

# Business process management in health care: current challenges and future prospects

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**Abstract:** The emphasis of performance management in health care is shifting from output or outcome-based to a system-based approach. In particular, clinicians and managers are re-focusing their attention on processes so as to achieve better health system performance, as a reaction to the financial crisis. Health care management is increasingly applying systems thinking and business process management (BPM) as philosophies, which have proved to make a difference in organizational performance and competitiveness to the industry at large. This commentary provides answers to five questions that emerged through a reflective exercise and use of secondary data sources and informal interviews. These questions are intended to contribute toward better understanding of the meaning and application of BPM by scholars and practitioners in health care management. The questions are as follows: What is BPM and is it relevant to health care? Has BPM been extensively applied to health care? Why focus on quality in health care delivery? What are the current challenges of health care and can BPM help? What role BPM will play in future to facilitate effective health care management?

**Keywords:** business process management, performance management, quality of care

## Introduction

Performance management in health care, despite an emphasis on processes, is still very much focused on patient outcomes. While targeting optimal patient outcomes remains the ultimate aim of health service delivery, re-focusing clinical performance on processes is proving to be the means by which patient morbidity and mortality statistics can be improved. Today, systems thinking and business process management (BPM) have become philosophies of industry management. The health care industry is among the fastest growing industries.<sup>1</sup> It is not surprising that this sector is turning to the wider business world for principles and practices that inspire the achievement of the optimal tradeoff between efficiency and patient responsiveness. The main aim of this commentary is to explore how BPM principles can help achieve superior health care management and discuss the application of BPM principles within health care. While secondary data sources show that most of the practical examples found in this area are hospital based, BPM principles are applicable across the wide spectrum of health services, such as primary care and public health. Despite the fact that the provision of these services is very different in terms of operating systems, BPM has developed into a possible driver and tool for the seamless integration of health care services. Using secondary data sources, informal interviews with practitioners, and researchers from the health care sector, this paper specifically offers responses to the following five emerging questions: What is BPM and is it relevant to health care? Has BPM been

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extensively applied to health care? Why focus on quality in health care delivery? What are the current challenges of health care and can BPM help? What role will BPM play in the future to facilitate effective health care management? In other words, this paper is intended to provide a debate on the use of BPM in health care while discussing its current challenges and future prospects.

## Methodology

This paper is a reflective exercise and makes use of secondary data sources and informal interviews as information sources. Informal interviews were held with a number of individuals in the areas of management, clinical care, pharmacy, and academia within the health care sector in Malta and the UK. The informal interviews addressed the informants' general experiences in the health care sector and aimed to highlight the relevant issues and challenges in health care that would be apt to address with the BPM approach. Table 1 gives background information on the informants who were involved in this reflective exercise.

The secondary data sources were the result of reviewing the literature on the wider use of BPM within industry and more importantly on its application in the health care sector, using PubMed, which is a search engine that indexes references and abstracts in the broad fields of life and biomedical sciences.

## What is BPM and is it relevant to health care?

BPM is a well-designed, implemented, executed, integrated, monitored, and controlled management approach, which strives to continuously improve and analyze key operations in line with organizations' strategies.<sup>2,3</sup> BPM is part of a tradition that is decades old whereby the aim of managers and practitioners is to rethink the organization of their business and focus on business process change.<sup>4</sup> A business process is a sequence of executions/steps within a business context, which aims to create goods or a service.<sup>5</sup> This approach

differs from the traditional outcome-based approach applied in health care. Ellwood defined outcomes management as "a technology of patient experience designed to help patients, payers and providers make rational medical care-related choices based on better insight into the effect of these choices on the patient's life".<sup>6</sup> So while Ellwood had already highlighted that process life cycle exists between patients, payer, and provider choices and patient outcomes, the focus of management was on the outcomes rather than the processes themselves.

While the historical roots of BPM will be discussed in more detail in the next section, BPM is said to be composed of the following six core elements:<sup>7</sup>

- Strategic alignment – processes within an organization need to be designed, implemented, maintained, and assessed in line with the strategic priorities of the organization.
- Governance – a focus on establishing accountability with respect to the roles and responsibilities within all levels of the management process.
- Methods – within BPM, the set of tools and techniques that are used to support and instigate the activities along the process life cycle. Some of these methods will be discussed in the next section.
- Information technology (IT) – IT-based solutions have become important elements in BPM with a focus on the development of process aware management systems. The importance of the IT wave in BPM will be discussed in the next section.
- People – the human capital of an organization is important for the effective implementation of BPM. Without the skills and knowledge of human resources, improvements in business processes cannot be achieved.
- Culture – the shared values of the people forming part of the organization lead to an environment that can effectively facilitate the implementation of BPM within an organization.

