

Evidence-Based Management Competency Model for Managers in Hospital Settings

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Evidence-based management (EBMgt), which refers to using the best-quality evidence from different sources in decision-making, is becoming an imperative for managers in both profit and non-profit sectors. Yet, the competencies underlying EBMgt have not yet received much attention. Therefore, the aim of this study is to identify the foundational and functional competencies of evidence-driven managers working in hospital settings and develop an empirically based competency model for evidence-driven managers. We collected qualitative data using semi-structured interviews and the critical incident technique from 36 executive managers from 11 hospitals in Lebanon about the competencies of managers who use EBMgt when approaching problems and making decisions. Using inductive coding, we identified 13 competencies that we grouped into four dimensions: technical, cognitive, interpersonal and intrapersonal. We further classified the specific competencies underlying each of the dimensions into foundational and functional, and highlighted those that are critical for the practice of EBMgt in hospital settings, including open mindedness, research knowledge and skills, ethicality in research, resourcefulness and relationship management.

Introduction

With the growing volatility, uncertainty, complexity and ambiguity surrounding businesses today (Bennett and Lemoine, 2014), exploiting data is key to creating competitive advantage (Provost and Fawcett, 2013). Yet, many decisions are still being made primarily based on experience and without reliance on other sources of data (Barends *et al.*, 2017). In fact, many management practices

are influenced by fads without consideration of their credibility (e.g. management by objectives, 360-degree feedback, value-based healthcare; see Miller and Hartwick, 2002; Porter and Teisberg, 2006) and many decisions continue to be made despite a body of evidence suggesting that they will have no positive impact or will be harmful (Starkey, Hatchuel and Tempest, 2009). Whilst organizational environments continue to change vastly and rapidly, management practices are not evolving as fast as the increasingly data-driven business environment (e.g. Prahalad and Hamel, 1990). Within this context, evidence-based management (EBMgt) has been proposed

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as an approach to encourage greater reliance on data in decision-making (Briner, Denyer and Rousseau, 2009). EBMgt is defined as the ‘explicit, judicious, and conscientious’ use of the best available evidence in management decision-making (Barends *et al.*, 2014, p. 4). Evidence may come from different sources, including professionals’ experience, scientific evidence, organizational data and stakeholder concerns (Briner, Denyer and Rousseau, 2009). The ‘best available’ evidence is evidence that is collected from these different sources and is appraised to be reliable. It depends on the context of each organization, because the sources of evidence available to managers and the relevance of the available evidence depend on the organizational context.

The EBMgt approach has gained considerable attention as the managerial approach that is most congruent with today’s working environment (Rousseau, 2006a, 2006b), which is characterized by an increase in the access to and availability of data. As EBMgt seeks to encourage the use of practices supported by strong evidence for their effectiveness, it can lead to improving decisions (Barends *et al.*, 2014). When adopting an EBMgt approach, it is managers who must identify, gather or mobilize the evidence, collaboratively with other stakeholders, and incorporate it in their decision-making (Swan *et al.*, 2012). Accordingly, insight into the personal knowledge, skills, abilities and other characteristics (KSAOs), or competencies, of managers who adopt an EBMgt approach can help organizations develop the right capabilities among their managers. In the EBMgt literature, Rousseau and Gunia (2016) conceptualized EBMgt competencies as foundational and functional, with foundational referring to competencies required for engaging in all EBMgt activities and functional referring to competencies required for engaging in specific EBMgt activities. Therefore, in this study, our aim was to empirically identify the foundational and functional competencies necessary for the practice of EBMgt in hospital settings and develop an empirically based competency model for evidence-driven managers. We were guided by the research question: What are the individual-level foundational and functional competencies necessary for managers to practice EBMgt in hospital settings? We will first shed light on the healthcare sector and the EBMgt literature in this field, and then present the theoretical framing adopted in this study.

EBMgt in the healthcare context

Healthcare organizations are complex and dynamic systems (Begun and Thygeson, 2015) that foster interactions between multiple factors related to patients, healthcare practitioners, healthcare teams, physical and social environments, organizational contexts, legislation and accreditation, to name a few, all of which impact the quality and outcomes of care (de Jonge, Huyse and Stiefel, 2006). With the wide array of problems facing the healthcare sector today (Porter and Teisberg, 2006), such as the increase in the medical needs of the community and the decrease in funding (Futurescan, 2008), healthcare managers’ roles and the decisions they have to make are becoming increasingly challenging (Baker, 2001). Furthermore, technology has had a huge impact on the availability of and accessibility to data for healthcare managers to leverage. For example, the widespread adoption of electronic medical records has allowed the proliferation and capture of unprecedented amounts and types of data, while open source platforms have made scientific literature more easily accessible (Mennemeyer *et al.*, 2016).

