonfatal cardiac postoperative outcomes between patients who did and did not undergo preoperative stress testing.		
Ferschl et al. (2005)	5,083 patient records in a US hospital system	Retrospective review of patient records		For same-day surgery, 8.4% of patients in suites with	

Finegan et al. (2005)	938 patient records in a preoperative clinic at a hospital in Canada	Prospective double cohort study	More complications were noted in the group in which tests were ordered by the anesthesiologists, but this finding appears to be unrelated to the testing ordering practice being examined.	preanesthesia clinic had day-of-surgery cancellations, compared to 16.2% in a traditional setting. For inpatient surgery, 5.3% of patients in suites with a clinic had day-of-surgery cancellations, compared to 13.0%. Time in the operating room was 3 minutes less for day surgery patients in suites with a clinic compared to 2 minutes.	The mean number of tests ordered did not differ between the patients tested by anesthesiologists compared to those tested according to standard preoperative orders, but the mean cost of testing was reduced by 41% in the anesthesiologist-led testing group.
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Table 1. (Continued)

Source	Sample/Setting	Type of Study	Findings: Clinical Outcomes	Findings: Efficiencies	Findings: Costs
Fischer (1996)	Preoperative clinic at a hospital in the United States	Case study		There were 148 unexpected cancellations in the 2-year period studied, causing an average of 1 hour, 37 minutes of downtime.	There were \$112.09 of cost savings per patient after implementation of the preoperative clinic due to a 55.1% decrease in number of tests ordered.
Fritsch et al. (2012)	1,363 elective surgery patient records at a hospital in Austria	Prospective cohort study	The best predictors of perioperative complications were: Age: OR 1.028, $p = 0.001$ Invasiveness of procedure: OR = 5.278, $p < 0.0001$ Renal disease: OR 4.987, $p < 0.001$ Anemia: OR 4.269, $p = 0.004$ Abnormal ECG: OR 2.814, $p = 0.005$ Other preoperative tests were not a significant predictor of perioperative complications.		

Holt et al. (2007)	1,587 anesthesiologists in the United States	Survey conducted at annual ASA (American Society of Anesthesiologists) meeting	23% of ASA members who worked with a preanesthesia clinic had delays in surgery 10% of the time. When the anesthesiologists did not see the patient until the day-of- surgery, delays occurred 57% of the time ($p < 0.001$). Impact of day-of- surgery information is higher at institutions without a PEC than with (60 vs. 41%, $p < 0.001$).
Katz et al. (2011)	1,000 patient records at a hospital in the United States and 17 preoperative directors, 175 anesthesiologists, and specialist surgeons	Retrospective review of patient records and survey of preoperative clinic managers, anesthesiologists, and specialists	46% of anesthesiologists surveyed ordered at least one test considered unnecessary by the preoperative directors. However, anesthesiologists were less likely to order unnecessary tests than the specialist surgeons surveyed.

Table 1. (Continued)

Source	Sample/Setting	Type of Study	Findings: Clinical Outcomes	Findings: Efficiencies	Findings: Costs
Knox et al. (2009)	2,826 patient records at a preoperative clinic at a hospital in Ireland	Retrospective pre/post review of patient records		There were 114 case cancellations after the implementation of preoperative testing clinic compared to 256 before ($p < 0.001$). These reductions came from decreases in cancellations for medical reasons (10 vs. 31, $p = 0.013$) and hospital administration reasons (49 vs. 132, $p < 0.001$).	
Nepomnayshy et al. (2013)	882 morbidly obese surgical patient records in a US hospital	Retrospective review of patient records	Bariatric morbidly obese patients are screened for sleep apnea to reduce perioperative surgical complications; orthopedic patients are not. Twenty-five percent of bariatric patients are diagnosed with sleep apnea as a result of this process. However, cardiopulmonary		

			complication rates were not significantly different between the two groups, indicating that the sleep apnea diagnosis may be unnecessary.	
Parker et al. (2000)	63,941 ambulatory surgical patients in a US hospital	Retrospective pre/post review of patient records		After implementation of a preoperative self-assessment tool, preoperative clinic, and preoperative optimization computer algorithm, the average monthly surgical delay rate decreased 49%. Patient interview time and dissatisfaction both decreased.
				35.6% did not need to see an anesthesiologist before surgery by using the self-assessment, and the cost per evaluation in clinic was just \$24.86. Total savings were estimated to be \$1.55 million over the course of the study.
Poldermans and Boersma (2005)	119,632 patient records in a hospital in the Netherlands	Retrospective review of patient records	Beta blocker use was associated with a 13% increase in risk of death for low-risk patients (Revised Cardiac Risk Index (RCRI) score of 1), but a reduction in the risk of death for moderate-to high-risk patients (RCRI scores of 2–4) ranging from 10% to 43%.	

Table 1. (Continued)

Source	Sample/Setting	Type of Study	Findings: Clinical Outcomes	Findings: Efficiencies	Findings: Costs
Pollard and Garnerin (1999)	6,349 surgical patients in US VA hospital	Retrospective pre/post review of patient records	Complication rates remained stable for outpatient procedures but increased for inpatient procedures (2.31% to 3.5%, $p < 0.05$). Mortality rate was unchanged for both inpatient and outpatient procedures.	The percentage of procedures carried out in an outpatient setting increased after the initiation of preoperative clinic (24.7% to 45.4%, $p < 0.0001$).	
Schein et al. (2000)	18,189 patients undergoing cataract surgery in nine clinical centers in the United States	Randomized controlled trial	The rate of medical events, both intra-and postoperative, was the same in the group receiving routine cataract surgery testing and the group not receiving testing.		
Sheffield et al. (2013)	74,785 US Medicare inpatient claims records for general, urological, or orthopedic surgery	Retrospective review of patient records	3.75% of patients with no indications for heart disease received stress testing prior to surgery. This rate increased from 2001 to 2007.		

Siriussawakul et al. (2013)	1,496 low-risk surgical patients at a hospital in Thailand	Retrospective review of patient records	Only 12.1% of patients had preoperative testing compliant with institutional guidelines, yielding excess costs of \$200,000. Excessive testing was more common for major surgery and younger patients.
Soares et al. (2013)	800 patient records in a preoperative clinic at a hospital in Brazil	Retrospective review of patient records	Only 68 of the 800 patients in the study had any change in surgical plan as a result of the preoperative tests, and only 10 of those had a modified approach (i.e., postponement or referral). No surgeries were suspended.
Thilen et al. (2013)	13,673 patients undergoing surgery in the United States who consulted with a specialist prior to surgery	Retrospective review of patient records	22% of all surgical patients had preoperative testing. Ophthalmologic, orthopedic, or urologic surgery patients were more likely to undergo testing than general surgical patients.

Table 1. (Continued)

Source	Sample/Setting	Type of Study	Findings: Clinical Outcomes	Findings: Efficiencies	Findings: Costs
Vazirani et al. (2012)	5,223 patient records at a preoperative clinic at a US VA hospital	Retrospective pre/post review of patient records	Average length of stay decreased for patients with ASA Physical Status of 3 or higher ($p < 0.0001$) after implementation of a hospitalist-run preanesthesia clinic. Inpatient mortality reduced was also reduced (1.27% to 0.36%, $p = 0.0158$).	There was a reduction in same-day cancellations following the implementation of preoperative clinic (8.5% to 4.9%, $p = 0.065$). More perioperative beta blockers and stress tests were ordered ($p < 0.0001$, $p = 0.012$).	
Wijeyesundera et al. (2009)	271,082 patient records at multiple hospitals in Canada	Retrospective review of patient records using propensity score matching	The number of patients receiving preoperative anesthesia assessment increased 34% from 1993 to 2004. Average length of stay decreased 0.35% ($p < 0.001$) for patients receiving anesthesia consultation. Consultation did not significantly reduce mortality.		

Wijeyesundera, Austin, Beattie, Hux, and Laupacis (2012)	204,819 patient records at multiple hospitals in Canada	Retrospective review of patient records	Patient- and surgery-level factors explained 5.9% of variation in preoperative consultation rates. Consultation rate differences across hospitals varied greatly, from 1% to 89.7%, but were not explained by surgical volume, teaching status, or patient- and surgery-level factors. Thus, the individual hospital is the primary explanatory variable.
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guidelines (Cinello et al., 2007; Finegan, Rashiq, McAlister, & O'Connor, 2005; Sheffield et al., 2013). An additional three studies looked at the effectiveness of testing conducted in a preoperative clinic or consulting service; these initiatives generally reduced length of stay and did not increase incidence of adverse outcomes (Pollard & Garnerin, 1999; Vazirani, Lankarani-Fard, Liang, Stelzner, & Asch, 2012; Wijeyesundera, Austin, Beattie, Hux, & Laupacis, 2009). For example, Vazirani and colleagues found that “a structured medical preoperative evaluation may benefit medically complex patients and improve perioperative processes and outcomes,” as the implementation of a preanesthesia clinic significantly reduced inpatient mortality (Vazirani et al., 2012, p. 697). Two studies examined factors that moderated the effectiveness of preoperative testing. These studies generally found that abnormal preoperative tests have limited ability to predict adverse perioperative outcomes; patient- and procedure-specific factors were much more influential and may moderate the effectiveness of preoperative testing (Fritsch et al., 2012; Poldermans & Boersma, 2005).

Effect of Preoperative Testing on Operating Room Efficiency

A total of 12 studies focus on the reduction of operating room (OR) cancellations and delays by preoperative testing. The results are mixed. Ferschl, Tung, Sweitzer, Huo, and Glick (2005) reviewed all six month surgical cases at the University of Chicago Hospitals and found that a visit to an anesthesia preoperative medicine clinic (APMC) was associated with fewer same-day surgery cancellations and an earlier room entry time than the non-APMC patients. Correll and colleagues (2006) found similar results in a study of 5,083 patients in a preoperative clinic at Brigham and Women's Hospital in Boston. They also found that preoperative evaluation was useful in identifying and resolving medical issues through information retrieval or testing. Knox, Myers, Wilson, and Hurley (2009) found that the preoperative testing process decreased cancellations for both patient medical reasons and hospital administration reasons.

However, other studies found no effect of preoperative assessment on OR efficiency. For example, in bariatric surgery, patients are routinely tested for sleep apnea to reduce cardiopulmonary surgical complications which increase OR time. However, cardiopulmonary complication rates between patients with and without this diagnosis were not significantly different, indicating that such testing is unnecessary (Nepomnayshy et al., 2013). In a broader study, only 68 of 800 preoperative tests yielded

abnormal results, and only 10 of these tests changed the surgical approach. An automated analysis of preoperative tests conducted at a hospital in France found that only 9% of preoperative tests caused the surgery to be canceled, delayed, or modified, but that usefulness could be increased with better adherence to testing protocols (Charpak et al., 1988). Holt, Silverman, Prasad, Dziura, and Ruskin (2007) found that anesthesiologist involvement in the preoperative testing process reduces day-of-surgery cancellation. These mixed results might be an indication of the importance of adherence to preoperative testing protocols when it comes to achieving efficiencies in OR utilization.

It should be noted, however, that recent evidence indicates that reductions in surgical delays and cancellations, while desirable, may not lead to significant cost savings (Epstein and Dexter, 2013).

Effect of Preoperative Testing on Costs

A total of six studies investigate the effect of preoperative testing on costs. The costs of preoperative testing are considerable; studies have found that the cost of unnecessary preoperative tests could be more than \$600 per patient in the United States (Pasternak, 2009). Studies indicate that minimizing unnecessary preoperative tests could reduce health care costs in the United States by \$10 billion and improve patient experience and care (Brown & Brown, 2011). A study in India found that preoperative testing in excess of institutional protocol suggestions increased costs by \$200,000 over the study period (Siriussawakul et al., 2013).

However, when testing is used appropriately, it can generate significant savings. In a study of the effectiveness of a preoperative clinic in the United States, only 17% of issues identified in the testing process were issues previously unknown to the patient. However, if these new issues had not been caught, the resulting day-of-surgery delays would have cost the hospital almost \$1,000,000, or \$1,500 per delay (Correll et al., 2006). Other studies found similar results (Fischer, 1996).

In 2005, Finegan and colleagues found that selective ordering of testing by anesthesiology staff as opposed to non-anesthesiologist staff decreased the number and cost of testing, saving the clinic on average \$73 per patient (Finegan et al., 2005). The use of self-assessment tools to determine the need for a clinic visit can also reduce unnecessary preoperative testing (Parker, Tetzlaff, Litaker, & Maurer, 2000). A Canadian initiative to eliminate unnecessary preoperative testing after review yielded a savings of

\$38.50 per patient and a total of \$18,447 over the study period (Chung et al., 2009). Various other studies have shown that routine testing, rather than selective testing, accrues no benefit to the patient population but excessive costs to the health care organization (Cooper et al., 2013; Soares et al., 2013). Results of these studies further emphasize the importance and need for evidence-based and agreed-upon practice guidelines and decision support systems – for anesthesiologists and surgeons – for the purpose of making preoperative testing and assessment choices.

Guidelines for Preoperative Testing

This wide variety on preoperative testing practice across surgical teams and hospitals may stem from a lack of clinical practice guidelines for preoperative testing or a lack of implementation of existing guidelines. One study found that preoperative tests may, in many cases, be performed even when not indicated by testing guidelines; only 12.1% of surgical patients received testing that complied with institutional recommendations, which cost the institution an estimated \$200,000 (Siriussawakul et al., 2013). In support of this finding, a study by Knox et al. (2009) shows that standardizing the preoperative assessment process by reducing “redundancy, avoiding surgery delays and cancellations, [and] improved reimbursement coding, [preoperative testing could] offset the increased costs of setting up and running the clinic” (Bader, Sweitzer, & Kumar, 2009, p. S104). The standardizing process includes collecting complete patient history and results of physical examinations; coordinating the surgical, anesthesiology, and nursing assessments; ordering tests; and providing information for documentation and billing (Knox et al., 2009). This lack of standard procedures noted multiple times in the literature is made more problematic because of a lack of perioperative data sharing (Frost, 2012). Frost suggested that better communication with surgeons, physicians, and patients could simultaneously improve the patient experience and ownership of care and decrease unnecessary preoperative testing.

Thilen et al. (2013) explored the opportunity for anesthesiologists to add value by controlling preoperative resources and standardizing the preoperative process. Using a 20% national random sample of Medicare Part B claims data from 2006, the authors found a large number of preoperative consultations and preoperative testing for low-risk patients who underwent low-risk procedures. They suggested that more rational use of these tests

could achieve considerable savings. According to Thilen, “Anesthesiologists are well positioned to guide and implement such use” (Thilen, Treggiari, & Weaver, 2012, p. 2). Other models suggested in the literature include staffing by nurse anesthetists and nurse practitioners (Badner, Craen, Paul, & Doyle, 1998; Hooper, 2013).

The literature strongly supports the development and implementation of appropriate preoperative testing guidelines to improve the efficiency of the preoperative process to reduce costs and potentially improve patient outcomes. Therefore, in the next section, we discuss and compare preoperative testing guidelines propagated in the United States, the United Kingdom, and Canada, and identify best practices and opportunities for improvement moving forward.

DISCUSSION

One of the striking features of the policy and empirical literature in this field is the high level of agreement, across very different countries and health care systems, that excessive preoperative testing is a substantial issue, worthy of attention by both clinicians and health care managers. As this is a complex phenomenon, it is perhaps not surprising that the extant literature is not yet conclusive on this issue. Nonetheless, given its importance, and the potential savings and improvements in outcomes that may be obtained, guidelines have been developed in Canada, the United States, and the United Kingdom. Guidance issued in the United States and Canada is not binding on physicians or hospitals, as they are not tied to payment. However, payment in the United Kingdom is tied to adherence to certain guidelines (Reynolds, 2006).