In industry, the use of BPM has become vital to ensure organizational competitiveness through added value by way of improved processes.<sup>8</sup> Total quality management and most recently six sigma and lean approaches have been successfully implemented in manufacturing, process management, construction, and services industries by deploying BPM. Process reengineering, which is part of BPM is adopted for organizational transformation in many industries. Today, most organizations measure business performance through process performance that is based on BPM principles. Brooks et al<sup>9</sup> have applied BPM for project management

**Table 1** Descriptive characteristics of informants

Sector	Number of interviewees	Average number of years in the health care sector
Clinicians	7	15
Management		
Top management	4	10
Middle	8	15
Departmental	9	20
Information technology	2	5
Academia	2	20

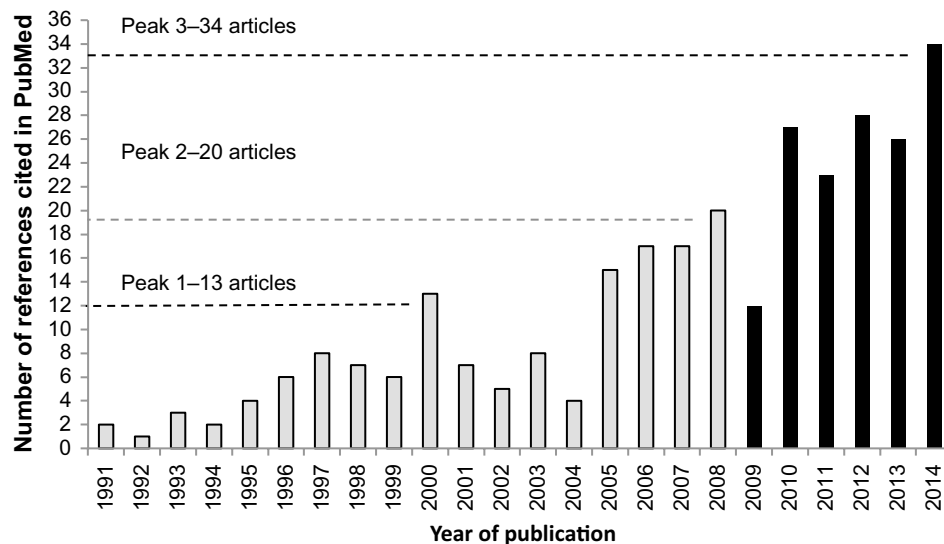
maturity analysis. Dey et al<sup>10</sup> adopted BPM for implementing enterprise resource planning in the UK-based organization in energy industry. Dey<sup>11</sup> also applied BPM principles in benchmarking project management practices of organizations in Caribbean. To date, clinical decisions in hospital must be based on scientific evidence, socioethical values, and economic factors. Additionally, evidence-based care requires transparency, justification, and accountability.<sup>12</sup> However, achieving this ideal scenario is problematic because clinical decisions can be heavily influenced by the pharmaceutical industry (in view of the financial interests involved in the development and marketing of drugs and devices), as well as by governments.<sup>13</sup> There is ample evidence that shows that “the pharmaceutical industry masterfully influences evidence based production, evidence synthesis, understanding of harms issues, cost-effectiveness evaluations, clinical practice guidelines and health care professional education and also exerts direct influences on professional decisions and health consumers”.<sup>14–16</sup> Health authorities also exert pressure on physicians so as to prescribe generics rather than patented products.<sup>17</sup> The tide, however, appears to be turning. Indeed, in the USA, the Obama administration has released final rules on the reporting of financial relations between drug companies, device manufacturers, and health care providers. This is part of the Affordable Care Act designed to ensure transparency in the health care marketplace.<sup>18</sup> Similarly in Europe, the Stockholm Drug and Therapeutics Committee in cooperation with Department of Clinical Pharmacology at Karolinska Institutet and at Karolinska University Hospital in Stockholm, Sweden, and in collaboration with the World Health Organization developed the “Stockholm model” for the rational use of medicines.<sup>19</sup> By focusing on robust processes in clinical decisions, as well as in prescribing, BPM can provide the optimal pathway for full transparency by including regulation procedures that would ensure objectivity in decisions, which are free from conflict of interests. Shortell and Schmittiel<sup>20</sup> argue that while health systems may not be limited by a lack of resources – financial, technological or human – they are limited by a lack of organization between these resources that enables more cost-effectiveness.

Shortell and Schmittiel contend that this can be achieved through integration, namely, functional (extent to which operating units are coordinated), physician (extent to which physicians have mutually shared objectives with organized delivery systems), and clinical (extent to which maximum value in terms of service delivered to patients is achieved through services that are coordinated across people, functions, activities, and sites over time).<sup>20</sup>

Shortell et al emphasize that clinical integration is of crucial and primary significance for organized delivery systems and delivery of integrated care.<sup>22</sup>

There is evidence that integrated care improves processes of care.<sup>22–25</sup> On the other hand, Tsasis et al<sup>26</sup> claim that although numerous initiatives of integrated care have succeeded in producing positive outcomes, many have not. The reason being that integration is a learning process, which dictates that professionals should “learn how to learn” so as to effectively exchange knowledge and self-organize within health care organizations that are conceptualized as complex adaptive systems.<sup>23</sup> We argue in favor of adopting BPM principles not only in hospitals but also across services within regional and national health systems. This is to ensure successful integration so as to achieve organized delivery systems that provide a coordinated continuum of services.

When compared to manufacturing industries, planning and control in health care operations management seem to lag behind. Houy et al<sup>27</sup> reviewed empirical research in BPM – an area they call “an emerging field of research”. The aim of their research was to analyze empirical work in BPM and identify any research gaps for further development in the field. In their systematic review, a search through two search engines (Science Citation Index and Business Source Premier) found 1,260 articles published between 1991 and 2008, which addressed the BPM approach within industry and public service. The earliest research was in 1992 with peaks in 1995 and 1998. From 2000 onward, Houy et al<sup>27</sup> reported an overall upward trend with the highest number of contributions per year being in 2007 and 2008. For the secondary data sources relevant to this paper, we replicated the search strategy by Houy et al, by using the same search terms in PubMed. Figure 1 graphically represents the development of BPM research in health care as extracted from a PubMed search. Between 1991 and 2008, only 145 articles were published within the health care field, which broadly referenced BPM. A small peak of research is observed in 1997 but the first large peak occurred in the year 2000. This peak was not maintained between 2001 and 2004 with a resurgence of research being seen from 2005 onward. The highest number of articles published in a year was in 2008 with 20 health-related BPM references found. In general, the trend shows a lower presence of BPM in the health care field as compared to that reported by Houy et al.<sup>27</sup> Additionally, there appears to be delays in reaching peaks of submitted work on BPM when compared to other sectors such as industry and public service. To assess the trend further, the search was extended