The adoption of EBMgt in this context is being seen as a timely strategic step that could enable managers to better cope with the complexity of healthcare organizations by relying on the best available evidence to improve their decision-making, and consequently achieve better organizational outcomes (Kovner and Rundall, 2006). However, the EBMgt literature has been critiqued for having a narrow view of evidence; privileging scientific evidence and quantitative research (Morrell, 2008; Morrell and Learmonth, 2015). Evidence, however, is not only quantitative scientific evidence, rather different types of scientific evidence, intra-organizational data (i.e. quality, effectiveness), professionals’ experience and stakeholders’ concerns (Osborne and Strokosch, 2013) are also critical sources of evidence. Additionally, the best available evidence depends on the context of each organization. For example, a hospital that utilizes electronic medical records will have access to different types of evidence than one that relies on paper documentation. What is ‘best’ in one context may be mediocre in another. Highlighting the importance of the context is also critical given that EBMgt has been critiqued for neglecting contextual complexities, such as ethics, power and politics (Morrell, Learmonth and Heracleous, 2015).

By not explicitly considering these issues, EBMgt has erroneously assumed that managers are impartial experts who will welcome evidence and use it to serve employee and client interests (Morrell and Learmonth, 2015; Tourish, 2012). Research has shown, however, that managers can be driven by self-interest and might choose to ignore evidence that contradicts their beliefs, knowledge and assumptions (Rynes, Colbert and O'Boyle, 2018).

In response to these critiques, the literature has called for developing a more in-depth understanding of EBMgt in practice (Currie, 2013; Reay, Berta and Kohn, 2009; Rynes and Bartunek, 2017; Walshe and Rundall, 2001) and for better understanding the role of the manager in EBMgt. To this end, some have focused on the competencies of managers, and in fact EBMgt has emerged relatively consistently, directly or indirectly, in recent generic competency models for healthcare managers. For example, among the five competency domains identified by the Healthcare Leadership Alliance (HLA), two domains – 'knowledge of the healthcare environment' and 'business skills & knowledge' – included references to EBMgt, specifically to using research findings to establish practice models and teaching others to use research (Steffl and Bontempo, 2008). Similarly, Liang and colleagues (Liang, Howard and Wollersheim, 2017; Liang *et al.*, 2013) identified evidence-informed decision-making as one of the core competencies for managers working in hospital settings. Moreover, McCarthy and Fitzpatrick (2009) identified promoting evidence-based decision-making, though referring mainly to clinical practice, as one of the competencies for nurse managers.

Other research specifically explored the competencies of evidence-driven healthcare managers. Liang, Howard and Wollersheim (2017) translated the competency of evidence-informed decision-making into behavioural descriptors, which were primarily process-oriented and did not refer to personal characteristics. Wright *et al.* (2016), in contrast, focused on understanding the characteristics of evidence-driven managers through a case study where a manager approached an operational hospital problem in an evidence-based manner. This study, however, was based on the analysis of only one manager in one specific hospital. Other researchers exploring the barriers to EBMgt have also identified certain competencies that are necessary for EBMgt practice, such as knowledge

in research methods and acquiring/appraising research evidence (Barends *et al.*, 2017; Liang and Howard, 2011; Niedzwiedzka, 2003). Therefore, as EBMgt is being promoted in healthcare management, research is being conducted on the competencies necessary for its practice. This existing research, however, has been scant, has not systematically delineated all necessary competencies and has not been driven by a theoretical framework. To overcome these limitations and achieve our aims, in this study we adopted a conceptual framework proposed by Rousseau and Gunia (2016), which we describe below, as our guiding theoretical framework.

Theoretical framing

In the EBMgt literature, Rousseau and Gunia (2016) proposed a conceptual categorization of the EBMgt competencies into foundational and functional. Foundational competencies refer to general skills and knowledge required for engaging in all EBMgt activities, such as domain knowledge, while functional competencies refer to skills and knowledge associated with specific EBMgt activities, such as acquiring the best available evidence, which is specific to the 'acquiring evidence' aspect of the EBMgt process. Furthermore, the foundational competencies form the basis for the development of functional competencies and support their application (Rodolfi *et al.*, 2005). For example, Rousseau and Gunia (2016) note that EBMgt functional competencies include the ability to structure one's thinking about a problem and about the information needed to solve a problem. They highlight that this functional ability is supported by the foundational competency of domain knowledge because it provides the necessary mental models that allow managers to organize problems and recognize incomplete information (Rousseau and Gunia, 2016). While this framework offers a promising basis for conceptualizing EBMgt competencies, these foundational and functional competencies still need to be empirically identified and situated within the overall literature on managerial competencies.