The results of this comprehensive literature review of studies of preoperative testing and assessment practices show that there are numerous opportunities for reducing surgical care cost while maintaining clinical outcomes and even improving patient experience by following evidence-based preoperative testing and assessment protocols and guidelines. Several countries have and are in the process of sharing these surgical quality and cost improvement strategies in the form of surgical practice guidelines at many different levels of policy and practice.

In the United States the power of intrastate collaboration to improve surgical quality has been recorded and demonstrated in such programs as the Michigan Surgical Quality Collaborative, where over 50 hospitals in the

state collaborate to develop best practices and assess problems with implementation of these best practices. These hospitals are supported by a third-party payer and have shown promising results in improvements in quality and patient satisfaction (Campbell et al., 2010). Other than the efforts by the National Veterans Affairs Surgical Quality Improvement Program, which created reliable data on patient risk factors, surgical care processes, and post-surgical morbidity and mortality rates for major surgical procedures in the 1990s (Khuri et al., 1998), there are no government-sponsored practice guidelines imposed on any phase of surgical care, including preoperative testing guidelines, at the national level in the United States. Traditionally, medical and surgical practice guidelines within the United States have been defined by the relevant health professional associations. In the case of preoperative testing guidelines, this task has been undertaken to a limited degree by several specialty societies, including the American Academy of Ophthalmology, American College of Surgeons, and Society of Thoracic Surgeons. Most of these resources are generally procedure-specific and vary greatly in terms of specificity; some provide general directives, while others provide very specific guidelines (American Academy of Ophthalmology, 2014; Byrne et al., 2011; Chow, Ko, Rosenthal, & Esnoala, 2011; Varghese et al., 2013). A broad endeavor by the American Board of Internal Medicine entitled “Choosing Wisely®” incorporates perspectives from various physicians groups on when preoperative testing is necessary. Each of these physician groups, including the American Society of Anesthesiologists (ASA), American College of Surgeons, and American College of Cardiology and many others, has developed a list of five “things physicians and patients should question” for their subject area (American Board of Internal Medicine Foundation, 2014). The ASA also publishes a practice advisory for preanesthesia evaluation, which includes guidelines for preoperative testing and assessment practices (ASA, 2012). None of these preoperative practice guidelines at the national level is tied to payment models or financial incentives, except for limited examples of individual states that collaborate with third-party payors to this end. The situation is similar in Canada. While preoperative testing guidelines have been developed by regional groups, such as the Ontario Pre-Operative Testing Grid, these guidelines are not tied to payment (Ontario Pre-Operative Task Force).

Preoperative testing in the UK National Health Service (NHS) has been driven principally by policy aims of improving quality and outcomes while at the same time driving down costs. The situation in the United Kingdom is a little more complex when compared to the United States or Canada.

While Royal College guidance is rarely binding on physicians; if it was not followed and a physician was sued, it could be problematic for that physician and his or her representatives. In contrast, the National Institute for Health and Clinical Excellence (NIHCE) guidance, while not legally binding, is the foundation for clinical policy in the UK NHS and would generally be followed, not least because hospitals are audited to enforce its implementation. At the discretion of local funding agencies (in the English NHS, Clinical Commissioning Groups) hospitals may be mandated to comply with NIHCE guidance, and be subject to financial penalties if they do not comply (Table 2).

The review of the literature demonstrates that there is a need for evidence-based preoperative testing guidelines that are both accepted and

Table 2. Country-Specific Preoperative Testing Guidelines.

Name of Protocol	Country	Protocol Developer	Adherence Tied to Payment?
ASA Practice Advisory Guidelines for Preanesthesia Testing	United States	American Society of Anesthesiologists	No
AHA/ACC Cardiac Preoperative Testing Guidelines	United States	American College of Cardiology and American Heart Association	No
AABGI Safety Guideline: Pre-Hospital Anaesthesia	United Kingdom	The Association of Anesthetists of Great Britain and Ireland	No
Anaesthesia Services for Pre-operative Assessment and Preparation	United Kingdom	Royal College of Anaesthetists	No
Preoperative Tests: The Use of Routine Preoperative Tests for Elective Surgery	United Kingdom	National Institute for Health and Clinical Excellence	Yes
CAS Guidelines to the Practice of Anesthesia	Canada	Canadian Anesthesiologists' Society	No
Ontario Preoperative Testing Grid	Canada	Ontario Pre-Operative Task Force	No
ESC Guidelines for Preoperative Risk Assessment and Perioperative Cardiac Management in Non-Cardiac Surgery	Europe	European Society of Cardiology	No

accessible by physicians, and the initiatives mentioned above provide examples of how various regions or countries have approached this task. Each approach is different, and as yet, none of the approaches are strongly validated. A more rigorous study of the strengths and weaknesses of each approach could yield a set of evidence-based international best practices for preoperative care that would be academically rigorous and useful in practice.

IMPLICATIONS AND CONCLUSION

Although the empirical research is not as conclusive as would be preferred, it is clear that there is substantial untapped potential both for savings in costs and for improvement in quality and outcomes by improved guidelines and, particularly, adherence to guidelines for preoperative testing. The quality of the research on this issue is strong, which suggests that action is needed in this area. In England alone there are 4.6 million admissions to hospital annually that lead to surgery ([Surgery and the NHS in Numbers, 2014](#)). Even given the comparatively modest savings found by [Chung et al. \(2009\)](#), this could yield annual savings of \$162 million in the English NHS. In the United States it is estimated that minimizing unnecessary preoperative tests could reduce health care costs by \$10 billion while improving patient experience ([Brown & Brown, 2011](#)). In just one institution in Canada in one year, more appropriate preoperative testing could save \$87,000 annually; the nationwide savings could be significant ([Bryson, 2006](#)).

For these savings and improvements to be realized, commonly agreed-upon guidelines need to be fully implemented. This is a complex issue in health care. Clinicians appear to be resistant to the use of guidelines ([Haagen et al., 2005](#); [Katterhagen, 1996](#); [Schers, Wensing, Huijsmans, van Tulder, & Grol, 2001](#)). [Urbach, Govindarajan, Saskin, Wilton, and Baxter \(2014\)](#) demonstrated that even the implementation of a safety intervention universally regarded as effective (the WHO safer surgery checklist) was not straightforward. We support the approach of [Greenhalgh, Robert, Macfarlane, Bate, and Kyriakidou \(2004\)](#) who show that the implementation of innovations in health care is a complex process, with multiple factors determining success or failure. All of these factors need to be addressed. Guidelines being mandated by governments do not necessarily lead to their adoption, and the use of financial incentives can lead to hospitals gaming the system rather than appropriate adoption in good faith. The

literature on the effects of pay-for-performance and other financial incentives on clinical outcomes and cost of care demonstrates potential cost reduction and effectiveness, but it is not convincing yet (Eijkenaar, Emmert, Scheppach, & Schöffski, 2013).

Limitations

This review is subject to two notable limitations. First, because we only incorporate published work, our findings are subject to publication bias, as negative or nonsignificant findings are not published as frequently. However, several of our studies, particularly pertaining to clinical outcomes, reported no significant difference as the key finding. Second, we did not restrict inclusion criteria to a particular set of methods, samples, or outcome metrics.

Implications for Future Research

We concluded that the effect of preoperative testing on clinical outcomes is somewhat ambiguous based on the research evidence reviewed. In a sense, this is not surprising. The outcomes of surgery are a complex and multifactorial phenomenon. Designing studies to disentangle the effects of one factor (preoperative testing) from all of the others would be a formidable methodological task, in a field where the difficulties of conducting randomized controlled trials have already been acknowledged (Cook, 2009). Nonetheless, we feel that this issue is sufficiently important to warrant a well-designed study. Likewise, the evidence on the effects of preoperative testing on efficiency and cost reduction is also insufficient, and we would call for rigorous, well-designed studies in these fields as well. This research could be used to strengthen evidence for the existing guidelines previously discussed in the United States, the United Kingdom, and Canada, and possibly increase pressure to implement these guidelines.

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PROCESS OPTIMIZATION IN THE EMERGENCY DEPARTMENT BY THE USE OF POINT-OF-CARE-TESTING (POCT) IN LIFE-THREATENING CONDITIONS: COMPARATIVE BEST PRACTICE EXAMPLES FROM GERMANY AND MALTA

Sandra C. Buttigieg, Wilfried von Eiff,
Patrick Farrugia and Maximilian C. von Eiff

ABSTRACT

Purpose – Point-of-care testing (POCT) at the Emergency Department (ED) attains better objectives in patient care while aiming to achieve early diagnosis for faster medical decision-making. This study assesses and compares the benefits of POCT in the ED in Germany and Malta, while considering differences in their health systems.

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Methodology/approach – *This chapter utilizes multiple case study approach using Six Sigma. The German case study assesses the use of POCT in acute coronary syndrome patients, compared to the central lab setting. The Maltese case study is a pilot study of the use of medical ultrasonography as a POCT to detect abdominal free fluid in post-blunt trauma.*

Findings – *This study provides clear examples of the effectiveness of POCT in life-threatening conditions, as compared to the use of traditional central lab or the medical imaging department. Therapeutic quality in the ED and patient outcomes directly depend upon turnaround time, particularly for life-threatening conditions. Faster turnaround time not only saves lives but reduces morbidity, which in the long-term is a critical cost driver for hospitals.*

Originality/value – *The application of Six Sigma and the international comparison of POCT as best practice for life-threatening conditions in the ED.*

Keywords: Emergency department; life-threatening conditions; point-of-care testing (POCT), Germany, Malta

INTRODUCTION

Health care organizations worldwide are facing increasing pressure to optimize their clinical processes, aiming for cost and waste reduction, while at the same time striving to improve quality of care (Graban, 2011; Kriegel, Jehle, Dieck, & Mallory, 2013). The financial crises of the past decade have in particular affected hospitals, with many having to face widespread staff and service cuts (Buchanan, 2013; Karanikolos et al., 2013). Coupled with these financial pressures, aging populations and advances in medical technology have further pushed hospitals into managing the increasing demands on all resources (Govindarajan & Ramamurti, 2013; Greinacher, Fendrich, Brzenska, Kiefel, & Hoffmann, 2011; Lichtenberg & Pettersson, 2014). This managing of resources can be exemplified in greater scrutiny of the duration of hospital stay of patients due to overcrowding of Emergency Departments (EDs) and shortage of acute hospital beds (Saghafian, Hopp, Van Oyen, Desmond, & Kronick, 2012; Skar, 2013).

This chapter focuses specifically on the ED, which is the first port of call for all emergencies that are admitted to hospital. An Emergency Medical Service can be defined as

a comprehensive system which provides the arrangements of personnel, facilities and equipment for the effective, coordinated and timely delivery of health and safety services to victims of sudden illness or injury. (Moore, 1999, p. 325)

The ED is obliged to provide timely lifesaving care to patients suffering from sudden and life-threatening conditions or emergencies thereby preventing avoidable mortality and morbidity. ED is therefore supposed to quickly provide a qualified diagnosis, initiate primary therapy, and decide on further patient treatment. The ED is characterized by unique and challenging complexities that are very different from other hospital departments, among which the hand-offs/communication within ED and with other departments (Hilligoss & Cohen, 2013). Other complexities include life-threatening conditions, high patient attendances and turnover; fluctuations in work demands and workload particularly when faced with major disasters; and variations in expertise of the accident and emergency room staff (Schubert, Denmark, Crandall, Grome, & Pappas, 2013). Operating within an environment with zero tolerance to error, hospital managers are forced to think “outside the box” and to adopt a lean management philosophy by eliminating waste and bottlenecks and reducing costs and risks, thereby allowing physicians and hospital employees to focus on providing good quality care (Arthur, 2011; Graban, 2011). As part of the lean philosophy, hospital managers are increasingly challenged to provide innovative solutions not only to provide accurate and early diagnosis and optimal patient management, but also to operate within the benchmarked ED patient turnover time. Through lean management, ED processes can be analyzed, optimized, and standardized. One of these innovations is point-of-care testing (POCT), which provides the tool for process streamlining as part of lean management (Lindenau-Stockfisch, Searle, & Möckel, 2013). POCT has become an established process in many clinical pathways worldwide, indeed securing fundamental roles in health systems, as more evidence is available of its accuracy, reliability, and effectiveness (Boehme et al., 2011; Pai, Vadnais, Denking, Engel, & Pai, 2012).

POCT at the ED has the potential of improving quality, reducing risk, and attaining economical objectives for patient care processes (Oredsson et al., 2011; St John & Price, 2013). POCT can operate within frameworks of organizationally controlled processes as regards timeliness, reliability, and validity to be able to confidently reach an early diagnosis and initiate

therapeutic management immediately (Pai et al., 2012). This chapter will first give a literature-based overview of the use of POCT in health care, followed by a focus of the use of POCT in the ED. Secondly, the chapter will provide case studies of experiences from two countries, namely Germany and Malta, that are using POCT in the ED (Buttigieg & Farrugia, 2014; Luppa, Müller, Schlichtiger, & Schlebusch, 2011; von Eiff, 2014). Apart from using POCTs primarily as lifesaving measures, both countries have reported overcrowding at ED due to bottlenecks created from patients waiting for laboratory or radiological investigations. Furthermore, patients may be transferred to the wrong wards on the basis of inaccurate diagnosis. POCT should provide solutions to these problems.

RESEARCH QUESTIONS

The first part of the chapter will attempt to answer the following general question, namely: Why is POCT in the ED used?

The second part of the chapter will assess and compare the benefits of one example of POCT in the ED in each of two European countries, namely Germany and Malta, while considering differences in their health systems and *modus operandi* of their ED. The research questions for the two case studies are: *Case study one – Germany*: To what extent is the use of Troponin-i in the ED as a POCT-setting for acute coronary syndrome patients beneficial when compared to using the central lab setting?

Case study two – Malta: To what extent is the introduction of medical ultrasonography in the ED as a POCT-setting beneficial to patients admitted with blunt abdominal trauma as compared to the use of the central medical imaging department (MID)?

BACKGROUND

Performance Measurement and Quality of Processes in ED

As highlighted earlier, cost pressures are forcing hospitals to optimize clinical processes. Several performance criteria are used to measure the achievement potential of clinical pathways, which span across structure, input, process, output, and outcome criteria of the systems model (Berenson, Pronovost, & Krumholz, 2013; Rademakers et al., 2011). Among the most

commonly cited are: consumption of resources; costs (direct costs, indirect costs, opportunity costs, intangible costs); duration (throughput, waiting time, length of stay); risk analysis (error rates, near misses, probability of loss, discovery probability, consequences for the patient in case of appearance); and medical quality and patient outcomes (complications, infections, readmissions, satisfaction, morbidity, mortality). The process and structure aspects of health care are not only more likely to increase patients' evaluation of the quality of care, but also linked to better outcomes (Joynt, Orav, & Jha, 2011; Rademakers et al., 2011).

In the emergency room, and more so in emergencies, the quality of processes largely depend on their robustness, predictability, and controllability. Process quality can be measured by the performance parameters' variance, which is the most important indicator for errors and adverse events. Additionally, a dashboard of variances of parameters provides an overview of how well processes are controlled. For example, it shows the extent to which constant quality can be guaranteed in treatment processes when input parameters (e.g., number of emergency patients day/night, or workload of central lab and MID) are changed. It is therefore evident that the extent to which medical decision structures in ED are robust is critical in terms of both time and economical relevance. Arguing from a process point of view, POCT can be considered as a key factor for process streamlining in particular with regard to patient safety and employee satisfaction. Additionally, POCT devices may help to eliminate quality-disturbing variances from clinical processes.