**Figure 1** Research indexed in PubMed, which broadly references BPM published up to end of 2014.

**Notes:** Horizontal reference lines indicate three peaks in number of publications. Between 1991 and 2008, only 145 articles were published within the health care field, which broadly referenced BPM (gray bars). To assess the trend further, the search was extended to research published up to 2014, which totaled 316 articles (black bars).

**Abbreviation:** BPM, business process management.

to research published up to 2014, which totaled 316 articles. The empirical research seems to show an increase in BPM-related health research from 2010 onward with the number of work published in the 6 years between 2009 and 2014 being nearly equal to the amount of work published over the 18 years between 1991 and 2008.

The apparent slower uptake of BPM research in health care is a reflection of the fragmented health care systems often with separate data sets for various settings/providers, thereby preventing in-depth and system-wide process examinations.<sup>28</sup> This fragmentation has been somewhat reversed in the new millennium by the creation of acquisitions, mergers, and consolidations in the health sector.<sup>29,30</sup> Additionally, the focus is mostly on hospitals as opposed to a health system-wide approach and on single managerial areas such as resource capacity planning, while ignoring hierarchical levels and supply chains, thereby resulting in piecemeal nonintegrated approaches in process management.<sup>31</sup> A silo mentality in the manner in which some hospital departments are reportedly managed is also an example of this.<sup>32</sup>

Furthermore, a major reason for the difficulties in health care management appears to stem from lack of proper communication and understanding between managers and clinicians, who by virtue of their professional training, tend to focus on individual patient care often at the expense of population-based health care and efficiency/effectiveness of health systems in which they operate.<sup>33</sup> Shortell and Schmittidiel define this as “disintegration in the health care system”.<sup>20</sup> This means that physicians may not be function-

ing synergistically to achieve a common goal, namely, that of achieving optimal quality-of-care delivery to patients, efficiently utilizing health services, and receiving personalized care from clinicians.<sup>20</sup>

The management–clinician conflict effectively translates in competition for resources such that investing in state-of-the-art management and information systems may be interpreted by major stakeholders in the sector as diverting funds from direct patient care. There is however ample evidence that investing in health IT results in health and financial benefits by improving health care processes, efficiency, and patient safety. For example, the use of health IT in the prevention and management of chronic diseases can lead to considerable savings.<sup>34</sup>

Hans et al<sup>31</sup> propose a four-by-four positioning framework for health care planning and control that would facilitate the much needed dialogue between managers and clinicians. The framework integrates four managerial areas of planning (medical, resource capacity, materials, and financial) and four hierarchical levels of control (strategic, tactical, offline operational, and online operational) involved in health care delivery operations. This ensures identification and positioning of managerial problems, as well as consistency and implementation of managerial responsibilities, at every level and along the entire supply chain of cure and care providers. Hans et al contend that the generic dimensions of the framework assist managers and clinicians to apply specific content based on the context of the specific application, for example, at departmental level (emergency

room or operating room) or hospital wide, rendering it widely applicable.<sup>31</sup>

On the one hand, clinicians are trained to manage patients and as part of their clinical workout, they need to go through various “clinical” processes. On the other hand, they may be averse to adopting pure management principles if they feel these are in conflict with their clinical practice, which remains centered around individualized patient care. Lega et al claim “clinicians focus on the individual patient, the effectiveness of the care, and evidence-based practices with little attention to cost control”.<sup>33</sup> This may conflict with the role of managers who are sometimes faced with an ethical dilemma – as increasing financial challenges lead to scarce resources, thus necessitating health rationing of services.<sup>33</sup> Despite the fact that both managers and clinicians are dealing with processes, the methods utilized are grounded in different philosophies, thereby leading to diversity in perspectives with regard to the achievement of quality. Indeed, Lega et al<sup>33</sup> contend, “Historically, the professional and cultural autonomy claimed by clinicians largely meant that clinical processes were treated as a ‘black box’ with which managers should not interfere”. However over the years, in particular because of the pressures of the financial crisis, it has become increasingly evident that a wider perspective of quality of care is emerging and that managers and clinicians are increasingly appreciating the importance and integration of both operational and clinical processes. For example, in the UK the National Health System (NHS) is urging managers and clinicians to work together as it came up with the best care for best value indicators in an attempt to target efficiency savings over the next decade.<sup>35</sup> In other words, a hospital may have the best clinical expertise, but unless this is adequately supported by robust operating systems with inputs, processes, and outputs, it will be difficult to close the loop in quality-of-care delivery. These operating systems need to have detailed process mapping so as to accurately design integrated care patient pathways with full clarity of roles of health providers and supporting professionals. Moreover, Vanhaecht et al<sup>36</sup> tackle the physician’s buy-in problem in patient care pathways by developing the seven-phase method (screening, project management, diagnostic and objectification, development, implementation, evaluation, and continuous follow-up) akin to the patient management processes (history, examination, clinical investigations, differential diagnosis, definite diagnosis, care plan, and follow-up) to design, implement, and evaluate care pathways so as to improve the quality of health care processes.<sup>36</sup>