Therefore, using this conceptualization as our guiding theoretical framework, and leveraging existing classifications of managerial skills in the management literature (Hogan and Warrenfeltz, 2003; Katz, 1955), our aim is to empirically

identify the foundational and functional competencies necessary for the practice of EBMgt and to develop an empirically based competency model for evidence-driven managers in hospital settings. Competency models include a collection of KSAOs combined into a set of core competencies necessary for effective performance (Campion *et al.*, 2011). Competency models focus on the worker rather than the work, and are the roots that drive the success of organizations (Pralhalad and Hamel, 1990; Schippmann *et al.*, 2000). To develop this model, we collected qualitative data from executive managers, working in multiple hospitals across Lebanon, about the competencies of managers who adopt an EBMgt approach to decision-making. Based on this data, we developed the EBMgt competency model for managers in hospital settings.

Methodology

Context

In organizational research, contextualization is strongly encouraged, considering the diverse nature of work settings and how that influences the phenomenon being studied (Rousseau and Fried, 2001). In this study, we focused on the hospital setting as the larger umbrella for our investigation, considering the uniqueness of this business context and the impact it may have on the manifestation of EBMgt in practice, particularly in Lebanon.

Lebanon is a middle-income country with a population estimated at around 4 million, of which more than 90% live in urban areas (Kronfol, 2006). Lebanon has 165 hospitals and a ratio of 3.73 beds per 1,000 population (Harb, 2016). Healthcare expenditure in Lebanon constitutes 7.4% of the national gross domestic product (Miller and Wei, 2018), which is higher than the average healthcare expenditure in the Middle East and North Africa region, and of middle-income countries (World Health Organization, 2016). Moreover, in Lebanon hospitals account for 40% of this expenditure (World Health Organization, 2010).

The private sector dominates healthcare service provision, with 88% of the total number of hospitals and 90% of the total number of beds (Ammar *et al.*, 2000). This is due to the long history of conflict in Lebanon, which weakened the public sector and led to the unregulated growth of the private sector. To combat the resulting issues, the Ministry

of Public Health (MoPH) introduced a hospital accreditation scheme, which was developed in line with international standards (Ammar, 2009). The scheme enhanced quality on the one hand, but increased expenses on all hospitals on the other hand (Saleh *et al.*, 2013). Additional challenges relate to controlling the quality and quantity of physicians as well as increasing the retention of nurses, who are increasingly leaving Lebanon for better job offers in the Gulf region (see Kronfol, 2006). Additionally, since 2011, and due to the conflict in neighbouring Syria, there has been an influx of an estimated 1.5 million Syrian refugees to Lebanon, corresponding to a 30% increase in Lebanon's population (United Nations High Commissioner for Refugees, 2019). This is threatening the continuity of service delivery in the Lebanese healthcare system, destabilizing governance and limiting access to care (Refaat and Mohanna, 2013). These factors highlight the unique challenges facing hospital managers in Lebanon today.

While the refugee influx has influenced healthcare outcomes in Lebanon, including increases in maternal mortality rates, mental health conditions and vaccine-preventable and water-borne disease outbreaks, other indicators, including life expectancy at birth and infant mortality rate, have improved (World Health Organization, 2018). Furthermore, a handful of international healthcare indices indicate that healthcare coverage and performance in Lebanon is improving (Fullman *et al.*, 2018; Miller and Wei, 2018). Lebanon ranked 23rd on the Bloomberg Health-Efficiency Index, which calculates the cost-efficiency of medical care based on national life expectancy and healthcare expenditure (Miller and Wei, 2018). Moreover, Lebanon ranked 33rd on the Healthcare Access and Quality (HCAQ) index, which approximates healthcare access and quality by calculating the level of mortality that would not occur in the presence of effective medical care (Fullman *et al.*, 2018).

Sample

We invited 56 executive managers from 15 hospitals, via email, to participate in the study and 36 individuals from 11 hospitals operating in major cities across Lebanon agreed to participate (response rate of 64.28%). These 11 hospitals had received the highest level of accreditation by the Lebanese MoPH (Ministry of Public Health

Table 1. Hospital information

	Frequency	Percentage
<i>Sector</i>		
Private	8	72.73
Public	3	27.27
<i>Academic status</i>		
Academic	6	54.55
Non-academic	5	45.45
<i>Bed count</i>		
<70	2	18.20
70–200	4	36.40
>200	5	45.50

Table 2. Participant demographic information

	Frequency	Percentage
<i>Gender</i>		
Male	19	52.80
Female	17	47.20
<i>Age range</i>		
20–29 years	1	02.78
30–39 years	6	16.67
40–49 years	14	38.89
50–59 years	13	36.11
60–69 years	2	05.56
<i>Education level</i>		
MA	15	41.70
MD	6	16.67
MA & MD	6	16.67
PhD	5	13.90
BA	4	11.10
<i>Education background</i>		
Business	8	22.20
Healthcare	8	22.20
management		
Medicine	5	13.90
Healthcare	5	13.90
management and		
medicine		
Healthcare	3	08.30
management and		
business		
Nursing	2	05.60
Healthcare	1	02.80
management and law		

Lebanon, 2014), and around 36% of these hospitals had received accreditation from different international accrediting bodies. As can be seen in Table 1, the majority of the hospitals were private (72.73%), approximately half were academic hospitals (54.55%) and almost half were large in size, with more than 200 beds (45.5%).