Defining POCT

There is no accepted universal definition of POCT (Pai & Pai, 2012). Ehrmeyer and Laessig (2007) clearly define POCT as

patient specimens assayed at or near the patient with the assumption that test results will be available instantly or in a very short timeframe to assist caregivers with immediate diagnosis and/or clinical intervention. (p. 766)

Pai et al. (2012) argue that irrespective of which definition one adheres to, the critical elements of all definitions of POCT are

rapid turn-around and communication of results to guide clinical decisions and completion of testing and follow-up action in the same clinical encounter. (p. 1)

POCTs are often simple tests incorporating user-friendly technologies, and are transportable handheld instruments, or small bench analyzers or

fixed equipment, in the home, community, peripheral clinic, or laboratory. POCTs can be conducted by non-specialized hospital staff (non-laboratorians and non-radiologists/radiographers) in emergency rooms, operating rooms, intensive care units, and labor wards (Pai et al., 2012).

Maryan and Abed (2013) provide a comprehensive list of POCT pathology services carried out in hospital settings. A few examples of these tests are electrolyte analysis, rapid cardiac markers, intraoperative parathyroid hormone assay during focused parathyroidectomy, blood glucose (includes self-testing devices), drugs of abuse screening, anticoagulant therapy monitoring (includes self-testing devices), pregnancy testing, infectious disease testing (Chlamydia, HIV), and fecal occult blood analysis among others. Additionally, the concept of POCT has gone beyond its use in pathology services to also include other technologies, namely ECG pulse oximeter (Allgeyer, 2011); POCT ultrasound (Nagdev & Stone, 2011); echocardiography (Andersen et al., 2011); and point-of-care computer systems (Reeder et al., 2002), whereby laboratory and radiology results are presented electronically to the ordering and consulting physicians at the point of care.

The fact that POCTs can be expediently and instantly done next to the patient increases the prospect that the health care team obtains the results faster, communicates these results immediately to the patient/relatives, and proceeds without delay to achieve immediate clinical management decisions (Ehrenkranz, Turbeville, Yoon, & You, 2012). Furthermore, POCT devices have become cheaper, smaller, faster, and smarter, thereby increasing their cost-effectiveness in managing many diseases for which physicians took much more time and resources in the past to achieve similar outcomes (Tran & Kost, 2006).

Point-of-Care Tests in the ED

The introduction of POCT in the ED is justified from a medico-logistic viewpoint due to the ever-increasing demands in diagnostics and therapy of patients with highly acute or even life-threatening diseases. From a strictly medical viewpoint, two vital criteria need to be satisfied for their introduction namely, improvement in the quality of medical diagnosis, decision-making and treatment, as well as improvement of medical effectiveness (Lindenau-Stockfisch et al., 2013). The application of POCT in the ED therefore raises the question of whether there is an association between the stability of POCTs as diagnostic processes on the one hand, and medical

treatment quality, as well as patient outcomes on the other. Additionally, the applications of POCT technologies in the ED require an investment decision, in which the investment returns and the amortization of the determined investment of the POCT technology are to be compared to the economical, strategic, and clinical benefits. Due to initial investment of the pay-off risk and due to limited reversibility of the decision, every investment plan has to be linked strategically, namely that there is a fit between strategic plans, financial plans, and business models, all of which need to be evaluated based on evidence (Gilkar, Fink, Eardley, & Barron, 2013). There is some, albeit limited, evidence of clinical relevance of having POCT lab parameters available in the quickest possible turnaround time. Examples include: D-dimer concentration as an indicator of the fibrinolytic activity of plasmin in the vascular system to exclude acute deep vein thrombosis and pulmonary embolism (Fukuda et al., 2007); NTproBNP used as an aid to assist in the diagnosis and assessment of severity of congestive heart failure and risk stratification in patients with acute coronary syndromes (Zaninotto et al., 2010); and cardiac troponin tests used to assist in the diagnosis of acute myocardial infarction and to aid in the risk stratification of patients with acute coronary syndromes with respect to their relative risk of mortality (Peetz et al., 2005). Apart from lab tests, the introduction of ultrasound as a POCT in the ED has changed the patient evaluation strategy, provided a safer and faster patient experience, and greatly influenced workflow. Irrespective of type of POCT used in ED, the total costs of patient care processes can be decreased if functional diagnostic areas in the ED are supported by prompt availability of certain lab parameters or medical imaging results. Additionally, the fact that faster definitive diagnoses can be reached may prevent transfers of patients from ED to non-appropriate wards, thereby improving patient pathways, cutting waste of resources, and reducing costs.

POCT and the Health Economics Argument

The contribution of economics is well established in health care, mostly because health care costs are major drivers for change. Economic evaluations employed in health care enable managers to assess adoption of new technologies and to quantify their benefits. The literature provides limited evidence of the effectiveness of diagnostic services (St John & Price, 2013). This may be due to the fact that problems exist in laboratory medicine on costing and reimbursement strategies, which are mainly based on the test procedure's complexity and cost-per-test service. The same applies to

medical imaging diagnostics. These strategies do not adequately provide the much-needed integrated investment and disinvestment business cases for assessing care pathway changes. Indeed, POCT in the ED provides the ideal scenario of emerging patient pathway changes that require health technology assessment with a sound economic evaluation in an environment where fast and lifesaving decision-making is a must. As highlighted earlier, introduction of POCT is an investment decision, whereby the higher unit cost-per-test (in the short term) through the loss of the economies of scale offered by automation, should be weighed against the potential substantial savings (in the long term) reaped as a result of fast output of results and savings from using larger laboratory/medical imaging facilities. At its most elemental level, if the introduction of POCT does not result into process change, then savings are unlikely to happen (St John & Price, 2013).

However, the economic assessment of POCT in ED should be tackled from both a risk management and an ethical point of view. Managing to obtain prompter results that could save lives should be considered in terms of its impact healthy life years gained (QALY) and/or disability adjusted life years (DALY) (Fitzgerald, Goodacre, Cross, & Dixon, 2011; Holbrook, Anderson, Sieber, Browner, & Hoyt, 1998). Furthermore, of major importance is the risk dimension. Risk avoidance and defensive behavior predominates among emergency physicians (Studdert et al., 2005), in that patients receive treatment that bears the lowest avoidable risk even though there is

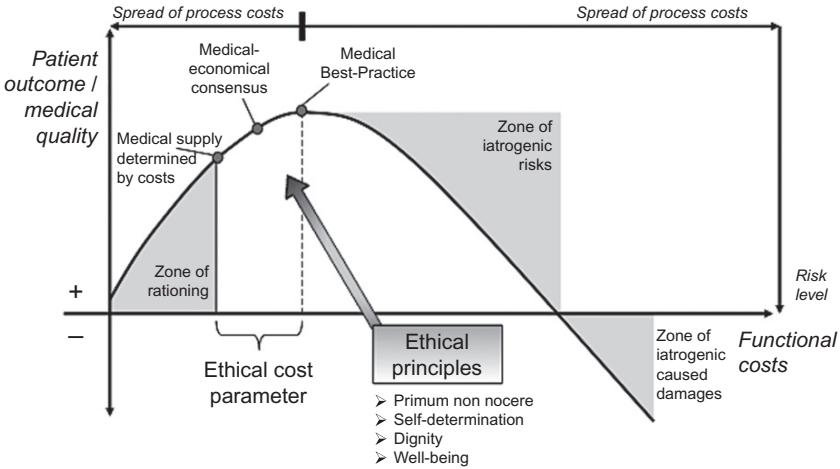


Fig. 1. Tension between Health Economics and Medical Ethics.

pressure on reducing costs. If investment decisions in the ED depended only on costs and return on investment or on a (capped) budget, there is the risk of suboptimal performance by emergency staff as well as higher level of patient adverse events. The investment decision should be based on achieving equilibrium between performance, risks, and costs. As illustrated in Fig. 1, ultimately, the aim is to achieve medical economic consensus, by adequately considering these three decision dimensions, namely: patient care on an appropriate quality level (evaluated by the existing structure quality and medical performance) with affordable costs and acceptable risk. Moreover, the application of ethical principles in the investment process covers any decision dilemma that may arise between patient management, investment costs, and risks.

CASE STUDIES

The use of POCT in the ED will be shown by means of two case studies carried out in Germany and Malta. These two countries differ considerably, namely in size, wealth, and type of health system. Table 1 shows a comparison of the two health systems and the EDs under study. Of particular note is the hospital bed density (OECD, 2013), in terms of number of beds per 1,000 of the population, in Germany (8.3) it is nearly double that of Malta (4.4), which interestingly is higher than that of the United States (3.1). This means that overcrowding is more likely to happen in the Maltese ED than in the German one.

The German case study is a randomized control trial that included patients identified for clarification of a myocardial infarct event, namely 92 non-STEMI patients as the central lab population and 88 patients for the POCT-Troponin I population. A defined triage pathway triggered the clarification. The study was carried out over a 6 week period in 2011 in a 500-bed teaching hospital in an urban area that also provides care for patients coming from semirural districts. The Maltese case study is a pilot study to assess the introduction of POCT ultrasound at ED in 2013 in an 850-bed acute general hospital. Therefore, the patients under study were selected retrospectively through the Hospital's Patient Administrative System by taking the total population admitted to Accident & Emergency (A&E) with blunt abdominal trauma in 2012, who used the MID (42 patients) and those admitted in 2013 using POCT-FAST ultrasound in ED (29 patients). Fig. 2 illustrates the processes involved in POCT-Troponin I and ultrasound use in the two case studies.

Table 1. Comparison between the German and Maltese Health Systems and Case Studies.

Health System/ED	Country	
	German Case Study/Health System	Maltese Case Study/Health System
Wealth: GDP at purchasing power parity per capita (IMF, 2013)	40,007 Int\$ for Germany	27,840 Int\$ for Malta
Type of health system ^a	Bismarck Model (State as the guardian and administrator of health service)	Beveridge Model – similar to UK system (State as the owner-operator of the health service)
% GDP Expenditure on Health System (OECD, 2013)	11.3%	8.7% (5.6% public spending; 2.9% private spending)
EU average (OECD, 2013)	9.6% (7.3% public spending; 2.3% private spending)	
Principles of health system ^a	Solidarity	Equality and universality
Financing of health system ^a	Pluralistic funding system: statutory health insurance is the major source covering more than 85% of the population; approximately 10% private medical insurance; 2% sector-specific government schemes	Public system: general tax revenues Private system: out-of-pocket and voluntary health insurance
Estimated number of patients seen at ED in hospital under study/year ^b	36,000 (preference to treat on scene rather than transport patients to hospital)	74,000 (preference to transport to hospital rather than treat on scene)
Estimated number of patients discharged in hospital under study/year ^b	20,000	48,000
Estimated number of patients admitted to acute care in hospital under study/year ^b	16,000	26,000
Estimated number of patients admitted to acute care in hospital under study/day ^b	120	190
Hospital bed density per 1,000 population ^c	8.3 (2010)	4.4 (2011)

^aSaltman (2004).^bSources from clinical performance units of German and Maltese hospitals under study.^cOECD (2013).

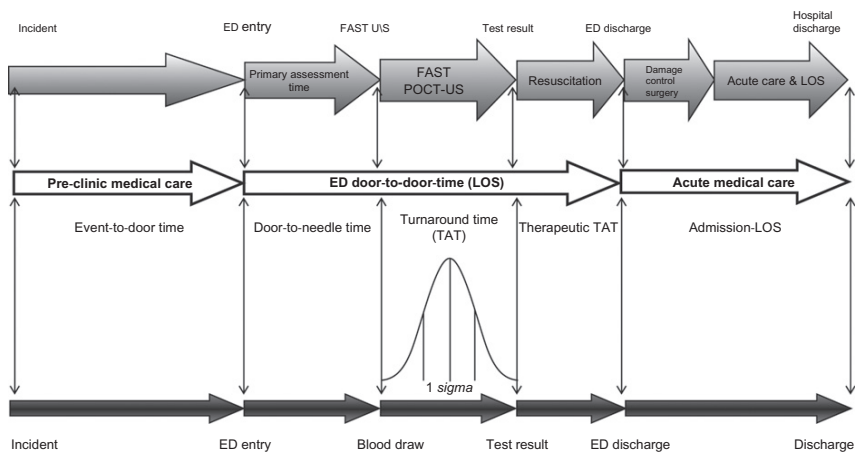


Fig. 2. ED Processes for Troponin I (Black and White) and FAST Ultrasound (Gray).

Methodology

Both case studies adopted Six Sigma, as the methodology for contrasting effectiveness of POCT at ED compared with traditional settings (central lab and MID for German and Maltese studies respectively). Motorola developed Six Sigma in 1987. [Schroeder, Linderman, Liedtke, and Choo \(2008\)](#) define Six Sigma as “an organized, parallel-meso structure to reduce variation in organizational processes by using improvement specialists, a structured method, and performance metrics with the aim of achieving strategic objectives” (p. 540). Disruptions in quality and efficiency of the medical treatment process can usually be retraced to the phenomenon of variation, which seems to be the most vital cause for errors, unnecessary costs, and patient dissatisfaction ([Vincent, 2011](#)). Variation is a sign of uncontrolled services. [Fig. 3](#) shows that the variation of the patient’s expectations/target is different from the variation of the real process. Defects can be prevented by reducing variation, meeting patient’s requirements, and centering the process.

Once time pressure is added to this lack of service control, the risk of error rises exponentially ([Fortune, Davis, Hanson, & Phillips, 2012](#)). In the ED, variation needs to be balanced with international benchmarks set for specific procedures or interventions. Specific to the two case studies of

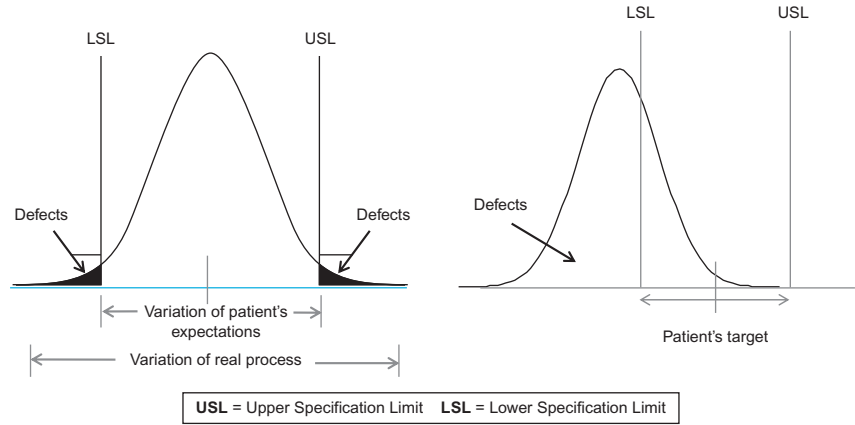


Fig. 3. Variation of the Patient’s Expectations/Target Is Different from the Variation of Real Process. Defects Can Be Prevented by Reducing Variation, Meeting Patient’s Requirements and Centering the Process.

this chapter, the benchmarks for “First-Contact-To-Balloon-Time” is of 90 minutes maximum in patients with acute myocardial infarction (Krumholz, Curry, & Bradley, 2011) and the time to laparotomy for intra-abdominal bleeding from trauma should also not exceed 90 minutes (Clarke, Trooskin, Doshi, Greenwald, & Mode, 2002). The time factor is important because the mortality rate increases by 41–62% for patients with door-to-balloon time exceeding two hours (Cannon et al., 2000) and about 1% for every 3 minutes that elapses before intervention in the occurrence of intra-abdominal bleeding (Körner et al., 2008). The knowledge of variation is a much more meaningful indicator than the use of arithmetic averages (Iwashyna & Odden, 2013). The use of Six Sigma in hospital practice has shifted the process of measuring variation into a more transparent one and is becoming increasingly used worldwide such as in the United States (Gowen III, McFadden, & Settaluri, 2012), India (Rohini & Mallikarjun, 2011), China (Gijo, Antony, Hernandez, & Scaria, 2013), Australia (Hilton, Balla, & Sohal, 2008), and Europe (Bertolaccini, Rizzardi, Filice, & Terzi, 2011; van den Heuvel, Does, & Vermaat, 2004). Indeed, Six Sigma defines quality as a measure of variance from a given performance standard or promise of quality. Six Sigma was derived from a measuring index that is used in quality management: Defects per million opportunities (DPMO), which translate into one million error possibilities. Every DPMO value

corresponds to a sigma value. A DPMO shows the frequency in which the error will possibly occur. An error possibility (opportunity) is every chance that a given request (promise of quality) is correctly or incorrectly exercised. One might argue that in health care, even a 99% yield/degree of perfection (2.8 sigma) is ethically and economically not acceptable. Indeed Table 2 shows that in this regard there is a big discrepancy between a sigma of 2.8 and 6 sigma.