Different disciplines, for example, managers and clinicians, view processes differently. By speaking the same

language as physicians and using the seven-phase method, management can find common ground with multidisciplinary health care teams so as to enable them to design and implement safe, efficient, effective, person-centered, timely, equitable, continuous, and integrated care flow processes, which need to be supported, controlled, and monitored.<sup>12</sup> Despite the fact that over the years, we have experienced innovation in health information and technology by way of, for example, electronic case summaries and Diagnostic Related Groups, their focus is largely on clinical and financial information with poor integration with operational information systems.<sup>31</sup> This can be achieved by focusing on processes that are used in operations management, and which from a business perspective, define in detail the transformation of inputs to outputs. Schmiedel and vom Brocke clearly state, “BPM has evolved from a technology-focused into a holistic and principle-oriented discipline concerned with efficient and effective business processes”.<sup>37</sup> Furthermore, these authors have grounded BPM in the digital world by claiming that BPM institutionalizes digital technologies in business processes.<sup>37</sup> In health care, improved health IT, for example, more complete electronic medical records and computerized physician order entry, helps in avoiding medical errors, tracking adverse events, and drug interactions/adverse drug events, thereby resulting in cost-saving safety benefits. Indeed, van der Aalst<sup>38</sup> identifies three paradigm shifts in information systems that have become relevant for BPM. They are from programming to assembly, from data orientation to process orientation, and from design to redesign and organic growth. Rising health care costs have put pressure on health policy makers and organizations to ensure that processes in operating systems run efficiently and cut wastage.<sup>31,39</sup>

By providing integrated systems for managing business performance as well as managing end-to-end processes on an on-going basis, we argue that BPM can provide solutions to issues and challenges facing health care today. As a counter argument, we however maintain that BPM is not the panacea of all the problems facing health care systems and hospitals today. As amply highlighted in this section, BPM needs the right conditions for its successful implementation. Apart from software that needs to be flexible to automate and to adapt to changing business processes, health care organizations require optimal leadership to create the right conditions in terms of discipline, commitment, alignment, motivation, and integration.<sup>40</sup> Moreover, even where and when BPM is introduced, clinical governance and continuous monitoring/evaluation of results are needed to assure improvement and optimal patient outcomes.<sup>41</sup> Furthermore, the success of BPM

depends on the continuity with which predetermined goals are achieved in the short term, for example, in a project, as well as in the long-term when dealing with operating systems.<sup>42</sup> We will provide a historical account of BPM and how it evolved largely over the past 30–40 years. Applications of BPM are found in industry across contexts but in this paper, we will focus particularly on the health care applications.

## A historical account of BPM and its application in health care

BPM encompasses a long-standing progress spanning several decades with the aim to continuously improve how organizations across contexts manage their business activities. Historically, BPM enables us to appreciate what we have achieved in terms of our comprehensive understanding to date and what future prospects it holds. The application of BPM in health care has proven more difficult because of the highly complex and multi-/interdisciplinary processes within the health care system. Apart from this, the health care sector is continuously facing challenges which require it to respond by adapting these processes as necessary.<sup>43</sup> In health care delivery, strategies are highly dynamic with ad hoc decisions often taken to respond to manage crisis on a day-to-day basis, for example, hospitals' response to unpredicted overcrowding at the accident and emergency departments. On the other hand, the health sector has become more organized in dealing with disasters by developing emergency preparedness plans with detailed processes to put in place in case of need.<sup>44</sup> Indeed, the occurrence of natural disasters over the past decade has triggered massive rethinking in terms of contingency plans and acquisition of professional competencies for health care providers across the world.<sup>45</sup> These natural disasters have provided the best examples of how clinicians and managers can synergistically function often at the levels of perfection. Perhaps, the best recent example on a global scale has been the health sector's response to the Ebola crisis, albeit the massive number of fatalities.<sup>46</sup>

There are three major process traditions, namely, quality control, management, and IT, all with their roots in work simplification and industrial engineering and each characterized by several emerging methodologies.<sup>4</sup> We will review these three traditions and their important impact on BPM development. The quality control tradition is mainly advocated and practiced by production engineers and quality control specialists. In the 1970s, Total Quality Management (TQM) was the top quality control philosophy that too a great extent has remained relevant even today.<sup>47</sup> In the 1980s, continuous quality improvement (CQI) with the application

of six sigma emerged as a successful approach that combines process with statistical quality control techniques.<sup>48</sup> In health care, early applications of CQI/TQM in the UK and USA were largely focused on nonclinical management functions to improve care at the organizational level.<sup>49</sup> However, when it came to apply the quality concepts to clinical areas, the overall effect was much more limited, with only small-scale improvements, which were not sustained. Some of the reasons cited were lack of senior management commitment and low clinical ownership.<sup>50–52</sup>

On the other hand, the use of six sigma in health care was advocated in the 1990s on the basis of the fact that defects, errors, and incidents are prevalent in health care. Indeed, Chassin posed a challenging question "Are human systems so different from others in which six sigma has been achieved or attempted that high levels of reliability are unattainable?" and encouraged its adoption.<sup>53</sup> Furthermore, Sehwal and DeYong advocate the use of six sigma principles, which are aligned with strategic objectives so as to achieve financial and operational performance improvement in health care organizations.<sup>54</sup> Infection control, operating theaters, medication delivery, and administration as well as laboratory processing are some of the clinical areas where six sigma has been applied.