On average, three executives participated from each of the hospitals. Participants (Table 2) were mostly 40 to 49 years old (38.9%) and half of the

Table 2. Continued

	Frequency	Percentage
Healthcare	1	02.80
management and		
medicine and law		
Healthcare	1	02.80
management and		
nursing		
Health science	1	02.80
Social science	1	02.80
<i>Years of healthcare</i>		
<i>management</i>		
<i>experience</i>		
1–9	5	13.90
10–19	18	50.00
20–29	11	30.60
30+	2	05.60
<i>Position</i>		
CEO/Hospital	9	25.00
Director		
Human Resources	5	13.90
Director		
Chief Quality and	5	13.90
Safety Officer		
Medical Director	4	11.10
Chief Financial	3	08.30
Officer		
Nursing Director	3	08.30
Director of External	1	02.80
Medical Affairs		
Associate Dean of	1	02.80
Faculty Affairs		
Chief Business	1	02.80
Development Officer		
Chief Medical	1	02.80
Information Officer		
Deputy to Executive	1	02.80
Vice President		
Director of	1	02.80
Operations		
Executive Director &	1	02.80
Senior Advisor to		
Administration		

participants were male (52.8%). Although information regarding gender distribution in healthcare management positions in Lebanon is not available, gender representation in this sample is comparable to that in healthcare managerial positions in other countries. For example, in the USA women make up 50% of senior management in healthcare companies (Krivkovich *et al.*, 2018) and 34% of leadership teams in hospitals (Tecco, 2017). The majority of participants had MA degrees (41.70%), MD degrees (16.67%) or both (16.67%). Their education was mostly in the domains of business (22.2%) and healthcare management (22.2%), with

many also having clinical backgrounds (13.90% medicine, 5.60% nursing), or both clinical and non-clinical backgrounds (healthcare management and medicine 16.70%, nursing 2.80%). This representation of clinical professionals in leadership positions is reflective of recent changes in healthcare management and comparable to most countries of the OECD, where medical doctors are part of the hospital top structure (Rotar *et al.*, 2016). Participants occupied various positions within the hospitals, with most in positions of CEO or Hospital Director (25%), Human Resources Director (13.9%) and Chief Quality and Safety Officer (13.9%). They had occupied their positions for an average of 9.01 years (SD 6.19 years) and half of them had 20–29 years of experience in healthcare management (50.0%).

Materials

We collected data using (1) semi-structured interviews and (2) the critical incident technique (CIT) (Flanagan, 1954) as part of a larger study examining how evidence-based decision-making is practiced by managers in hospital settings. We defined evidence-based decision-making for participants as involving ‘the use of best available evidence/data in managerial practice and decision-making’.

In this study, we focused on analysing participants’ responses to two questions from the semi-structured interview: ‘What do you think are the knowledge, skills, abilities and other characteristics needed by managers who demonstrate evidence-based management practice in their day-to-day work?’ and ‘How would you distinguish between good experience that yields good decisions and bad experience that yields bad decisions?’ We also used the two CIT questions where we asked participants to describe in detail a scenario where a manager (1) used an evidence-based approach to decision-making and (2) did not use an evidence-based approach to decision-making.

Procedures

Interviews were conducted between December 2016 and November 2017 at the participants’ offices and lasted approximately 50 minutes each. One of the authors, a bilingual in English and Arabic languages, conducted the interviews in English and either audio-recorded or took notes. Some participants, however, sometimes used certain words in Arabic. The interviewer transcribed

the interviews in their original language and translated the Arabic segments in parentheses next to the original text. The transcriptions were analysed in their original language using QSR Nvivo version 11 software.

Analysis

We analysed the data using an inductive coding approach (Lincoln and Guba, 1985). We used an iterative process, which included four steps: (1) initial open coding of the data; (2) developing the initial coding template; (3) developing the initial thematic template; (4) expert vetting to develop the final competencies.

Initial open coding

We started the analysis with initial open coding. One of the authors thoroughly read each participant’s responses, then, guided by the research question, coded words, phrases, sentences or paragraphs (hereafter utterances) into categories to capture the ideas conveyed. For example, the utterance ‘*to have an inquisitive mind*’ was coded as Being Inquisitive. This author applied line-by-line coding initially to 15% of the interviews (five interviews) and generated a list of categories.