Therefore, based on the premise that every process/error/variance of a determined quality standard in a hospital could generally be improved with the help of Six Sigma, the use of POCTs in Germany and Malta were analyzed using this methodology. The following definitions need to be established first:

- “Unit” of performance (object/product/service) to be delivered to the patient: Troponin I test (German POCT case study) and Ultrasound (Maltese POCT case study);
- “Requirements” or the main parts that make up the performance that will satisfy or anger the patient;
- Number of “requirements” for every performance category (“unit”) in which the number of “requirements” equals the number of error possibilities.

For both case studies, the DMAIC (Define, Measure, Analyze, Improve, Control)-Cycle method is used to estimate the differences between POCT-ED scenarios and traditional central lab/MID with a view to assess client orientation, quality, and costs. The concept is to aim for elimination of existing wastefulness in the “hidden factory,” which needs to be optimized and reorganized (Gygi & Williams, 2012). Table 3 provides a list of sources that are waste in health care.

Table 2. 99% Perfection Is Not Enough for the Health Care System.

Sigma Level of 3.8	Six Sigma
99% perfection = 2.8 Sigma = 96,000 DPMOs	99.9997% perfection = 6 Sigma = 3.4 DPMOs
5,000 incorrectly performed surgical procedures per week	1.7 not correctly performed surgical procedures per week
200,000 wrong prescriptions a year	68 wrong prescriptions a year
48,000–98,000 avoidable deaths in hospitals a year	17–34 avoidable deaths in hospitals a year

Source: <http://www.creative-healthcare.com/Six-Sigma-Healthcare-Training>

Table 3. Leading Sources of Inefficiency in Hospitals.

Source of Inefficiency	Examples
Medicines: underuse of generics and higher than necessary prices for medicines	Inadequate controls on supply-chain agents, prescribers, and dispensers; lower perceived efficacy/safety of generic medicines; historical prescribing patterns and inefficient procurement/distribution systems; taxes and duties on medicines; excessive mark-ups
Medicines: use of substandard and counterfeit medicines	Inadequate pharmaceutical regulatory structures/mechanisms; weak procurement systems
Medicines: inappropriate and ineffective use	Inappropriate prescriber incentives and unethical promotion practices; consumer demand/expectations; limited knowledge about therapeutic effects; inadequate regulatory frameworks
Health care products and services: overuse or supply of equipment, investigations, and procedures	Supplier-induced demand; fee-for-service payment mechanisms; fear of litigation (defensive medicine)
Health workers: inappropriate or costly staff mix, unmotivated workers	Conformity with predetermined human resource policies and procedures; resistance by medical profession; fixed/inflexible contracts; inadequate salaries; recruitment based on favoritism
Health care services: inappropriate hospital admissions and length of stay	Lack of alternative care arrangements; insufficient incentives to discharge; limited knowledge of best practice
Health care services: inappropriate hospital size (low use of infrastructure)	Inappropriate level of managerial resources for coordination and control; too many hospitals and inpatient beds in some areas, not enough in others; often this reflects a lack of planning for health service infrastructure development
Health care services: medical errors and suboptimal quality of care	Insufficient knowledge or application of clinical-care standards and protocols; lack of guidelines; inadequate supervision
Health system leakages: waste, corruption, and fraud	Unclear resource allocation guidance; lack of transparency; poor accountability and governance mechanisms; low salaries
Health interventions: inefficient mix/inappropriate level of strategies	Funding high-cost, low-effect interventions when low-cost, high-impact options are unfunded; inappropriate balance between levels of care, and/or between prevention, promotion, and treatment

Source: World Health Organization (2010).

Analysis and Results of German Case Study

The German case study assesses the use of ED-POCT in acute coronary syndrome patients, compared to the central lab setting. It is hypothesized that a faster troponin test turnaround time would result in quicker diagnosis, lower duration of stay in ED, and better patient outcomes. The patients included in the study were non-STEMI patients, as it was necessary for these to clarify diagnosis of infarction. In every setting, 92 Troponin (I) tests were compared based on their turnaround time for Troponin-i (duration of time taken from collection of patient blood sample to bed-side availability of Troponin test result), which were recorded and the clinical and economic effects evaluated. Additionally, the effects of a shorter stay in the ED on the overall hospital stay were investigated. So as to determine the “requirements” the following three evidence-based criteria (Cannon et al., 2000; Krumholz et al., 2011) that were considered as the most important demands on the ED from the acute coronary syndrome patient’s point of view were chosen:

A = Number of patients with maximum amount of time spent waiting for a doctor (first sight) of 15 minutes;

B = Number of patients with turnaround time (TAT) for Troponin (I) not longer than 60 minutes;

C = Number of patients with length of stay in the ED not longer than 2 hours.

These three demands are equal to three error possibilities for every patient visit. Thus, if N = number of patients, the sigma value computes: $\{[(N - A + N - B + N - C)]/N*3\} * 106 = \text{DPMO}$. The Six Sigma ANOVA analysis demonstrated that the stability of the POCT-ED is much higher when compared to the central lab process. For this specific case study (Table 4), in the central lab test environment for 92 patients, 17 waited for more than 15 minutes to see doctor; only 21 (out of 92) tests met the requirement of a 60 minutes TAT, and all took more than 2 hours in the ED; whereas for POCT- Troponin I tests, 6 patients waited for more than 15 minutes for doctor, none had a TAT of more than 60 minutes and none stayed in ED longer than two hours. Therefore Process Sigma value for central lab is 1.11 whereas for POCT, Process Sigma value is 3.5 showing an improvement of percent yield from 35% to 98% and percent defects decreased from 65% to 2%.

The average turnaround time of Troponin I tests is about 18 minutes by using POCT and nearly 80 minutes in case of the lab test setting. The reduction of treatment time and length of stay in the ED leads to less crowding effects, and therefore less treatment capacity is needed to meet

Table 4. Defects Per Opportunity, Defects (%), Yield (%) and Process Sigma Computation for German and Maltese Case Studies.

A. German case study: RCT of patients taking Troponin I test in ED (POCT) as compared to central lab			
		Central Lab (n = 92)	POCT_ED (n = 88)
Defects per unit (DPU)	[Total defect]/product unit	[17 + 92 + 71]/ 92 = 1.957	[6 + 0 + 0]/ 88 = 0.068
Total opportunities (TO)	Total number of product units × opportunities	92 × 3 = 276	88 × 3 = 264
Defects per opportunity (DPO)	Total number of defects/ total opportunities	180/276 = 0.065	6/264 = 0.023
DPMO	DPO × 1,000,000	65,000	22,727
Defects (%)		65.22	2.27
Yield %		34.78	97.73
Process Sigma		1.11	3.5
B. Maltese case study: Pilot study of patients admitted to ED for blunt abdominal trauma comparing before and after introduction of ultrasound as a POCT in 2013			
		2012 Use of MID (n = 41)	2013 Use of POCT-US (n = 28)
Defects per unit (DPU)	[Total defect]/product unit	[0 + 36]/ 41 = 0.88	[0 + 2]/ 28 = 0.071
Total opportunities (TO)	Total number of product units × opportunities	41 × 2 = 82	28 × 2 = 56
Defects per opportunity (DPO)	Total number of defects/ total opportunities	36/82 = 0.44	2/56 = 0.0357
DPMO	DPO × 1,000,000	439,024	35,714
Defects (%)		43.9	2.27
Yield %		56.1	96.43
Process Sigma		1.65	3.3

the patients’ requirements. Table 5 and Fig. 4 show the defects and yield in both settings.

Using a Rolled Throughput Yield as a measure of process stability and process output, it is estimated that the opportunity to produce a correct and timely diagnosis for acute coronary syndrome patients (non-STEMI) is 52%. The results clearly show that Troponin I is a significant indicator for diagnostic and therapeutic quality of non-STEMI acute coronary syndrome patients. This indicator information contributes to a significant reduction of cost-intensive resources, for example intensive care beds, thereby

Table 5. Defects and Yield with the Limits of 95% CI for German Case Study.

	Total Opportunities	Defects	%	Standard Error	Upper Limit of 95% CI	Lower Limit of 95% CI
Central lab						
Defects	276	180	65.217	2.867	70.837	59.598
Yield	276	96	34.783	2.867	40.4017	29.164
POCT-ED						
Defects	264	6	2.273	0.917	4.071	0.475
Yield	264	258	97.727	0.917	99.525	95.930

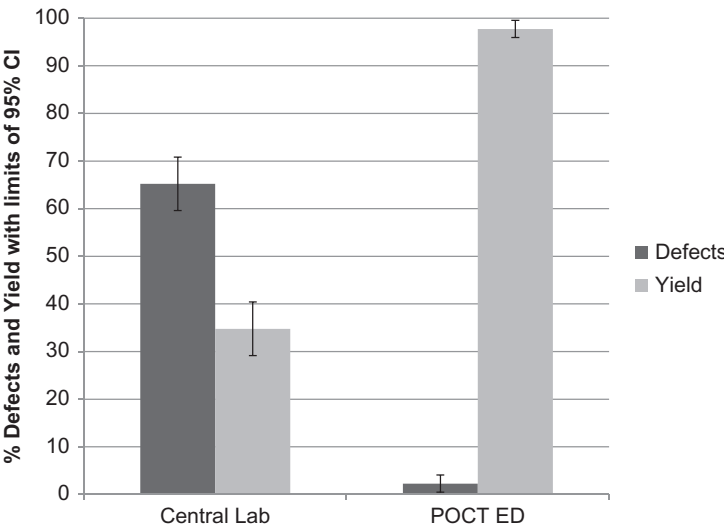


Fig. 4. Defects and Yield with the Limits of 95% CI for German Case Study.

avoiding opportunity costs as well as direct costs of treatment. Another finding indicates that high-sensitive Troponin, available in 18–25 minutes, can help to overcome the diagnostic gap which may be brought on by the use of 12-channel ECG. STEMI/NSTEMI classification through ECG tends to characterize the total size of Myocardial Infarction (MI) rather than the transmural extent such that transmural myocardial infarction events may not be identified (Sarafoff et al., 2013).

Analysis and Results of Maltese Case Study

The Maltese case study assesses the use of medical ultrasonography introduced as a POCT in the ED in 2013 to detect lifesaving abdominal free fluid in post-blunt trauma when compared to patients admitted in 2012 with the same diagnosis who were assessed using the MID. It is hypothesized that using FAST ultrasound at the ED would result in quicker diagnosis, and results which concur with those from CT (considered as the gold standard). So as to determine the “requirements” the following two evidence-based criteria (Clarke et al., 2002; Körner et al., 2008) that were considered as the most important demands on the ED from the acute blunt trauma patient’s point of view were chosen:

A = No false negatives and false positive results, when compared to gold standard investigations (CT abdomen and pelvis, Polytrauma CT).

B = Result of FAST ultrasound/CT not longer than 90 minutes and therefore availability of result (report) so as to aid in the resuscitation decision process and guide further patient treatment.

Based on the literature highlighted above, the earlier the availability of the result the better, so as to shorten the ischemic/shock time and subsequently to stop and reverse the hypovolemic shock process. The study by Clarke et al. (2002) suggested a 90-minute cut-off point based on their findings that patients waiting in the ED beyond this time experience an increased mortality at rate of 0.35% per minute. These two demands are equal to two error possibilities for every patient visit. Thus, as shown in Table 4, the sigma value for 2012 (MID only) is 1.65, whereas for 2013 with the use of POCT-US, sigma value is 3.3 showing an improvement from 439,024 DPMO to 35,754. Therefore the Process Sigma value for 2012 patients using MID is 1.65 whereas for POCT-US, the Process Sigma value is 3.3 showing an improvement of percent yield from 56% to 96% and percent defects decreased from 44% to 2%. Table 6 and Fig. 5 show the defects and yield in both settings.

All the patients in the Maltese pilot study had stable parameters that allowed them to be transferred to the CT scan room. Since unstable patients are by protocol transferred directly to theater, these were excluded from this pilot study. The time taken for the patient to be transferred to the MID depends on a number of factors, namely overcrowding at ED and queues at MID itself, the time taken for the primary survey to be carried out, time for resuscitation, the availability of the allied staff needed to make the safe transfer of the patient and the availability of the CT scan room. In most cases the radiologist would have communicated the

Table 6. Defects and Yield with the Limits of 95% CI for Maltese Case Study.

	Total Opportunities	Defects	%	Standard Error	Upper Limit of 95% CI	Lower Limit of 95% CI
MID						
Defects	82	36	43.902	5.480	54.644	33.161
Yield	82	46	56.098	5.480	66.840	45.356
POCT-ED						
Defects	56	2	3.571	2.480	8.432	-1.289
Yield	56	54	96.429	2.480	101.290	91.568

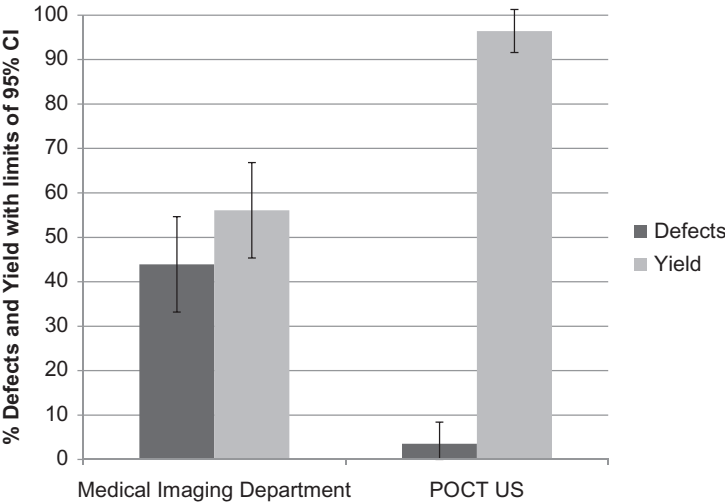


Fig. 5. Defects and Yield with the Limits of 95% CI for Maltese Case Study.

radiological finding over the phone but the official report is issued some time later. The times used are those when the result was issued officially on the Patient Archiving Communication System.

DISCUSSION

In this chapter, we have attempted to illustrate the extent to which investing in POCT in the ED can be considered as an example of best practice

in health care management using Six Sigma principles, and aligned to Total Quality Management (TQM). Indeed, Six Sigma provides a strategic dimension to hospital management to improve processes and functions, as well as attain zero-error hospitals. It is a quality improvement approach aimed at optimizing patient safety by reducing process variation, and eliminating waste and non-value-added steps/tasks. The case studies discussed in this chapter amply demonstrate that the use of POCT in the ED led to major improvements in processes, reduced process variation, and achieved better-benchmarked target ED times. Furthermore, the application of Six Sigma methodology operationalized these improvements in terms of yield and defects, in that much better results were achieved for POCT technology in both case studies as compared to traditional central laboratory/MID.

The organizational and technological dimensions are crucial for the successful operation of the ED, irrespective of the type of health system in which it operates. Risk and cost analysis of emergency rooms show that the fast availability of clinically critical laboratory/radiological results within the ED contributes to securing medical quality through accurate and timely treatment results, which improve patient outcomes and in turn result in reduction of patient care costs. These unique characteristics make ED the ideal setting for the adoption of POCT.