In the new millennium, and against the background of global financial crises, reducing waste in organizations has become a top priority, the focus has turned to the combination of lean management and six sigma, using several techniques, for example, define, measure, analyze, improve, control, and just-in-time but most importantly emphasizing employees' responsibilities for process quality.<sup>55</sup> Lean thinking and six sigma were also combined in health care to tackle the spiraling health care costs and improve quality while cutting down on waste. An example, where this was applied was Red Cross Hospital in the Netherlands in 2002, which led to the development of processes for institutionalized systematic innovation.<sup>56</sup> A more specialized development in the quality control tradition is the development of Capability Maturity Model by Software Engineering Institute in the early 1990s to determine the extent to which organizations understand their processes,<sup>57</sup> with several examples of application in health care.<sup>58,59</sup> The model is comprised of five levels, namely, initial, repeatable, defined, managed, and optimizing with the latter being the top level found in successful companies like Toyota and GE, whereby managers and team members continuously work to improve their processes.

The beginning of the management tradition can be traced back mainly to Ford and Taylor. However, the academic

origin dates back to the 1980s with Porter's value chain, which supports a product line, a market, and its customers, and Rummer-Brache Performance Improvement, which integrates three levels of analysis (organizational, process, and performance levels) with concerns on measures, design and implementation, and management.<sup>60,61</sup> The 1990s are characterized by the emergence of Business Process Reengineering (BPR) that motivated senior executives to rethink their business strategies. An example where BPR principles are applied in health care is a case study in Canada, where improvement projects were carried out through ehealth and IT to address patient's waiting times, medical errors, high health care costs, and access to health care.<sup>62</sup> Additionally, Kaplan and Norton designed the Balanced Scorecard (BSC), which is a continuously evolving strategic performance management tool to reflect the deficiencies in the currently used methods and to satisfy the particular needs of communities of interest.<sup>63</sup> The first-generation of BSC designs, which mainly satisfied the needs of nondivisional commercial functional organizations, used a four-perspective approach as strategic performance metrics of success, namely, financial, customer, internal business processes, and learning and growth. An improved second-generation emerged in the mid-1990s with measures selected based on the strategic objectives within each of the perspectives, which then define the cause-effect chain among these objectives by drawing links between them to create a "strategic linkage model". A third-generation of BSC, which emerged in the late 1990s, refined the second-generation to give more relevance and functionality to strategic objectives through the incorporation of Destination Statements, namely, to show what "strategic success" or the "strategic end-state" looked like. BSC has been extensively used in health care by a wide range of health care organizations; however, it had to be modified to include perspectives, such as quality of care, outcomes, and access.<sup>64</sup> Furthermore, as part of the management tradition, BPM, Process Frameworks, and Business Process Architectures also emerged in the late 1990s.

The third tradition involves the rapidly evolving IT, namely, through the use of computers and software applications to automate the work processes. This tradition, which spans over 4 decades, completely revolutionized the thought and decision processes in organizations. Perhaps, the major change happened in 1995 with the emergence of the Internet and the Web, such that a paradigm shift occurred from thinking about computers as tools for automating internal business processes to using IT as communication tools that facilitated radically new business models with worldwide

integration. Jobs have become more dependent on processes with IT largely operating independently of the core business and conceptualizing itself as a service. The approaches within the IT tradition are numerous and include Structured Software Methodologies, IT Architecture, BPR (Hammer and Davenport emphasizing BPR within IT rather than management tradition), Computer-Assisted Software Engineering Tools, Enterprise Architecture, Business Process Modeling Tools, Object-oriented Software Methodologies, Unified Modeling Language, Business Process Model and Notation, Enterprise Application Integration, Workflow, Business Process Management Software, Enterprise Planning Enterprise, Customer Relationship Management, Expert Systems, Business Rules, and Business Intelligence Tools. Faced with these major advances in IT, organizations strived to assure that business, and IT managers engage in process-focused discussions, and that they embrace a common and comprehensive understanding of process. Despite the fact that many organizations continue to work largely within one of the three traditions, BPM appears to embrace all three traditions.

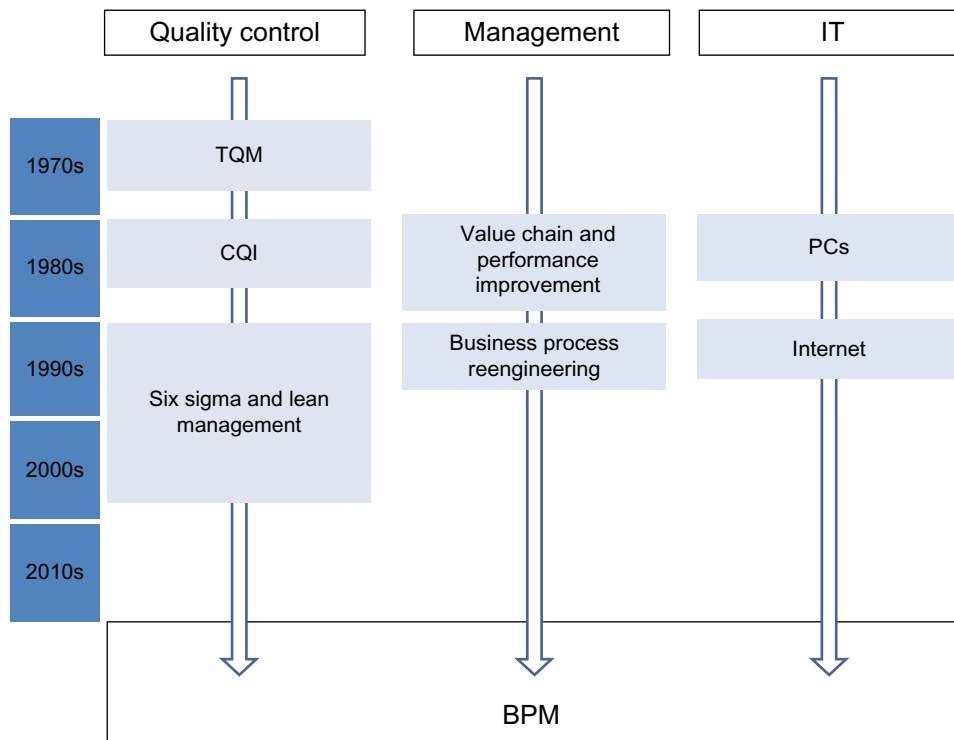
Health informatics has grown over the years, establishing itself as one of the pillars in the delivery of quality health care. An area of major advancement is in medical imaging technology, namely, picture archiving and communication systems, information systems, image-guided surgery and therapy, computer-aided diagnosis, decision support systems, and the electronic patient record.<sup>65</sup>