Developing initial coding template

The above author then vetted these categories collaboratively with another author. We re-examined the categories against the utterances they were referring to, as well as against other categories. Accordingly, we merged some categories and added new ones. For example, Knowing How to Search the Literature and Understanding and Knowing How to Do a Literature Search were merged. This led to the development of an initial coding template.

Developing initial thematic template

After coding 50% of the interviews (18 interviews) using the initial coding template, we examined the categories for accuracy and duplication, and reduced them to a more manageable number. We then began assembling the categories into sub-themes and themes. For example, we grouped the categories Data Analysis Skills and Knowledge of Comparing Numbers under a sub-theme (hereafter sub-competencies) labelled Analysing Data.

We further grouped multiple sub-competencies into themes (hereafter competencies) reflecting the KSAOs emerging from the data. For example, we grouped the sub-competencies Analysing Data, Searching the Literature, Collecting Data and Applying Data under the competency Research Knowledge and Skills. Furthermore, we grouped competencies under aggregate dimensions based on the type of KSAOs they reflected. For example, we grouped Research Knowledge and Skills, General Business Knowledge and Domain Knowledge under the dimension Technical Knowledge and Skills. As further illustration of our progress from categorization to dimension, we labelled the utterances '*I have to think about the problems a decision might cause in the future (...) I have to think ahead*' and '*In 3 months one of the head nurses leaves, so I have to plan ahead, starting today I need to think who should replace this nurse and start training them*' under the first-order category Short and Long-Term Implications. We then grouped this category with Considering Larger Context under the sub-competency Long-Term Thinking because they both revolved around considering the implications of decisions within the context of current systems and over time. We then grouped this sub-competency with the sub-competency Holistic Thinking under the competency Systems Thinking, because both sub-competencies dealt with considering the overall implications of decisions. Finally, since the competencies Systems Thinking, Critical Thinking and Creativity all reflect cognitive abilities, we grouped them under Cognitive Dimension. This grouping led to the development of an initial thematic template.

Expert vetting

After completing the full analysis using the initial thematic template, we formed a vetting panel including all three authors and re-examined the template. Guided by the literature on EBMgt and competencies of evidence-driven managers (Gioia, Corley and Hamilton, 2013), we refined the categorization and developed the final template situated in the larger EBMgt literature.

Inter-rater reliability and member check

To assess the reliability of the categorization, two independent coders, who were unfamiliar with the study, assigned sample codes to competencies and

a sample of competencies to dimensions. We assessed inter-rater reliability by comparing their categorization with ours using Fleiss's kappa (Fleiss, 1971). We found moderate agreement in the categorization of codes to competencies ($\kappa = 0.58$) and substantial agreement in the categorization of competencies to dimensions ($\kappa = 0.66$; Landis and Koch, 1997). We then met to discuss the discrepancies and made some very minor adjustments to the definitions of some codes and competencies. Finally, we conducted member checks by sharing our results with the participants, who were mainly in support of our categorization, with minor suggested amendments.

Results

Evidence-based management competency model

We captured participants' 657 utterances and followed an iterative process of data analysis (Table 3).

The final outcome was the template (Table 4) comprising four dimensions, 13 competencies, 35 sub-competencies and 68 categories. To identify these four overarching dimensions, we leveraged existing managerial skills classifications, including Katz's (1955) three-skills approach and its elaborations by Mann (1965) and Yukl (2013) and Hogan and Warrenfultz's (2003) domains. Accordingly, we identified the following dimensions: (I) technical, (II) cognitive, (III) interpersonal and (IV) intrapersonal.

- (I) *Technical dimension*. This dimension includes skills and knowledge of methods, procedures and techniques related to the profession being practiced (Ericsson and Lehmann, 1996). It encompasses four competencies and 12 sub-competencies.

The first competency, *General Business Knowledge*, refers to knowledge and skills necessary for managing organizational activity (Hogan and Kaiser, 2005). Here, participants emphasized general management, which allows for the planning, execution and monitoring of organizational activity. They also emphasized financial management, which allows for the budgeting and financial planning of organizational activity, '*Budgeting, feasibility studies, and priority setting are mandatory points*' (P8). Finally, participants emphasized

Table 3. Count of categories, sub-competencies, competencies and dimensions throughout the analysis

Data analysis step	Count of categories	Count of sub-competencies	Count of competencies	Count of dimensions
<i>Open coding</i>				
Coding 15% of interviews (5 interviews)	70	–	–	–
<i>Developing initial coding template</i>				
Vetting codes	59	–	–	–
<i>Developing initial thematic template</i>				
Coding 50% of interviews (18 interviews)	201	–	–	–
Grouping into initial thematic template	108	20	16	3
Coding 100% of interviews and refining grouping	80	19	16	4
<i>Expert vetting</i>				
Refining initial thematic template and developing final competency model	68	35	13	4