One of the factors that differentiate between health systems is the capacity to innovate. Additionally, it is well known that health care innovations are slow to disseminate and adopt internationally. However, because POCTs have become increasingly affordable and transportable, they are ideal for cross-national application on a global scale which could render them best practices as regards internationalization of health innovation.

Regardless of this one must also acknowledge that barriers do exist for the adoption of POCT. [Pai et al. \(2012\)](#) provide a comprehensive list of barriers (p. 4) to adoption and scale-up of POC technologies that will be discussed in relation to the two case studies. The first is the economic barrier to POCT adoption in that it may prove to be more expensive to locate tests at point of care, which may mean that it becomes less affordable for some countries. In both case studies, the economic arguments were considered in tandem with ethical arguments, and with a longer-term view to return on investment. The second barrier is policy related in that existing guidelines and standard operating procedures (SOP) may not include POCT in their algorithms as a result of gaps in the evidence-base leading to uncertainty among policy makers on recommendations to be provided. Both the German and Maltese ED have introduced SOPs with

consideration of POCT as part of diagnostic-related patient pathways. However, as the number of available POCTs increases, improvement of guidelines needs to be continuously conducted. The third barrier is the apparent lack of regulation of diagnostics. Lack of regulation increases the availability of poor standard POCTs on the market while preventing the scale-up of validated ones. Indeed, even simple POCT do require quality assurance and quality control. The fourth barrier is capacity and infrastructure. The adoption of POCT does require dedicated and trained personnel to not only use the equipment but also ensure quality assurance. Furthermore space (physical and storage) in the ED is required to ensure smooth running of patient pathways that include POCT; as well as additional equipment resources needed for POCT. For example, at the time of the pilot study in Malta in 2013 only seven out of forty eight emergency physicians were trained to use the FAST ultrasound. Since then the number has increased to twenty-three. It should be noted that if unqualified staff uses POCT, then faulty results are more likely and this may lead to lower confidence in its use. The fifth barrier is ED overcrowding, staff shortages, and high workload, which may drive emergency physicians to shift their patients elsewhere for investigations rather than using POCT. This defeats the purpose of POCT when its aim is to alleviate ED crowding by establishing faster throughput. Finally, supply chain, administrative and operational deficiencies may lead to suboptimal or poor quality POCTs. Furthermore, the use of diagnostic tests outside their traditional settings may trigger professional turf wars about roles/tasks performed by specific disciplines, with staff becoming worried about relinquishing control over testing.

In conclusion, POCT in ED should be given serious consideration by hospital managers as a method of best practice, by investing in POCT as a package that includes not just purchasing of equipment, but also training, establishing the needed ED infrastructure, and developing patient pathways with guidelines/SOPs that truly recognize POCT. Equally important is the identification by hospital managers of the barriers to successful implementation through the recognition of the inherent complexity and diversity of POCT.

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SECTION III
BASICS AND PRINCIPLES OF
BENCHMARKING

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INTERNATIONAL BENCHMARKING AND BEST PRACTICE MANAGEMENT: IN SEARCH OF HEALTH CARE AND HOSPITAL EXCELLENCE

Wilfried von Eiff

ABSTRACT

Purpose – Hospitals worldwide are facing the same opportunities and threats: the demographics of an aging population; steady increases in chronic diseases and severe illnesses; and a steadily increasing demand for medical services with more intensive treatment for multi-morbid patients. Additionally, patients are becoming more demanding. They expect high quality medicine within a dignity-driven and painless healing environment.

The severe financial pressures that these developments entail oblige care providers to more and more cost-containment and to apply process reengineering, as well as continuous performance improvement measures, so as to achieve future financial sustainability. At the same time, regulators are calling for improved patient outcomes. Benchmarking and best

practice management are successfully proven performance improvement tools for enabling hospitals to achieve a higher level of clinical output quality, enhanced patient satisfaction, and care delivery capability, while simultaneously containing and reducing costs.

Approach — This chapter aims to clarify what benchmarking is and what it is not. Furthermore, it is stated that benchmarking is a powerful managerial tool for improving decision-making processes that can contribute to the above-mentioned improvement measures in health care delivery. The benchmarking approach described in this chapter is oriented toward the philosophy of an input–output model and is explained based on practical international examples from different industries in various countries.

Findings — Benchmarking is not a project with a defined start and end point, but a continuous initiative of comparing key performance indicators, process structures, and best practices from best-in-class companies inside and outside industry.

Benchmarking is an ongoing process of measuring and searching for best-in-class performance:

- *Measure yourself with yourself over time against key performance indicators*
- *Measure yourself against others*
- *Identify best practices*
- *Equal or exceed this best practice in your institution*
- *Focus on simple and effective ways to implement solutions*

Comparing only figures, such as average length of stay, costs of procedures, infection rates, or out-of-stock rates, can lead easily to wrong conclusions and decision making with often-disastrous consequences. Just looking at figures and ratios is not the basis for detecting potential excellence. It is necessary to look beyond the numbers to understand how processes work and contribute to best-in-class results. Best practices from even quite different industries can enable hospitals to leapfrog results in patient orientation, clinical excellence, and cost-effectiveness.

Originality/value — Despite common benchmarking approaches, it is pointed out that a comparison without “looking behind the figures” (what it means to be familiar with the process structure, process dynamic and drivers, process institutions/rules and process-related incentive

components) will be extremely limited referring to reliability and quality of findings.

In order to demonstrate transferability of benchmarking results between different industries practical examples from health care, automotive, and hotel service have been selected.

Additionally, it is depicted that international comparisons between hospitals providing medical services in different health care systems do have a great potential for achieving leapfrog results in medical quality, organization of service provision, effective work structures, purchasing and logistics processes, or management, etc.

Keywords: Benchmarking; best practice; best-in-class; leapfrogging

ISSUES OF CONCERN

Due to simultaneous demographic developments and medical progress, the extent and intensity of demand for medical services are rising in all European countries, and the average age of patients admitted to an acute hospital has risen by four years between 2003 and 2010 (von Eiff, Schüring, & Niehues, 2011). The number of concomitant diseases and the risk factors have increased simultaneously, for example, during that period in Germany, CABG-patients' average ages have risen from 60.08 to 65.5 years (phenomenon of multi-morbid and therefore cost-intensive patients) (von Eiff, Schüring, & Niehues, 2011).

In order to secure the sustainable financial viability of medical services, some European countries have introduced a budget cap, while others have implemented a price-orientated reward system based on prospective payments (Diagnosis Related Group (DRG) System). From an economic perspective, prospective payments create target-costing situations. The price for a particular medical case is predefined as fixed and the care provider organization has to ensure that the emerging costs of treatment do not exceed recoverable earnings and that future funding can be provided by the profits generated.

At the same time, competition between hospitals has intensified and the intrusion of private hospital chains into the public sector has increased. Therefore, hospitals are being confronted more and more with a previously unknown situation: they have to enhance medical quality, raise the patient's

benefits (service, satisfaction, anxiety relief, etc.), reduce costs, optimize the resource workload, and minimize the average length of stay (ALOS).

Such a daunting constellation of objectives can only be pursued through efficient performance processes, whose output corresponds to patients' expectations and where the use of resources is optimal (meaning without waste in resources) (von Eiff, 2002a, 2002b). Simultaneously, it is important to bear in mind that a given hospital can secure a strong and lasting competitive position through an innovative configuration of medical and performance-based offerings (Porter & Teisberg, 2006).

BENCHMARKING AND BEST PRACTICE MANAGEMENT

Benchmarking is a comparative analysis of processes and outcomes with an (external) reference level, which represents a best-in-class solution (BIC).

Benchmarking does not refer to one project, but must rather be considered as a continuous, systematic (method) process of the evaluation of products, services, and working processes of BIC organizations aiming for continuous enhancement and improvement.

Benchmarking is geared toward the identification of best practices, in order to tap the potential within one's own organization. Benchmarking also aims to identify "Disruptive Innovations" in order to develop value-added services for patients and payers and by this to create a strong competitive position in the health care market (Christensen, Bohmer, & Kenagy, 2007).

Aims of Benchmarking

A comparison of organizations provides the hospital management with current information relevant for the decision making. Furthermore, a benchmark guides the hospital's performance toward the cost or quality objective, especially in cases of planned changes in the medical service contract or the future service portfolio.

A benchmark in terms of a BIC solution indicates the best possible performance of other hospitals. Benchmarking also serves as an early-warning system, by signaling the need for intervention with respect to process, staff, quality, and costs.

Especially through the comparison of BIC hospitals, it helps to identify tendencies concerning

- the development of the appropriate structure for providing health care;
- medical techniques and the operational organization/workflow management;
- legal regulations, their consequences, and allocation of responsibility.

At least, benchmarking helps formulating business goals, as well as priorities for decision and action. At the end of the day benchmarking intends to provide high-end quality in all service areas for patients and to realize an “evidence management approach” (Berry & Bendapudi, 2007). In addition benchmarking should contribute to patient safety in order to prevent patients from harm related to, for example, surgical site infections (Anderson et al., 2014) and medical errors (Kohn, Carrigan, & Donaldson, 1999).

Types of Benchmarking

Organizations can be compared in various different ways. These different approaches vary by the effort necessary to gather reliable data, the intensity of analytical effort, and the knowledge about different industries; comparisons across sectors, industries, and countries, specifically in health care, comparisons across health systems.

Internal Industry Comparison

The classic comparison of organizations/benchmarking is an internal industry comparison of companies and parts of companies, with the aim of assessing the economic capabilities and ascertaining the basis for business success (success factors). The bases for assessment are the aggregated key factors and soft factors for the benchmark. The results from the focus of consideration are characteristic for the activities and success of a company (typical for a business): market share, profit before taxation, costs of warranty, inventory turnover (as in industrial companies); LOS, occupancy rates, length of operation and suture, and other activities occurring in hospitals.

Comparison under Competitors

In the form of a competitive comparison, the benchmarking test aims at the identification of the current cost, product, and service gap in relation to the best competitor. This form of benchmark is based regularly on the key result factors. This type of comparison has limited value. It is not suitable for gaining leapfrog results and in the best case discovers the gap between the own company and the market leader. Gathering information is also difficult because most companies within an industry are not willing to give sensible data to competitors, fearing to lose their strategic market position.

Reverse Engineering

Reverse engineering was invented by a Japanese automobile manufacturer (Liker, 2004). It entails a competitive comparison, which is linked to outcome: “achievable market price for a product with a customized functionality” which subsequently leads to the reengineering of the product process. The reason, why the BIC competitor is able to deliver a product with high quality at competitor-free low prices is, that this company controls all research and development activities oriented to the real needs of the customer and gives strong limitations to departments pertaining innovations and inventions. By proceeding in this way, the “reverse engineering” departs methodologically from a pure comparison of results and integrates the comparison of processes as objects of analyses. The starting point for reverse engineering is the so-called “slaughter/butchering” of products: the product (e.g., automobile) is systematically taken to pieces to identify, from an engineering point of view, which components/elements, material, and principles of assembly are characteristic. Subsequently, conclusions and inferences are drawn on assembly and the principles of construction.

In health care systems, this kind of “market-into-company” approach is implemented and established in highly specialized clinics providing standardized procedures, for example, using standardized medical equipment.

Within the scope of best practice management, target costing and value analysis are also gaining ground for hospital management. Regarding an analysis of medical performance portfolios for hospitals, it is conspicuous that BIC hospitals offer some services, which are not offered by others. This is the result of direct and procedure-based costs, which are higher than those resulting from alternative procedures.

The Center for Hospital Management at the University of Münster (Germany) carried out a study in order to compare the results of different

opportunities for haemorrhoidectomy procedures. The medically indicated piles surgery with a circular stapler enables, through a departure from classical surgery (according to Milligan-Morgan, Parks, ...) the reduction of LOS from 5.8 to 2.8 days (reduction of infection risk and increase in comfort rate for the patient through an early return to the usual social environment), the reduction of operation time by 17 minutes (capacity gain, optimal surgery workload), and a painless reentering into work life only 12 days after surgery (in comparison to 24 days after the previous type of surgery) (von Eiff, 2007). However, the costs of each procedure rose by about €430 in comparison with the classical surgery. The problem is that in the German health care system there is no incentive for hospital managers to foster procedures that only contribute to patient satisfaction and issues pertaining economy (e.g., reducing time between discharge and being back to work). So the success of benchmarking directly relates to the environment, the rules, and institutions of a specific health care system.

Nevertheless, BIC hospitals orientate their decisions on the basis of process cost benefits, time benefits, portfolio variety, and the possibility of establishing an image, not on product prices or direct procedure costs.

Generic Benchmarking

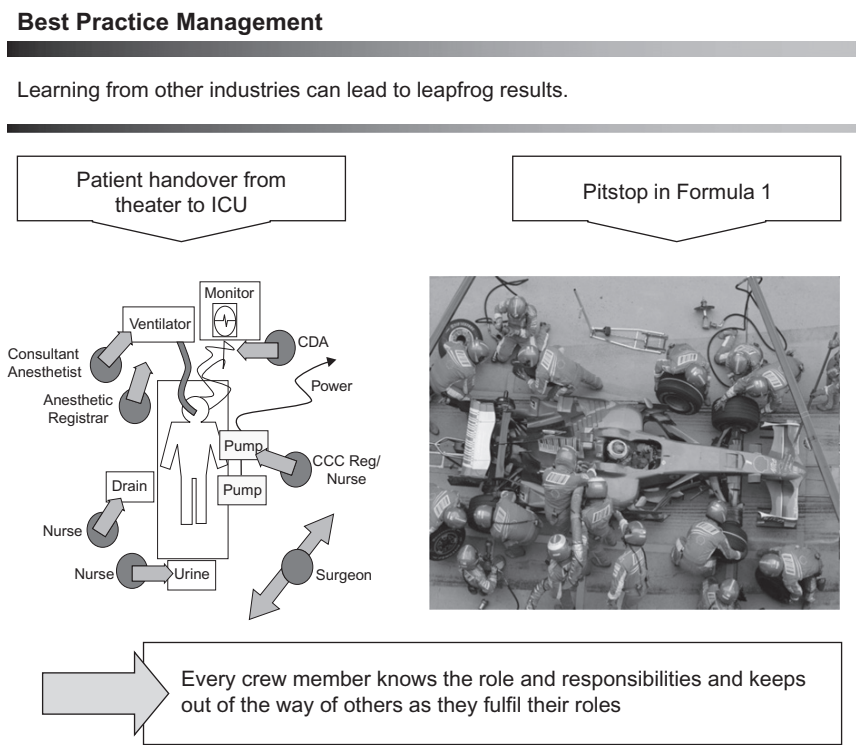
Generic Benchmarking searches cross-sectorally for “best practice” ideas and transfers them in a groundbreaking way at one’s own company. In this manner, a minibar-system in a hotel in Dublin becomes an idea generator for an electronic dispensing system to supply a ward with medical products in the OLVG-Hospital (Amsterdam). In an electronic minibar system every consumption of drinks is automatically registered. Opening flap a red button is pressed automatically and starts two information routines electronically: the room service is informed about the consumption and the need to restock the compartment and the consumption is directly booked on the guest’s accommodation bill. An electronic cabin placed in the cath-lab and containing medical products (e.g., catheters) as well as pharmaceuticals is working based on the same principles of lean production. If a nurse wants to take out a catheter he/she has to feed the system with defined information (product or drug, number of pieces taken out, name of the patient, ID-number) in advance. Pressing a button after take-out, the logistical provider is informed about the current stock level, so he/she is able to avoid out-of-stock situations. In parallel the medical controlling department is informed about the costs of a procedure/patient caused by medical products. This efficient replenishment solution avoids unnecessary stock

as well as out-of-stock situations, and contributes to patient safety and cost-containment in ordering and logistics.

The workflow management of the Ferrari pit stop crews’ pit stops in Formula One are the force behind the reorganization of transferring immediately post-operation children from the surgery team to the intensive care team in the Great Ormond Street Hospital, London (see Fig. 1).