It seems that the health sector is still building the body of evidence on the clinical impact of picture archiving and communication system in the working environment that justifies the investment. However, the use of noninvasive digital imaging systems in clinical application is an important consideration (Figure 2).<sup>66</sup>

In the health care applications discussed earlier, BPM is heralded as a means to improve processes but with the ultimate aim of improving the quality of health care delivery across health systems. Therefore, we will justifiably turn our focus to quality of care and argue in favor of processes without losing focus on the fact that they should be understood as part of a whole system.

## Why focus on quality in health care delivery?

The quality control tradition has had, and continues to have, an important impact on the development and implementation of BPM. As was outlined previously, the historical underpinnings of BPM find themselves routed in a long tradition going as far back as the 1970s with a focus on quality management



**Figure 2** Historical development of BPM.

**Abbreviations:** BPM, business process management; IT, information technology; TQM, Top Quality Management; CQI, continuous quality improvement; PCs, personal computers.

and quality improvement. This relationship of efficiency and quality is of specific relevance to the health care field, which seems itself continuously pushed to maximize resource use and reduction in waste while maintaining quality of care and patient outcomes. This section therefore aims at highlighting the relevance of focusing on quality when discussing the application of BPM in health care delivery.

In the context of health care, the Institute of Medicine's six dimensions in defining quality of care require well-designed, integrated, monitored, and controlled processes and therefore should form the basis for the application of BPM in health care. These are efficiency (maximizing resource use while avoiding waste), accessibility (providing timely, geographically reasonable care), patient centeredness (taking into account the preferences of individual service users and the cultures of their communities), equity (delivering health care that does not vary in quality because of personal characteristics of the patient), safety (minimizing risk and harm to service users), and effectiveness (delivering health care that is adherent to an evidence base and results in improved health outcomes for individuals and communities, based on need).<sup>67</sup>

The definition of quality of care brings forth the complexity of the concept and therefore of its evaluation. Holistic

care, integrated care, patient pathways, clinical audit, patient logistic flow, patient empowerment, and teamwork are some of the popular keywords in health care literature related to the quality and they reflect wide perspectives and the complex dynamics of health care delivery. McGlynn<sup>68</sup> identified six challenges which are encountered when addressing this complexity. These challenges center on the conflict between competing stakeholders with respect to health care delivery objectives and the need for adequate information systems to enable the collection and monitoring of indicators of quality of care.<sup>68</sup>

These challenges focus on quality assessment, measurement, and inhibitors/enablers of improving performance.<sup>68</sup>

All processes have a system perspective and therefore processes have to be understood as part of the whole. In a report published in 2006,<sup>69</sup> the World Health Organization addresses quality from a health systems perspective. This is because even well-developed and well-resourced health systems suffer from wide variations in standards of health care delivery and that expected outcomes are not always achieved. Indeed, over the past few years, scandals in the delivery of basic health care have surfaced in health systems considered as world leaders. A public inquiry into the goings on of the Mid Staffordshire NHS Foundation Trust from



2005 to 2008 highlighted that even in a developed system such as the British NHS, serious failings led to a catastrophic reduction in performance. This in-depth inquiry highlighted a number of factors that led to a breakdown in the health system. It is clear that a negative culture is developed, which led to the system failing to react to all the information and warnings signs. This inevitably led to an acceptance of poor standards for all targets. Once processes and targets were no longer being managed, governance of the system faltered, professionals became disengaged, and patient standard of care diminished.<sup>70</sup>

On the end of the spectrum, developing countries are faced with the challenge of optimizing the use of scarce resources, while still striving to supply universal population coverage. The root of the problems worldwide can be traced to the process of improvement and scaling up, which need to be based on sound local strategies for quality so that the best possible results are achieved for whatever investment.

The discussion on achieving optimal quality of care in any health system would be incomplete if the current challenges facing health care today are not understood and included in this paper. Additionally, against the background of emphasizing BPM as a means to put in place processes for performance improvement in health systems and organizations, it is pertinent to ask whether or not BPM helps in addressing some of these current challenges that are deemed to threaten the sustainability of health systems.