Table 4. Evidence-based management competency template

Category	Sub-competency	Competency	Dimension
Administrative knowledge	General Management	General Business Knowledge	Technical
Project management			
Knowledge of financial procedures	Financial Management		
Financial systems knowledge			
Computer skills	Digital Skills		
Writing capabilities			
Knowledge of relevant national and international standards	National & International Standards	Industry Knowledge	
Knowledge of benchmarking			
Lean management	Process Management		
Process design			
Quality audit and control	Quality Assurance		
Proper understanding of quality metrics			
Integrity	Ethicality in Management	Ethicality	
Transparency			
Confidentiality			
Fairness			
Objectivity			
Transparency in research	Ethicality in Research		
Objectivity in research			

digital skills, referring to having the skills to use relevant tools that support the management function, including software such as Microsoft Excel and statistical software, as well as having the proper writing skills when using these tools, such as when writing analysis reports and proposals.

The second competency, *Industry Knowledge*, refers to the knowledge and skills necessary for coordinating the activities of healthcare facili-

ties (Thompson, Buchbinder and Shanks, 2012). Here, participants emphasized national and international standards, referring to knowledge of the relevant norms and standards of practice. Participants also emphasized quality assurance, referring to knowledge of quality metrics, and tools and techniques for auditing and controlling of healthcare safety and quality. Finally, participants emphasized process management, referring

Table 4. Continued

Category	Sub-competency	Competency	Dimension		
Searching for data and literature	Knowledge in Searching for & Understanding Data	Research Knowledge and Skills	Cognitive		
Reading and understanding	Knowledge in Collecting Data				
Data collection methods					
Auditing accuracy					
Warehousing and documenting					
Basic mathematics knowledge	Knowledge in Analysing Data	Critical Thinking		Cognitive	
Statistical analysis	Applying to Practice				
Incorporating data in decisions					
Applying theory to practice	Inquisitiveness				
Intellectual curiosity					
Asking questions	Analytical Thinking				
Breaking down problems					
Comparing and synthesizing	Systematic Thinking				
Being methodical and organized					
Being goal-oriented	Holistic Thinking		Systems Thinking		
Considering impact on others					
Considering perspectives of others	Long-Term Thinking	Creativity	Interpersonal		
Considering short & long-term implications					
Considering larger context	Innovativeness				
New ways of working					
New ways of solving problems	Resourcefulness				
Ideas around scarcity of resources					
Establishing professional relationships	Building Relationships			Relationship Management	
Understanding others and their needs and motivations	Emotional Intelligence				
Regulating one's own and others' emotions	Conflict Management Skills			Team Leadership	Interpersonal
Solving problems between people					
Refraining from taking sides	Role Modelling				
Serving as an example					
Motivating team to get results	Motivating Others				
Willingness to share information					
Directing to relevant resources	Sharing Information & Experiences				
Content					
Verbal and non-verbal skills	Effectively Delivering Information	Management Style	Intrapersonal		
Being available for employees					
Providing opportunity to share mistakes	Open Door Policy				
Providing chance to fix mistakes	Accepting Others' Mistakes				
Seeking field information	Hands-On Management				
Being part of practice					
Adapting decisions to fit new situations	Adapting to Change				
Adapting behaviours to fit new situations					
Prioritizing stakeholders' interests based on the situation	Adapting Priorities			Adaptability	Intrapersonal
Self-awareness	Self-				
Ability to learn from experiences	Development	Self-initiated Improvement			
Taking initiatives to learn and grow					

Table 4. Continued

Category	Sub-competency	Competency	Dimension
Identifying areas of improvement	Process and Quality Improvement		
Finding solutions	Openness to Receiving Input from Stakeholders	Open Mindedness	
Changing one's mind after decision made	Openness to Change One's Mind		
Openness to different outcomes			
Tolerance of uncertainty			

to knowledge of methods, tools and techniques necessary for improving the quality of healthcare delivery processes (Taylor *et al.*, 2014), ‘*the skills of doing a PDCA [plan–do–check–act] how to look at a process and break it down into steps*’ (P6).

The third competency, *Ethicality*, refers to the use of appropriate judgements in line with ethical standards guided by the benefit of patients, employees, the organization and society (Kanungo, 2001). We categorized ethicality as a technical competency because it refers to a manager's knowledge and practice of ethics as it relates to their profession rather than their ethical orientation as a person. Participants emphasized ethicality in management, referring to managing with transparency, upholding confidentiality and treating others with fairness and objectivity. They also emphasized ethicality in research, referring to transparency and honesty about the data used in decision-making, ‘*being transparent with the numbers and the data you use*’ (P15), and objectivity in terms of being unbiased and letting the data rather than initial judgements guide decision-making.