A second example for generic benchmarking relates to the automotive industry: the customized standardization of a Mercedes-Unimog serves as a model for hospital logistic organization on the basis of an appropriate intervention surgery-set, anesthesia, and surgery covering cardiac operations in the Kerckhoff-Hospital (Bad Nauheim).

The time taken to prepare a patient for a surgical procedure is significant economically, medically, and ethically. As a general rule, we find that the longer the preparation time, the riskier it is for a patient and the more cost



intensive the procedure. For security reasons, the Kerckhoff Clinic decided to hone the preparation time down from 25 to 10 minutes. The idea of honing down the preparation time by means of standardized kit packs/ procedure sets was adopted from a best practice in the automotive sector (these findings result from a process study in the Kerckhoff Clinic Heart Center, Bad Nauheim, Germany, carried out by the Center for Hospital Management). Mercedes-Unimog in 1993 and 1996 had problems with costs and profits, due to a marketing and sales policy driven by customer requirements and individually over-engineered products. Each client received his Unimog with exactly the functionality and working components he wished and thought he needed. In that way, the development, production, and logistic costs rose explosively and the overloaded factory was unable to satisfy the additional demand. A feature analysis of 71 sales orders revealed that 85–90% contained the same product features and service components and only maximally 15% were caused by individual customer wishes. A detailed survey of the real needs of the customers revealed that most do not or only occasionally use their additional components (snow plough, cleaning brush for tunnel facility, and so on) – a classic case of over-engineering (see Fig. 2).

Customer-oriented Standardization

In cooperation with selected customers and official distributors an equipment package was developed, that covered 90% of the customers' requests.

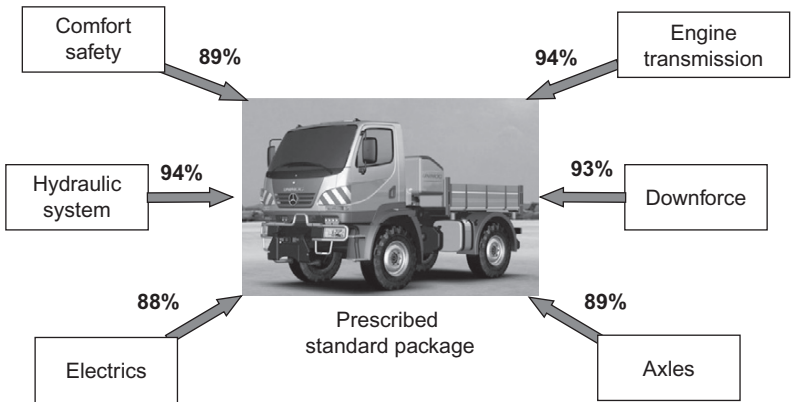


Fig. 2. Standardized Customer Requirements Are the Preconditions for Lean Processes.

The introduction of a Standard-Unimog Model with a fixed set of functionalities reduced costs and raised profits. Furthermore, customer satisfaction was even enhanced.

This concept of standardization was transferred to the surgery processes at the Kerckhoff Heart Center. The surgery-orientated procedures use time more efficiently, so that neither the patients nor the staff now has unproductive waiting times. The entire process of preparing a CABG-patient for operation could be personalized due to the use of three defined kit packs for anesthesia, procedure, and gowning. Each kit pack contained all medical products definitely need under operation. All these products were in a ready-to-use condition (see Fig. 3).

Methodologically Assumptions and Propositions

Methodologically, benchmarking draws on a range of assumptions and propositions:

The centre of attention: the patient

The coordinated use of standard sets leads to effects in terms of organization, costs, and time which are advantageous for the patient and the personnel.

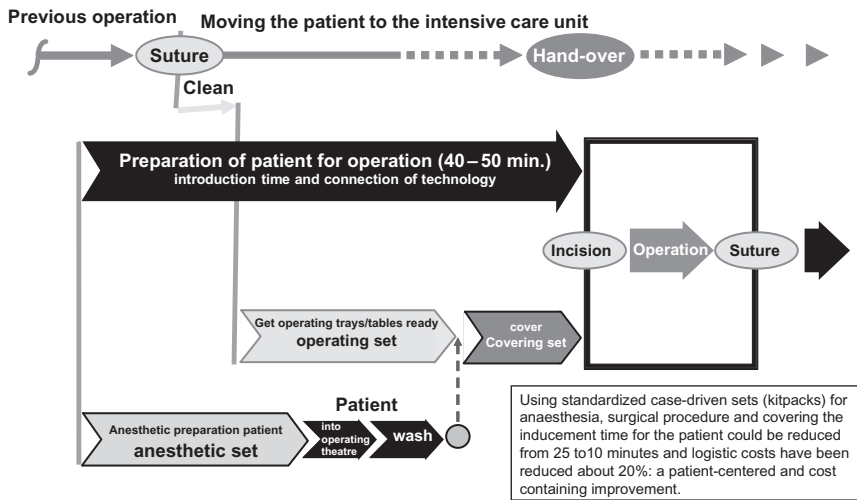


Fig. 3. Optimization of Patient Flow in Heart Surgery based on Procedure Kit Packs.

1. The Minimum-Thesis specifies the absolute time limit for a particular type of process as a comparison standard (e.g., the turnaround time for a troponin test in an emergency department should not be longer than 60 minutes).
2. The Iceberg-Thesis always assumes that the cause of a problem lies in another unit of responsibility, on a previous stage of the process (e.g., if the purchasing manager decides to buy circular staplers because of cost-containment target agreements, in consequence the procedure time in the OR is extended by 17 minutes).
3. The Aim-Disharmony-Thesis assumes the compatibility of contrary aims. The Toyota-Approach is a prominent example: double production, in half the time with only one-tenth the mistakes on half the area.
4. A partial price (Partial Price Thesis) accrues from the mental fragmentation of processes into separately calculable components. A comparison of manufacturers ensues, based on the prices of the single component. For each component, the best offering must be chosen. The newly ascertained value-based price combines the lowest respective price for the components.
5. Hence, benchmarking is not limited to a pure comparison of key figures, but entails a systematic search for the “best practice” beyond a key figure comparison. It includes an understanding of correlations and interrelationships between the process objectives, drivers, and practices, and involves innovative enhancement, as well as a high-quality and cost-effective implementation of the “best practice” in one’s own company. Therefore, benchmarking has nothing to do with a mere copying of others; following that approach the performance level of the better competitor in the best case can be achieved only after a time lag of months or years.

What Benchmarking is and What it is Not

From experience with benchmarking in the industrial sector, six main aspects can be outlined, which are fundamentally significant for the practical success of organization benchmarking comparisons (e.g., see “7-S-Framework” in [Berry & Seltman, 2008](#); [Peters & Waterman, 1982](#)):

- (1) the process orientation of the comparison;
- (2) cultural and organizational requirements of success;
- (3) method (=procedure/approach of identification, adoption, and implementation of best practices);

- (4) innovation and creativity orientation (=to enhance and advance, not merely copying external ideas);
- (5) the reengineering orientation, meaning the systematic breaking of rules, which were previously typical of the process (e.g., process of reclamation) or the sector and in that form have been regarded as unalterable;
- (6) the “trapped value” orientation (=recognition of not fully exploited potential of customer value in existing services).

Benchmarking is a methodically structured approach: from the identification of the problem through organized recognition to the implementation and enhancement of an externally sourced best solution to a “best practice.” The method includes the use of a unified description grid for “best practices” to evaluate the comparability, transferability, and risk of change management (see Fig. 4).

Structural Grid for Best Practices

Learning from the best requires that the problem structures are comparable.

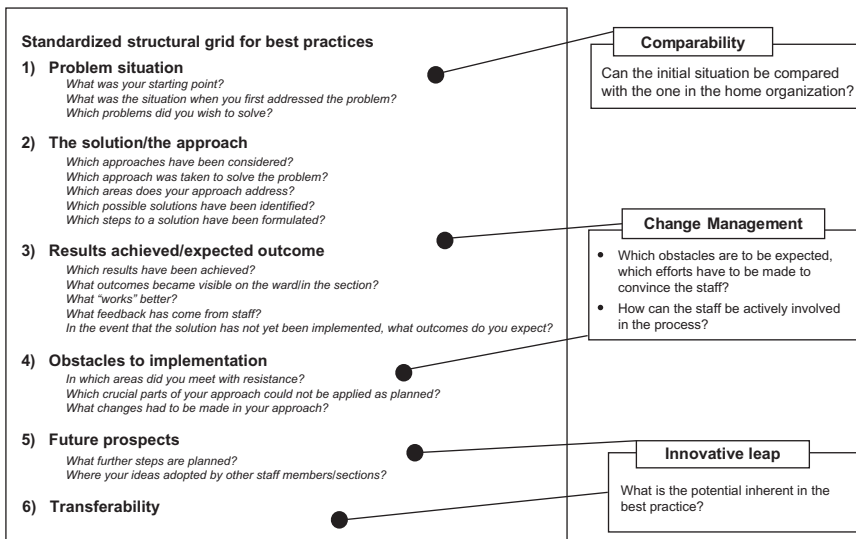


Fig. 4. Learning from the Best Requires Comparability of the Problem Structure.

- Benchmarking is an integral part of the objective-formulation process in a company: Benchmarks are the service visions of tomorrow. In the context of the benchmarking process, not only objectives are developed and/or enhanced, but also implementation recommendations are made.
- As a part of the organization and its cultural development process, benchmarking is supported by the leadership. In so-called benchmarking companies, the search for “best practice,” aiming at a creative enhancement of the company and the accordingly necessary reorganization process, is institutionally anchored in the organization itself (Meyer, 1998).
- Benchmarking is a methodical process: a benchmarking company works with a fixed benchmarking phase concept and trains its employees on the different benchmarking techniques (see Fig. 5).

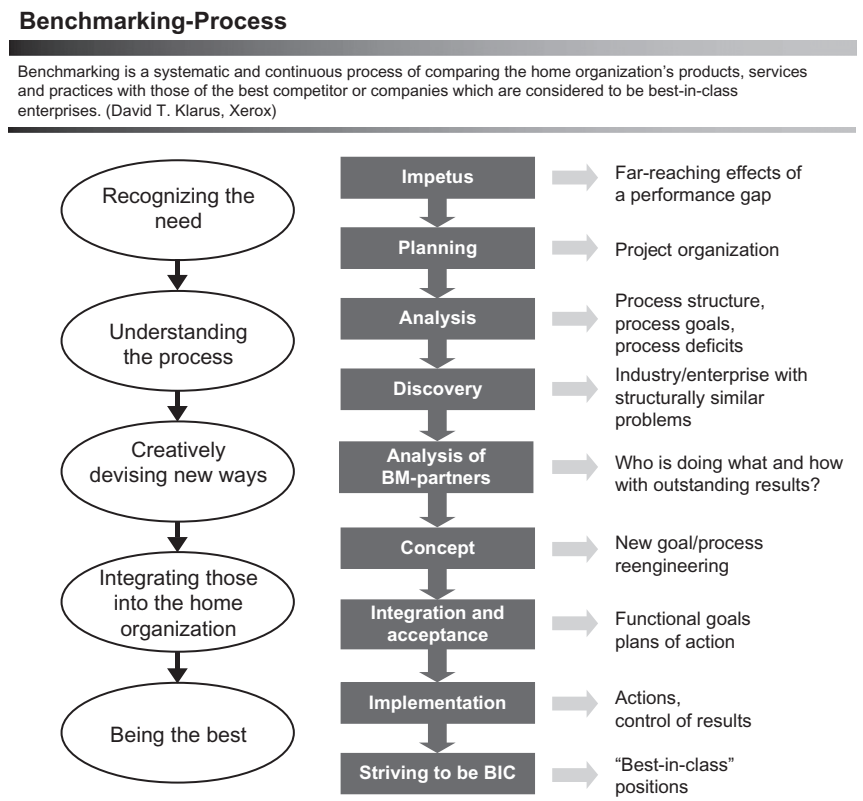


Fig. 5. The Methodology – How to Turn a Threat into Best-in-Class Position.

- Benchmarking is also a part of corporate culture. The contribution to a benchmarking initiative is considered in the incentive system (Liker, 2004).
- Benchmarking is designed to be sector-comprehensive: this is the only way to achieve “breakthrough innovations” and competitive advantages.
- Benchmarking yields the greatest impact, when designed in three phases: in the first, an intra-sector comparison takes place, the inter-sector comparison, on the other hand, occurs in the second phase, and the third phase entails the generic (designed to achieve leapfrog results) search for innovative best practices.

KEY AREAS OF BENCHMARKING IN A HEALTH CARE ENVIRONMENT

Levels of Benchmarking

Related to the subject area of benchmarking three major levels can be identified.

Benchmarking of Hospitals

Benchmarking of hospitals aims to improve the hospital’s competitive position. It is focused on achieving better patient outcome and patient satisfaction, enhanced medical quality in terms of innovative and painless procedures, and to ensure a sustainable financial position of the individual hospital. All services are dedicated to patients, who give direct feedback about their satisfaction status. Typical figures to compare are:

- ALOS,
- infection rate (e.g., MRSA, Cdiff),
- complication rate,
- T0/T1 rate (tumor surgery),
- turnaround times for imaging and lab test results,
- medication errors,
- surgical site infections,
- patient satisfaction,
- readmission rates.

Benchmarking of Health Service Settings

Health Service Research (HSR) is focused on the research of causes and effects of alternative health providing procedures and care provision

structures. HSR examines how people get access to health care, how much care costs, and what happens to patients as a result of this care. The main goals of HSR are to:

- identify the most effective ways to organize, manage, finance, and deliver high-quality care;
- study why people follow specific types of health behavior;
- check how health care environments can be designed in a safe-for-patient manner;
- compare different settings of care provision that support a specific type of illness (e.g., breast cancer);
- cope with the discharge management of rehab patients;
- handle the “last mile” of health care systems, where these services are carried out that are relevant for the medical result.

The comparison focus is not related to tangible patients but to homogeneous patient groups with identical or at least similar needs (e.g., patients suffering from MS, diabetes mellitus, therapy of refractory wounds).

Benchmarking of Health Care Systems

The comparison of Health Care Systems targets to state to what extension a national health system contributes to population health (e.g., life expectancy of a new-born child; new born mortality rate), to hindering economic burden of disease (e.g., waiting lists for elective treatment), and to a sustainable reimbursement of medical treatment. On the level of a health care system comparison the medical results in relation to cost ratios are reflected, the individual outcome situation of patients are not. Major comparison areas are:

- ALOS in hospitals,
- national infection rates (not infection rate of individual hospitals),
- waiting lists for procedures,
- accessibility,
- equity,
- safety.

Health care systems are strongly coined by attitudes, values, and habits of the society based on hidden incentives. This one has to take into consideration when comparing, for example, the ratio of cesarean sections. In the U.S. system this rate is about 22% of all births given while in Germany a rate of 33% is accepted to be normal. One reason may be that in the German system both cesarean sections and vaginal births are fully covered by the sickness funds, without any copayment.

In the Japanese system a “normal” vaginal birth is stated to be no illness, therefore people have to pay for all services provided under birth giving procedure. If a woman needs a cesarean procedure this is stated to be a disease and will be covered by the payers (except a copayment of about 30% of the total costs). The amazing fact: the cesarean rate in Japan is not more than 10% due to religious and cultural values and attitudes coining the Japanese society.

Key Performance Indicators: The Key Figure Dashboard

Benchmarking is related to the performance of processes, so it is fair to say that benchmarking activities are focused on the different areas of an Input–Output Model (see Fig. 6).