## **What are the current challenges facing health care today and how can BPM help?**

Health care literature extensively addresses issues facing health care delivery worldwide. Among the major challenges are rising costs, variations in quality, diversity in consumers, and concerns about value return on investment.<sup>71</sup> A growing concern that is grounded in operations management is the constant tradeoff between the need to cut down on costs while at the same time raising awareness of greater patient responsiveness and improving health care quality, which should not go below a certain level. Faced with financial crises and fear of unsustainable health systems worldwide, a constant call from policy makers is to cut down costs even though resources are becoming more expensive and patient expectations are higher. These are hard decisions, often involving ethical dilemmas, namely, balancing cost cutting while providing full support to patients. When tackling challenges, we need to dissect each challenge and look at the microlevel issues in public health, primary, secondary,

and tertiary care. Then we need to achieve the tradeoff between cost and responsiveness. The tension between individual versus population-based orientation in health care is particularly relevant in financial crises, for example, the decision to use expensive technology at the expense of mass vaccination.<sup>72</sup>

Other major pressures on health systems are aging populations with conditions like dementia and diabetes becoming more difficult to support, advances in medicine and medical technology providing better diagnostics and treatment but creating more socioeconomic class differences in affordability of care, and widening of services. Health systems are finding difficulties in supporting these challenges. This begs the question of how can policy makers and providers make rational decisions. Other than strategic and policy issues, there are numerous operational issues and challenges such as resource allocation, scheduling activities, waiting time reduction, length of stay in hospital, procurement of drugs and disposables, and handling biomedical wastes. Every decision is connected to efficiency and patient responsiveness tradeoff. The BPM approach can provide us with a solution to the challenges that health care faces today through process reengineering. Process mapping is the first step. It follows by identification of the process parameters and measuring current performance, deriving issues and challenges through root cause analysis, and determining enablers for achieving superior performance and process reengineering.<sup>73</sup> Process performance measurement and patient-focused quality management offer other means for effective health care delivery.<sup>74,75</sup>

Whatever method is applied, a deep understanding of how to face or combat the issues and challenges facing health today needs to be achieved. Business process mapping not only helps to develop standardized processes within health care systems but also helps to minimize the variation in quality of health care delivery and errors. BPM also helps to select the right enablers in information management and technology so as to manage these processes. As highlighted earlier, BPM can also help managing patient flow and information flow, which facilitate managing waiting time in health care delivery. Additionally, BPM integrates health care processes with IT to achieve efficiency and at the same time patient satisfaction. Furthermore, BPM approach advocates using process-based performance measurement over outcome-based performance measurement that enables practicing proactive approach in health care delivery. This leads to better understanding of issues and challenges proactively, which in turn enables providers to be better prepared for achieving the planned targets.

BPM approach has been extensively used in industry through TQM, continuous improvement, six sigma, business process reengineering, and benchmarking. We have also identified evidences of their application in health care. Despite the fact that we have seen increases in the application of BPM techniques in the health care sector, we still have reports of unsustainable health systems, system failures, and variations in quality of care because of the challenges highlighted earlier.<sup>76,77</sup> This may be due to the fact that the application of these techniques is still not widespread enough or also due to improper adoption of BPM without proper synergetic integration with the IT. Indeed, the four interrelated dimensions that are necessary for the success of BPM adoption are process engineering, cultural (underlying beliefs, values, norms, and behaviors of organization), technological (training and information support systems), and structural changes (mechanisms to facilitate learning). These four dimensions are all necessary for their multiplicative function to ensure organization-wide improvement.<sup>28</sup>

If one dimension is missing, improvement is likely to be unsustainable. For example, if the structural change dimension is not considered, despite registering success in the other three, it is likely to result in unsustainable performance. Additionally, can we really adopt US culture to another culture by simply using software technology without involving the people and training them in this? This will lead to disaster. Unfortunately, health care systems, even those in highly developed countries, seem to have these problems and are not benefiting from the expected outcomes of the advances in information and communication technology and adoption of BPM approach. Prior studies reveal that many enterprise resource-planning projects in industry failed not due to technological failure but because of cultural adoption failure.<sup>78,79</sup>

## The way forward

As has been highlighted previously, BPM has the potential to drive innovations, especially as the world becomes more digital; however, this undeniably brings with it new challenges for the effective application of BPM and necessitates a rethinking of the role of BPM in organizations.<sup>37</sup> Harmon categorically states, “today, it is hard to remember what the world was like without computer systems”.<sup>4</sup>

Computers moved from tools used to automate business processes to communication media facilitating new business processes. We have invented technology and adopted a process approach in one way or another. Technology is being adopted and reengineered to fit demands. Performance management is being conducted, and people are trying to achieve targets but

fail to achieve their full potential because of a lack of understating of “soft” issues, which may have been considered as irrelevant but which now can be seen as crucial for the successful implementation of BPM. In the health care sector particularly, we find examples of projects that are failed because in some measure the concept of integrated information system is far from being realized. In fact, the health care sector in Europe seems to demonstrate that it is still relatively underdeveloped with respect to IT systems when compared to other industries. Furthermore, content and structural issues unique to the health care sector make process modeling difficult as the “time” element in health care is based on care demands, which only help to increase variability.<sup>80</sup> This leads to the conclusion that BPM needs to be innovated itself before it can be a successful driver of innovation in an organization. Harmon suggests that the way forward is to integrate the three broad traditions of BPM – management, quality control, and IT.<sup>4</sup>

The major argument here is that systems have developed and became so complex that we cannot allow for one of the traditions to be ignored. The challenge of the digital world can not just be seen as a challenge but also as a future prospect. While information and communication technologies further push the need for a process approach, the development and implementation of these systems help stakeholders make decisions through the continuous availability of information for management. In business involvement, not least health care, smart decisions need to be made, as it is clear that we can ill-afford to waste resources and experiment with bad decisions. Evidence needs to be used to take decisions at all levels – tactical, operational, and strategic. Thus the future prospects of the new digital age will follow the model inputs–processes–outputs and objective data will automatically follow. The objective data will be intelligently molded to help reach better decisions.