The fourth competency, *Research Knowledge and Skills*, refers to the knowledge and skills necessary for conducting research. Here, participants emphasized knowledge in searching for and understanding data, whether within the organization or in the literature. Participants also emphasized knowledge in collecting data, from methods of data collection to recording the data and assessing its accuracy. They also emphasized knowledge in analysing data, referring to knowledge of different statistical analysis methods. As a participant stated, ‘*You cannot be evidence based if you don't know the basics behind comparison and some form of statistics analysis*’ (P1). Finally, participants emphasized the skills of applying data to practice, as

in this example: ‘*Knowledge by itself is not enough if you don't know how to apply (...) how can I move that theory to reality?*’ (P23).

(II) *Cognitive dimension*. This dimension includes skills and abilities related to the way managers organize and process information (Messick, 1984) and understand relationships between different factors, (Katz, 1955; Yukl, 2013). This dimension includes three competencies and seven sub-competencies.

The first competency, *Critical Thinking*, refers to the ability to purposefully reflect on, evaluate, analyse and synthesize information, and structure an argument to arrive at conclusions (Moon, 2007). Here, participants emphasized core elements of the construct (Facione, Facione and Sanchez, 1994), including inquisitiveness, referring to having intellectual curiosity and frequently asking questions, ‘*they are always curious, always asking*’ (P34). They also emphasized being analytical, referring to breaking down problems into more manageable components and comparing and synthesizing information (Amer, 2005). Finally, participants emphasized systematic thinking, referring to being methodical, following an approach marked by regularity (Facione, Facione and Sanchez, 1994), and being ‘*oriented towards goals*’ (P8), referring to setting goals and working to complete them.

The second competency, *Systems Thinking*, refers to the ability to see the organization as a whole, recognizing the different parts that make it up and how they interact together (Katz, 1955). To this end, participants emphasized holistic thinking, referring to considering the implications of decisions for the different stakeholders within and outside the organization, ‘*people who are going*

to apply your decision (...) you should think in their perspective' (P17). Participants also stressed the importance of long-term thinking, referring to thinking of both the short and long-term implications of decisions, *'even in times of crisis I have to think about the problems a decision might cause in the future... we have to think ahead'* (P23).

The last competency, *Creativity*, refers to the ability to generate original ideas (Amabile, 1988) and to find creative solutions even in the face of resource scarcity. Participants emphasized innovativeness, referring to coming up with new ways of conducting work processes and solving problems. They also emphasized resourcefulness, referring to the ability to generate original ideas vis-à-vis a scarcity in resources, *'If you don't have the financial or other resources (...) then you need creativity to find a way around such shortages'* (P15).

(III) *Interpersonal dimension*. This dimension refers to the skills and abilities necessary for working with and leading people (Hogan and Warrenfeltz, 2003; Katz, 1955) and includes three competencies and 10 sub-competencies.

The first competency, *Relationship Management*, refers to the ability to initiate, cultivate and maintain relationships with colleagues. Participants stressed building relationships, being able to establish professional relationships with individuals inside or outside the organization, so as to facilitate access to information and expert opinion, *'he [evidence-driven manager] has public relations with other people who can help him in specific subjects'* (P33). They also stressed emotional intelligence, focusing on core elements of the construct (Petrides and Furnham, 2001), including understanding others' needs and motivations, and regulating one's own and others' emotions, *'[When there is a problem] you have to be very understanding of [others' feelings] without getting emotional and getting into the problem'* (P22). Participants also emphasized conflict management skills, referring to how managers approach and handle conflicts in the workplace, and the importance of refraining from taking sides (Wilson, 2004).

The second competency, *Team Leadership*, refers to the ability to direct individual and group activities towards a shared goal (Yukl, 2013). Participants emphasized the importance of role mod-

elling, of adopting practices to serve as an example and encourage adoption in others, *'when you take a decision... you should apply it first yourself and then expect other people to'* (P17). They also emphasized motivating others, inspiring team member to get results by providing meaning to their work (Bass, 1995). They also emphasized the importance of team leaders sharing information and experiences, either their own knowledge or directing subordinates to relevant sources: *'I answer if I have the information, otherwise (...) I will try to get them the one who can help'* (P33). This is facilitated by managers' ability to effectively deliver information to peers and subordinates, focusing on both the content and the tone.