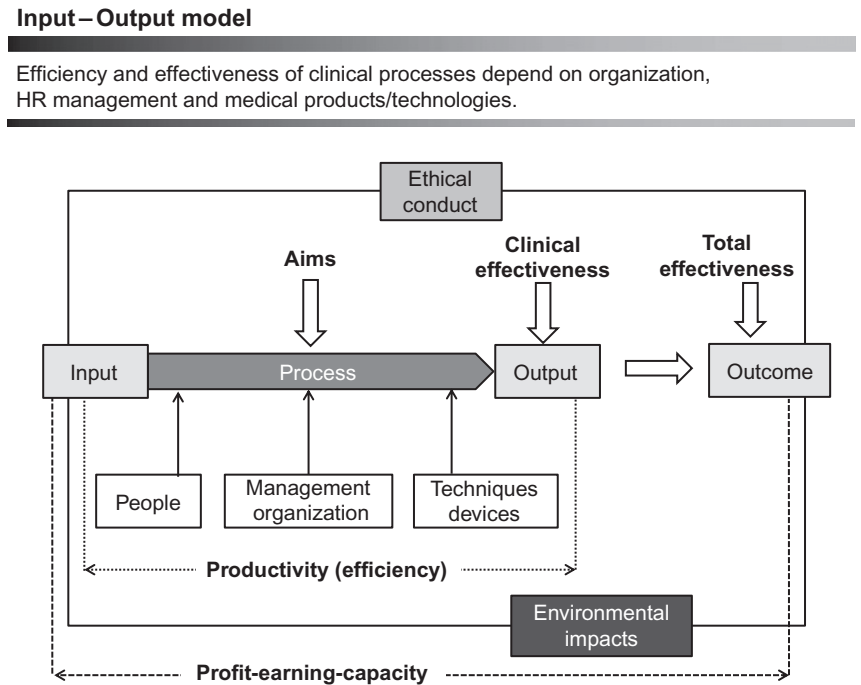


Fig. 6. Structure of the Input–Output Model and Areas of Measurement (Cost-Benefit Analysis).

In this conceptual context one has to keep in mind that efficiency and effectiveness of clinical processes directly relate to direct costs (e.g., an investment in medical devices) and opportunity costs in terms of “costs of poor quality” respectively “costs of risks for the patient.” The scheme in Fig. 7 is adopted from the “Lean Production Approach” and points out that benchmarking is a managerial approach of assessing medical output and patient outcome under heading of “costs of risk” or “costs of poor quality” (von Eiff, 2002a, 2002b).

From the viewpoint of patient risks, benchmarking projects with a focus on the optimal size of hospitals will become increasingly important. The questions secondary care providers should ask themselves is which size of a hospital fulfills the ideal of effective and efficient quality medical care provision. International studies on optimal sizing of hospitals show that risk in those institutions that are considered to be of optimal size is performed at minimum. For example, in a hospital with an annual number of only 30 colectomies the mortality rate is 89% higher than in a hospital where over 120 of these interventions are performed. A significant higher mortality and number of emergency CABGs can be observed in organizations that

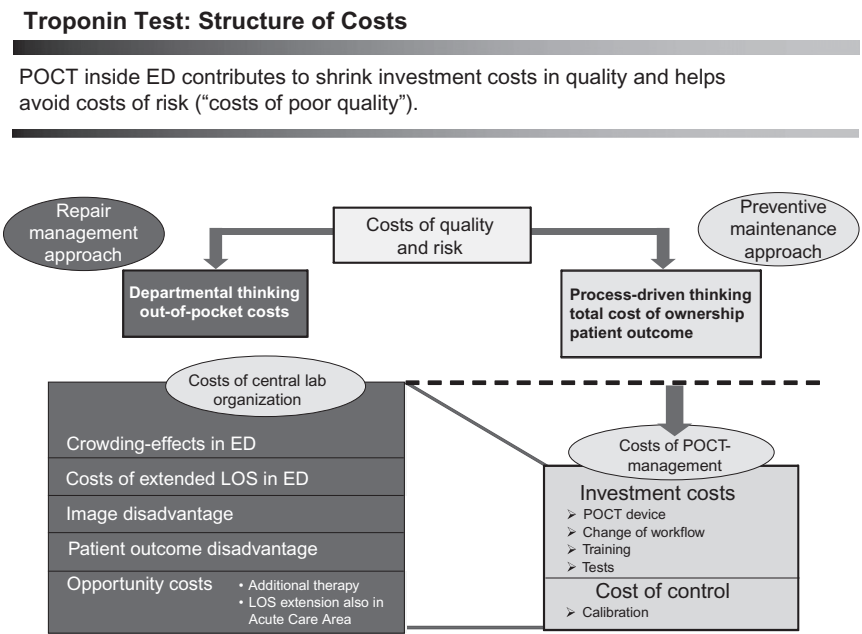


Fig. 7. Costs of Poor Quality as Assessment Tool in Benchmarking Initiatives.

perform less than 75 PTCAs per annum in comparison to organizations that do more than 200.

Based on the findings, especially, maximum care providing hospitals tend to establish competence centers that are able to provide integrated care for patients with complex diseases (e.g., lung cancer, prostate cancer, breast cancer, multiple sclerosis). Providing integrated care for those patients has a high positive impact on patients' safety and their quality of life. At the same time substantial cost savings can be achieved. The same appears to be true for diseases with high-quality medical care and expenditure demands (i.e., cancer). For example, studies relating to breast cancer survival reveal that the mortality rate drops by 15% with surgeons treating more than 30 new cases per year (von Eiff, 2007).

From a management point of view benchmarking data should be easy to collect with minimal effort and costs and the data must be precise, simple, and with high information value. To accomplish this, it is required to first precisely describe the figures as follows:

- Precise definition in order to avoid overlapping content with other figures or ratios;
- Clear determination of three different information areas (traffic light systematic):
 - green area (no management activities necessary);
 - red area (management is required to start specific actions immediately);
 - yellow area (management is supposed to check the situation within shorter timeframes and should prepare concrete actions for the case of a worsening situation);
- Clear definition of upper and lower thresholds combined with clear advices how to proceed in both cases (what decisions have to be made; what institutions should be informed; what decision-making process has to be started).

Example

- Figure: SSI rate in heart surgery (e.g., mediastinitis after CABG procedure following media sternotomy).
- Definition: Number of surgical site infections in relation to all surgical procedures performed within a defined timeframe.
- Thresholds:
 - Average SSI rate = 1.5%
 - Upper threshold (red area) = 2.3%
 - Lower threshold (green area) $\leq 0.8\%$

- Activities: When reaching the red area it is highly recommended to check
 - preoperative skin disinfection practice;
 - patient mix related to patients with diabetes, high blood pressure, obesity;
 - structure of types of SSI phenomenon, for example, A1/A2 infections and A3 infections (mediastinitis).

The second requirement for successful benchmarking is to detect and fix the KPIs that represent the real core business of an institution (see Fig. 8).

A KPI is a type of performance measurement (Kaplan & Norton, 2001). The analysis of KPIs leads to the identification of opportunities for improvement in terms of quality, turnaround time of processes, patient-centeredness, and costs. Such findings are commonly associated with performance improvement initiatives (see Fig. 9).

The third step of preparing structured benchmarking-based decisions is to transform KPIs into dashboards and at least into a Balanced Scorecard (Kaplan & Norton, 1996).

Key Performance Indicators

KPIs uncover the performance of core business processes.

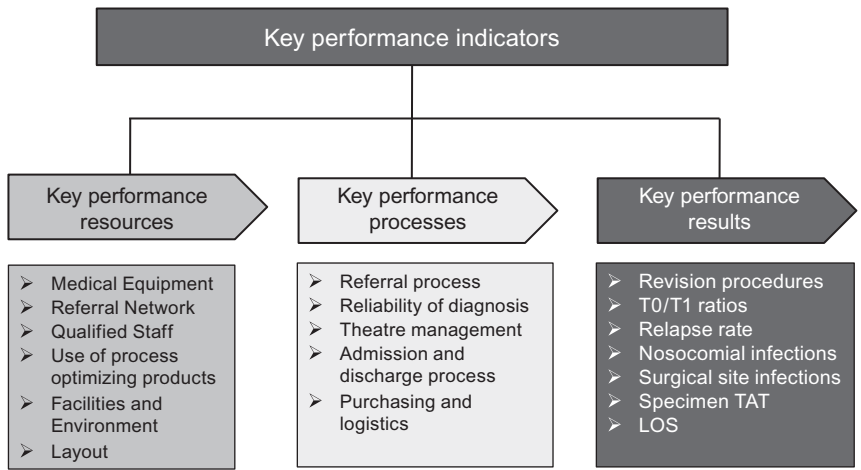


Fig. 8. Areas of Key Performance Indicators.

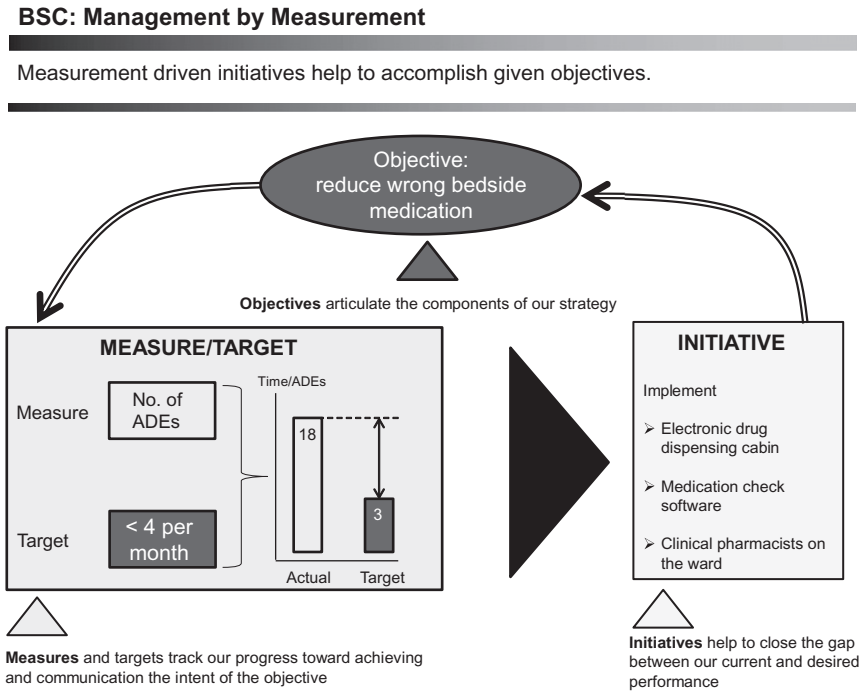


Fig. 9. The Connection between Objectives, Measures, and Initiatives Ensures Strategic Positions to be Realized.

From the perspective of a hospital manager, who has to make a qualified decision, a dashboard maintains all decision-relevant information, which is necessary to steer a controlled and unique area of responsibility and the associated business processes.

A dashboard is therefore a structured system of figures and decision-related information concerning the value of information, as well as being aligned with the specific context. Dashboards are fitted to the individual information needs of the leader, depending on the contextual area of responsibility (e.g., clinical pharmacist, senior physician, hospital purchaser), and the reached hierarchical level (hospital manager, manager of the human resources department, of medical product warehouse, of the pharmacy, of a therapeutic stroke team). Key figures have the function of informing the executive/manager about the current situation in his own area of responsibility (= reporting function). Furthermore, each key

figure provides decision-relevant information on future developments (= early-warning function) and signals the executive/manager the nature, gravity, and urgency of the necessary action (= signaling function). In the best case, key figures are associated with recommendations and depending on the situational key figure manifestation (= recommendation function).

Dashboard key figures are constructed as follows:

(1) Contextual definition

Key figures must be defined precisely and it is necessary to ensure that the data used for determining the key figures are valid, current, and can be obtained without undue effort. Ideal key figures are supplied with data accumulated within the scope of an automatic and routine data-acquisition process.

(2) Purpose and value of information

A key figure is an indicator of a specific form of performance or failure. Such phenotypes or visible consequences of committed mistakes/failures can be detected, analyzed, and assessed through interaction with the management tool “Failure Mode and Effects Analysis” (FMEA), the 80:20 Pareto Rule, the Ishikawa Fishbone Graph as well as decision-making instruments, for example, Scenario Planning, SWOT Analysis or Porter’s 5 Forces Analysis.

(3) Determination of intervention values

The standard values, upper and lower intervention value (“thresholds”), have to be defined for decision-orientated key figures. Accordingly, the decision maker receives targeted signals, which induce him/her to intervene. Variances (sigma shift) and frequency-of-incident types are used for the analysis (occurrence frequency, standalone event, time reference).

(4) Indicators for intervention

An ideal case would be if, together with the intervention level, intervention help, in the sense of a strategic norm decision, would be offered. If, for example, the troponin-I value of an acute myocardial infarction emergency patient is lower than 125 ng/l, the patient can be released.

(5) Possibilities for error detection

These help the decision maker to avoid wrong decisions/mistakes. Mistake-avoiding tips are helpful (sound-alike, look-alike, confusion of measurands like ng/l and µg/l).

(6) Benchmarks

Furthermore, the accomplishment of an orientation by using (international) comparison figures can be helpful. The key figures in a

dashboard must be chosen based on content and structurally orientated so that the relation between the quality and efficiency of clinical performance processes, quality, and efficiency of cooperation between admission physician, nurse, emergency physician, mobile intensive care unit and the therapeutic team, efficiency of medical product use and medication as well as the risks for patients are all made transparent.

The cardio dashboard presented in Fig. 10 maintains key figures, which represent the entire medical care process from the occurrence of an emergency case (e.g., acute coronary syndrome) to moving the emergency patient from the emergency admission or the catheter laboratory.

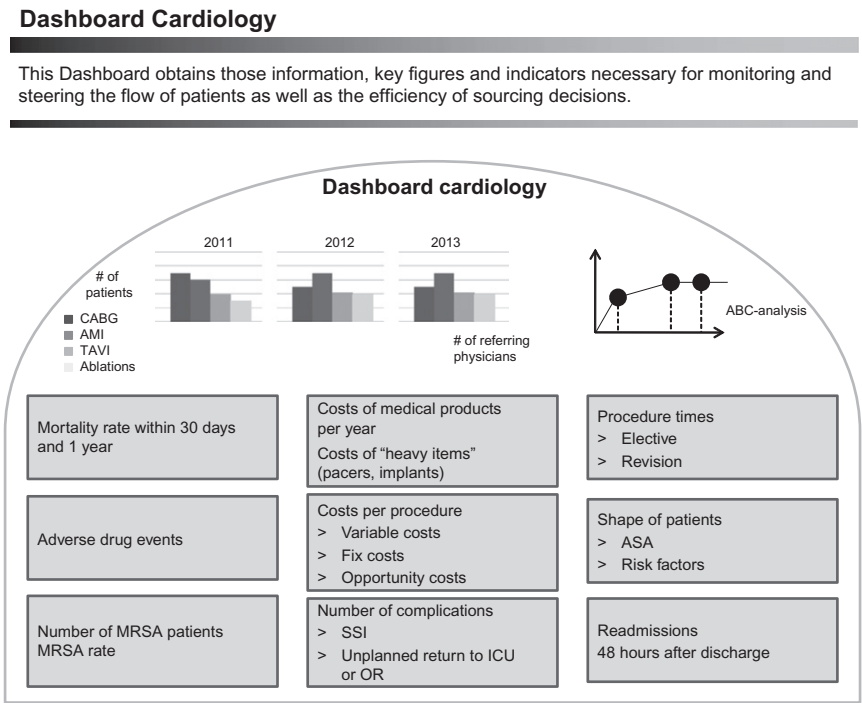


Fig. 10. The Cardio Dashboard Contains All the Information, Key Figures, and Indicators Necessary for Monitoring and Steering/Regulating the Cardio-Surgical Medical Care Processes.

The key figures inform about:

- Performance ability of emergency services:
 - Quality of first diagnosis and primal emergency care in the place where the emergency occurred;
 - Rapidity of emergency transportation;
- Efficiency and effectiveness of intra-company emergency organization:
 - Availability of computed tomography, Magnet Resonance Tomography (MRT), ultrasound;
 - Door-to-needle time;
 - Door-to-balloon time;
- Quality of the relationship between mobile emergency care unit and internal emergency management (especially the catheter laboratory).