The complexity of any system inherently means that multitude of processes at different levels are present that need to be linked vertically with strategic intent as well as horizontally with operational decisions. If one would take the health care system, for example, for every part of any decision, there are implications vertically and horizontally. For example, if a decision is being made on the scheduling within the operating theater, implications will reverberate throughout other wards, such as the accident and emergency and other departments, such as imaging. For these process, changes to be tackled effectively and comprehensively, a robust process management system approach needs to be implemented, which is supported by the technology while taking into account other nontechnological capabilities, such as governance, culture, and human resources.<sup>37</sup>

**Table 2** Seven steps in the way forward for BPM implementation**The seven steps to drive BPM forward as a tool for health care innovation**

1. Clear consensus about what is “quality of care” in 2015 and how it can be linked to the digital age.
2. Train health care professionals to become aware of what they want to achieve – giving more focus on defining clear concepts and end points.
3. Engage IT experts to develop tools as a means to reach the end points.
4. Reinforce the principles of transparency discipline, commitment, alignment, motivation, and integration across the health care industry supply chain.
5. Bring focus back to the multidisciplinary approach – pushing all professionals out of their comfort zones regardless of their area of expertise – IT, managerial, or clinical.
6. Implement transformational leadership within the organization to bring about change, without losing focus on patient outcomes.
7. Ensure that the driving seat remains within the hands of professionals to avoid complete dependency on technology.

**Abbreviations:** BPM, business process management; IT, information technology.

This drives innovation through the use of BPM while also innovating BPM by considering the transformation of organization structures and ensuring cultural adaption, thereby avoiding a silo mentality in decision-making and ensuring wider visibility of the decision-making process. Application of decisions support systems across the entire supply chain processes of health care delivery will enable us to clearly find answers to the what, who, why, and how for managing system effectively. These will enable us to reach the right tradeoff between efficiency and patient responsiveness in strategic, tactical, and operational levels with the dynamic involvement of the stakeholders. This will also help integrating clinical and managerial processes in health care delivery. In Table 2, we highlight the seven key steps that we believe are needed to drive BPM forward as an effective within health care.

## Conclusion

This paper has focused on providing answers to five questions that we believe will contribute to better understanding by scholars and practitioners in health care management on the meaning and application of BPM. We started our paper by asking what is BPM and if it is relevant to health care. BPM is a tradition that is decades old, and despite the many definitions of BPM as applied to industry at large, we have emphasized the need to ground BPM in a language that can be easily understood and practiced by both clinicians and managers. BPM is focused on six core elements – strategic alignment, governance, methods, IT, people, and culture.

This paper has provided several examples of applications in health care, though we have shown that when compared to the manufacturing industry, the application of BPM principles in health care seems to lag behind. Indeed, unless clinicians and managers are on the same level of understanding when aiming to provide integrated care to patients, the full expectations of BPM will not be achieved. This line of argumentation took us to the next question, namely, Why focus on quality in health care delivery? The quality control tradition has had an important impact on the development and implementation of BPM and the relationship of quality and efficiency within this tradition is of specific importance within the health care sector. With the continuous challenges being faced across health care systems, the push is for the maximization of resources and the minimization of waste without a reduction in the quality of patient care. Institute of Medicine’s definition of quality of care, based on efficiency, accessibility, patient centeredness, equity, safety, and effectiveness, provides a sound platform on which clinicians and managers can identify clinical and operational processes that would ultimately enable them to provide health care delivery in a holistic and integrated manner. We have amply emphasized that clinicians and managers cannot work in isolation, and that health care organizations need to close the loop to ensure sustained and continuously improving optimal quality-of-care delivery. Above and beyond the complexity of the health care environment, there are challenges often arising from issues not necessarily within health care that impact on the performance of health systems. In this paper, we have highlighted rising costs, variations in quality, diversity in consumers, and concerns about value return on investment as the top challenges facing the health sector today. However, on a positive note, we have also discussed how BPM can play an important part to facilitate effective health care management, particularly in the future through seven practical steps for the way forward. We hereby end this paper by summarizing some of the attributes of BPM.

System thinking and BPM have been widely adopted in industry through process mapping, TQM, CQI, process reengineering, benchmarking, six sigma, risk management, and process-based performance measurement tools and techniques. Although health care industry adopted these approaches lately, the literature provides several examples from many countries where these have matured. There are evidences of achieving efficiency and patient satisfaction through application of various BPM methods across health care industry. On the one hand, process mapping, TQM, and CQI allow industry to adopt standardized practices and improve performance continuously.

On the other hand, process reengineering and benchmarking facilitate radical improvement in patient's satisfaction. Six sigma, risk management, and process-based performance measurement help optimize performance through appropriate tradeoff between efficiency and patient responsiveness. These also integrate entire health care supply chain through appropriate synergies across material flow, patient flow, and information flow. Practicing of this philosophy calls for paradigm shift of managing today's health care from individual health unit management to entire health care supply chain management through equal emphases on reengineering processes, selecting right IT, transforming structure, and culture. Dynamic and transparent group decision-making with the help of decision support systems in strategic, tactical, and operational levels is also critical to achieve and maintain health care supply chain integration.

## Disclosure

The authors report no conflicts of interest in this work.

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