PITFALLS AND TRAPS

Benchmarking which only focuses on comparing of key figures does not fulfill the purpose of generating decision-relevant information and is not sufficient for achieving the BIC position. Key figures can only indicate assumed best practices. Only after analyzing the process, the forms of cooperation and corporate culture, which lead to a key figure, can a BIC position be proved or rejected.

Example 1: The Length of Stay of Patients in the Intensive Care Unit

The number of patients, transferred from the intensive care unit (ICU) to a peripheral unit, and transferred within 12 hours after the surgery back to the ICU, is an indicator of the quality of clinical service. If this key figure (see Fig. 11) is high in relation to other hospitals, this could imply that the patients were transferred too early to the peripheral unit (i.e., in an unstable medical condition). The staffing overload and low capacity in the ICU are possible reasons. An insufficient qualification or poor staffing capacity on the peripheral unit can also be a reason. A low relocation rate on the other hand could imply that the staffing in the peripheral unit is highly qualified and that the technical equipment and facilities of the unit are comparable to an intermediate care unit: a very cost-intensive solution with no BIC character.

The “right” Benchmark

Don't compare single figures! Do compare ranges of ratios and have a look inside the nature of the process.

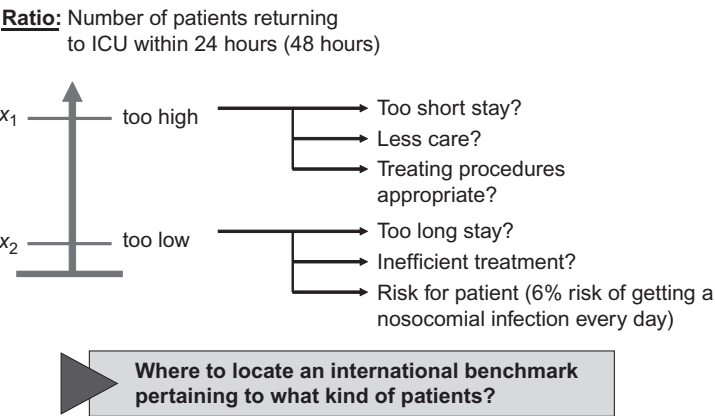


Fig. 11. For Every Benchmark Figure a Threshold Has to be Defined.

Example 2: Logistics of Medical Products

By exploring the duration of the order process, a comparison of three hospitals led to three totally inexplicable responses:

Hospital A specified the process time as 2 days, hospital B 20 days, and hospital C was unable to specify the duration at all, but mentioned that no out-of-stock situation was registered over the past year. It was the analysis of differences in the process structure that clarified which hospital truly achieved a best practice and why the comparability in this case was not possible. The hospitals had totally different definitions of the order process. Furthermore, hospital C had integrated an electronic medical delivery locker as a direct retrieval system. This system enabled hospital C to reduce its stock level, reduce staffing costs, prevent errors during withdrawal, and hence represent a best practice (see Fig. 12).

Example 3: Variations in Total Hip Replacement (THR) Surgery

The phenomenon of variety indicates the need for unrestrained work processes. Fig. 13 shows an international comparison of hip surgery,

Process Comparison

Numbers alone do not capture the essence of best practices (competitive advantages).

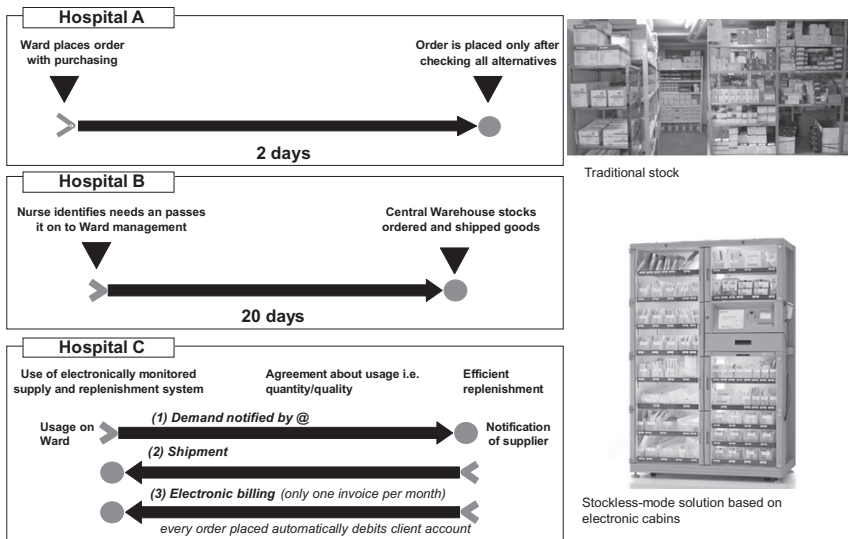


Fig. 12. Figure-Based Comparisons May Mislead if the Benchmarker Ignores Organization and Resources behind the Figures.

conducted by the Centre for Hospital Management (CKM). The study reveals that patients in Germany are operated earlier than those in England and that the procedure is undertaken mainly “cement free.” However, the percentage of over-80 patients is more than twice as high in England than in Germany. Correspondingly, the “hybrid” form of surgical technique is preferred in England.

Despite extremely varying data in the European country comparison, some recommendations can be made:

- Patients under 70 years preferably receive a “cement free” intervention; patients over 80 years rather receive a “cement procedure”;
- The age of patients is an indicator of the physiological condition of the bones;
- A “confounding factor” is that hospitals with a limited number of hip interventions (less than 200) specialize in only one form of intervention.

Age Distribution of Patients

Country	< 50 years	51–60 years	61–70 years	71–80 years	> 80 years
Italy	5%	7%	56%	29%	3%
Germany	17%	20%	33%	25%	5%
United Kingdom	9%	14%	34%	31%	11%
France	14%	18%	27%	30%	11%

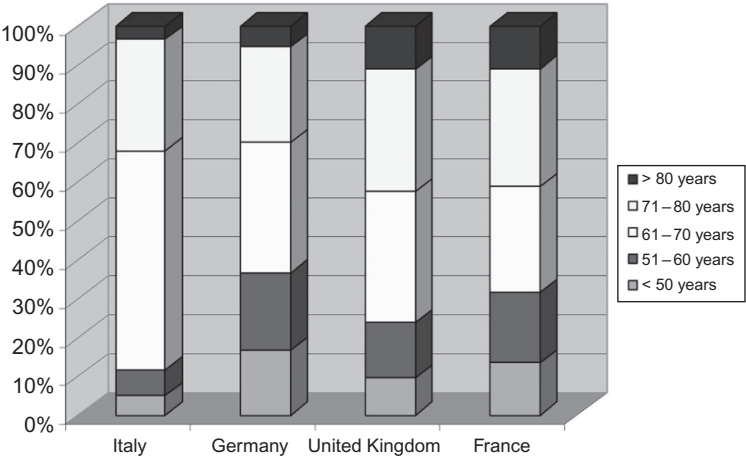


Fig. 13. Germany Has the Highest Performance of THR Patients under 60 Years in Europe.

THE ETHICAL DILEMMA OF BENCHMARKING

Benchmarking more often contributes to discovering ethical misbehavior or to uncover unethical side effects of management decisions that are rather guided by shareholder interest than bounded to patient-centeredness (Crane & Matten, 2004).

The most crucial question is how to decide, if, for example, the use of a specific medical device (like a circular stapler) contributes to reduction of

LOS from 5.8 days (conventional procedure) to 2.5 days, is associated with significant less pain for the patient and allows to go back to work after 12 days instead of 24 days. If this stapler device is not an official part of the DRG calculation, then the additional costs of the stapler will lead to a negative margin.

Under the ethical viewpoint benchmarking should contribute to more transparency between costs, medical quality, and patient risks (see Fig. 14). Figures combined to ethical requirements describe the relation between ethical principles and economic needs (von Eiff, 2014).

- The basic ethical principle “*primum nihil nocere*” (First, do no harm) could be proved by figures like wrong-site surgeries, surgical site infections, critical incidents, MRSA rate, and ventilator-associated infections.
- The principle of “patient autonomy” is depicted by figures like “litigation caused by non-adequate patient information” or “number of beds configured with features to enable the patient to vary positions as he/she likes it.”
- “Dignity” as ethical principle can be assessed by figures like “pain management/pain nurses,” “practice of minimal invasive procedures,” “pain free procedures despite of higher costs,” and “without fear procedures.”

Ethical Categories

Hospitals act in a Bermuda Triangle between appropriate medical provision, controllable risks and cost restrictions.

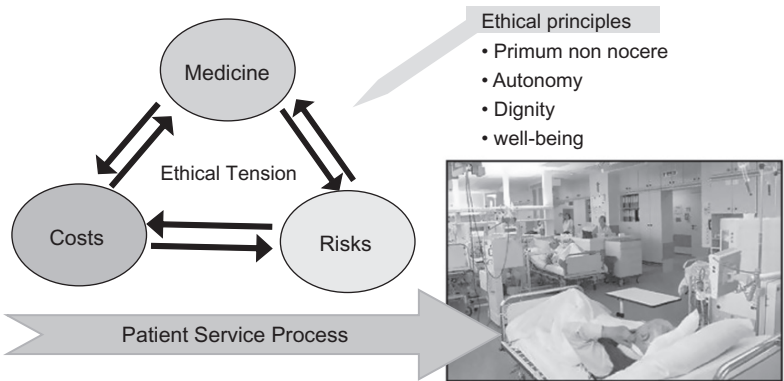


Fig. 14. Patient Risks as an Ethical Benchmark.

The link between classic performance figures and ethical requirements fosters the establishment of a healing environment approach in health care.

MAIN FINDINGS

- The aim of comparisons is to detect one’s own strategic gaps, to determine the advantageous position of competitors, and to identify the best performance that will influence the sector in the future.
- Key figures in the sense of KPIs provide information about one’s own competitive position and service situation.
- A reliable statement about current productivity can be only made after analyzing the process which leads to that key figure.
- From the perspective of competitive factors, the most important form of comparison is, the “generic benchmarking,” meaning the identification of BIC performance in other sectors and their application to one’s own hospital.

Benchmarking

More important than the key figure’s form/manifestation is the comprehension of the process’ mode of action/mechanism of action.

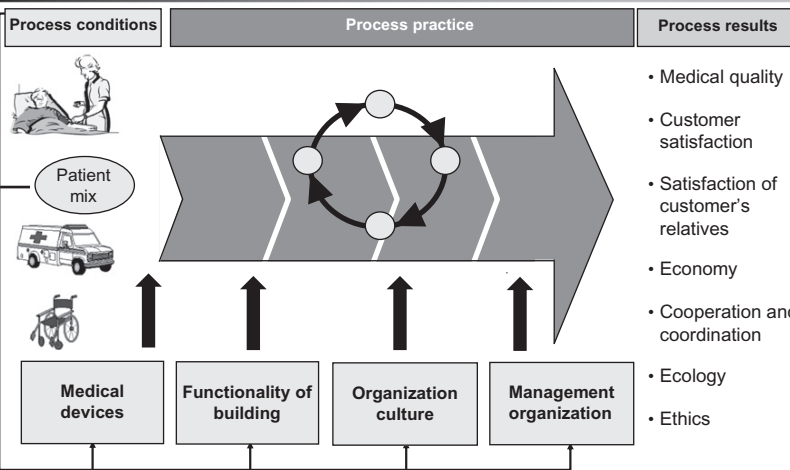


Fig. 15. Process Comparison: Knowledge of Process Circumstances and Parameters Is a Requirement for Comparability.

Benchmarking is more than comparing pure figures and ratios, but is focused on processes in terms of process results, process conditions, and process practices. Furthermore a comparison of processes has also to take into consideration the environment of process, for example, medical devices, the functionality of the building, the process organization, and the attitude of staff (see Fig. 15).

The newly established European Health Management Association (EHMA) initiative (Special Interest Group) “Best Practice Management in Healthcare and Hospital Management” is guided by these findings and will help hospitals to gain leapfrog results in achieving substantial strategic strength in a health care model that is becoming progressively more competitive.

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CONCLUDING REMARKS

This volume has presented a wide array of exemplary studies that illustrate the many ways in which best practices can be compared across national boundaries. Although many challenges were presented, such challenges are rife with opportunity for innovation. In other words, taken as a whole, the studies in this volume suggest that not only are there opportunities for identifying and developing best practices that are internationally valid and relevant, but also investigators who take on such research will face opportunities to develop innovative research methods as they address methodological, ethical, and project management challenges. Furthermore, some of the findings that emerge from international comparative research may serve to inform research and practice within countries. For example, Schnarr and colleagues' finding that health system governance models present barriers to dissemination of innovative best practices is a finding that may potentially generate hypotheses regarding change within health systems or organizations. Similarly, the Dong study suggests that individuals and organizations may respond to certain incentives in similar ways regardless of their countries of origin. Identifying similar incentives as well as specific governance models that pose barriers to change may help guide policy as health care systems develop and evolve.

Moreover, this volume includes in-depth discussion about the challenges faced in international comparative research, which was a key aim in the call for papers. Indeed, as specified in the chapter by Buttigieg, Rathert, D'Aunno, and Savage, there are substantial methodological challenges in this line of research that are not present when undertaking domestic research. Perhaps the most salient are the language translations and ensuring equivalence of measures across cultures. Modern statistical techniques, for example, multi-group structural equation modeling, help in analyzing for construct validity across groups. International comparisons need to be carried out with special diligence in terms of selection of measures, attention to cultural distinctiveness, and influences of political frameworks and legal systems.

In the quest for identifying international best practices in health care management, the practice of benchmarking with the best in class is crucial

for health care organizations seeking continuous quality improvement. Benchmarking initiatives, especially the exchange of best practice experiences across national boundaries, are a source of improvement with tremendous information value that can potentially enable organizations and systems to gain leapfrog improvement results. Such initiatives may result in competitive advantage for single hospitals as well as medical service provision of entire health care systems; however, we caution that goal-oriented benchmarking has to be guided by transparent and accepted rules of business ethics (e.g., [von Eiff, 2001](#)). Benchmarking can function only on the basis of a strict code of conduct, which requires discretion from all participants. In particular, all data must be evaluated only for purposes of benchmarking and not give over to third parties for commercial uses. Finally, benchmarking must be part of the corporate culture. Benchmarking without creative input and the will to reorganize degenerates into ineffective strategies.

While the studies included in this volume are enlightening and illustrate an array of topics, what is missing is studies on the patient experience. Many countries, both developed and developing, are focusing on how to improve patient-centeredness and safety. Many countries are publicly reporting patient hospital experience survey responses, and some, including the United States and Canada, are holding hospitals accountable for their patient experience scores. In a systematic review of the literature on patient-centered care and outcomes, [Rathert, Wyrwich, and Boren \(2013\)](#) found empirical studies from at least eight different countries examining how patient-centered care relates to patient outcomes, suggesting that patient-centered care is of wide international interest. [Jenkinson, Coulter, and Bruster \(2002\)](#) developed and field tested in five countries a core patient experience questionnaire. They found that some of the key attributes of the patient experience were similar across patients in all of the countries. Similarly, a study that surveyed patients in eight European countries found that although patients rated their experiences differently across the countries, patients in all countries reported they experienced less individualized care than that reported by the nurses in these countries ([Suhonen et al., 2012](#)). Comparative patient experience studies may shed light on practices that transcend culture. Such information is essential as the world faces accelerated globalization and increasing numbers of disasters affecting large populations.

As scholars tackle the methodological and ethical challenges of intercultural research, lessons can be learned that may be used to improve research within countries, particularly those with many subcultures, such as the

United States and Canada. International comparative research will lead to innovations in research methods and understanding about how to improve health care management.

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