The third and final competency, *Management Style*, refers to the way managers relate to and interact with their team members and subordinates. Participants emphasized creating an atmosphere of acceptance where employees can safely express their concerns and share information. This involved having an open-door policy, referring to being available to employees for discussion of their concerns or suggestions, *'[encourage the employee not to] hide anything, whatever is wrong can be fixed'* (P35). According to participants, to allow information-sharing specifically about accidents, and mistakes, managers must be accepting of others' mistakes. This involves giving subordinates a chance to admit and fix mistakes, *'It's ok to make a mistake (...) [the evidence-driven manager] does not crush them [employees] (...) [he/she] lets them sit in a meeting and say: "hey you know I did a mistake let's redo this"'* (P24). Finally, participants also highlighted the importance of a manager practicing hands-on management, characterized by seeking 'field' information and knowing what is happening in practice, and being part of the practice. This style was differentiated from its opposite, *'there is management, by what I call remote control, sitting behind a desk and managing and making decision'* (P10).

(IV) *Intrapersonal dimension*. This final dimension refers to the KSAOs related to the internal state of the individual needed for changing behaviours (Hogan and Warrenfeltz, 2003), and includes three competencies and six sub-competencies.

The first competency, *Adaptability*, refers to the capacity to shift one's approach to adjust to

dynamic work situations (Johnson, 2001). Here, participants emphasized adapting to change by changing behaviours and decisions: *'To adapt... Even if you don't change your decisions... But maybe some fine tuning; maybe you can change some things'* (P17). They also emphasized adapting priorities, referring to adjusting priorities based on stakeholders' interests, such as in cases where patients' needs are determined to be of higher priority than hospital policy.

The second competency, *Self-initiated Improvement*, positions the evidence-driven manager as an agent actively seeking to create change. Improvement can be geared towards self-development, referring to developing personal skills, learning from mistakes, and taking initiatives to learn and grow, *'being self-motivated, interested in constantly reading, learning, and improving themselves'* (P12). In parallel, self-initiated improvement also entails process and quality improvement, which requires identifying problems and finding solutions for them: *'people who come to their managers, and tell them "in doing this I discovered that we have a flaw and I did an analysis and I suggest we do this to fix it"'* (P11).

The final competency, *Open Mindedness*, refers to being tolerant of divergent views (Facione, Facione and Sanchez, 1994). Here, participants stressed that managers must have openness to receiving input from stakeholders, referring to being receptive to information from stakeholders at different levels and considering their input when making decisions: *'You have to show them [employee] that everything that [they] reported will end up being considered in your decision-making process'* (P35). Participants also emphasized the importance of openness to changing one's mind, referring to being receptive to changing one's ideas or decisions even after decisions have been made if new evidence points in a different direction. As a participant described an incident with a non-evidence-driven manager: *'[I would] show them articles, designs and the benefits of these... but there is no openness to changing [their] idea'* (P2).

Mapping onto Rousseau and Gunia's (2016) framework

To explore whether these competencies could fit into Rousseau and Gunia's (2016) conceptual framework, we mapped our findings onto this framework. The distinguishing feature between the

foundational and functional competencies is that the former are required to engage in all aspects of EBMgt, while the latter are required to engage in specific EBMgt activities (Rousseau and Gunia, 2016). Considering that the two core EBMgt activities are acquiring and critically appraising evidence, we categorized competencies specifically necessary for engaging in acquisition and appraisal of evidence as functional and the rest of the competencies as foundational. In doing this mapping, we found that the foundational–functional division is, in some cases, better expressed at the level of the sub-competencies rather than the competencies. We identified seven functional competencies and/or sub-competencies and present below their link to the core activities of EBMgt (Figure 1).

Within the technical dimension, the competency Research Knowledge and Skills can be considered functional as it encompasses sub-competencies that can help managers search for existing evidence and design data collection methods to gather evidence. Additionally, these sub-competencies can help managers assess the quality of evidence, depending for example on how the data was collected and what sample it was collected from vis-à-vis the context it will be applied to. These are critical activities of EBMgt, no matter the type of evidence (Barends et al., 2014; Swan et al., 2012). Furthermore, the sub-competency ethicality in research, under the Ethicality competency, can also be considered functional because it allows managers to be ethical and uphold ethical principles when acquiring and appraising the evidence. It allows managers to be transparent about the data they acquire and use as the basis of decision-making, and to be objective in appraising the quality of the data and interpreting its meaning. Within the cognitive dimension, under the Critical Thinking competency, the inquisitiveness sub-competency can be considered functional because it drives the individual to ask questions to better understand the problem and thus acquire the best available evidence. It also drives the individual to ask questions to assess the quality of this evidence. Moreover, under the Creativity competency, the resourcefulness sub-competency can be considered functional. In the EBMgt context, resourcefulness refers to managers' ability to generate and acquire evidence in novel ways when it is not easily available due to organizational and other constraints. For example, in one hospital, internal information about

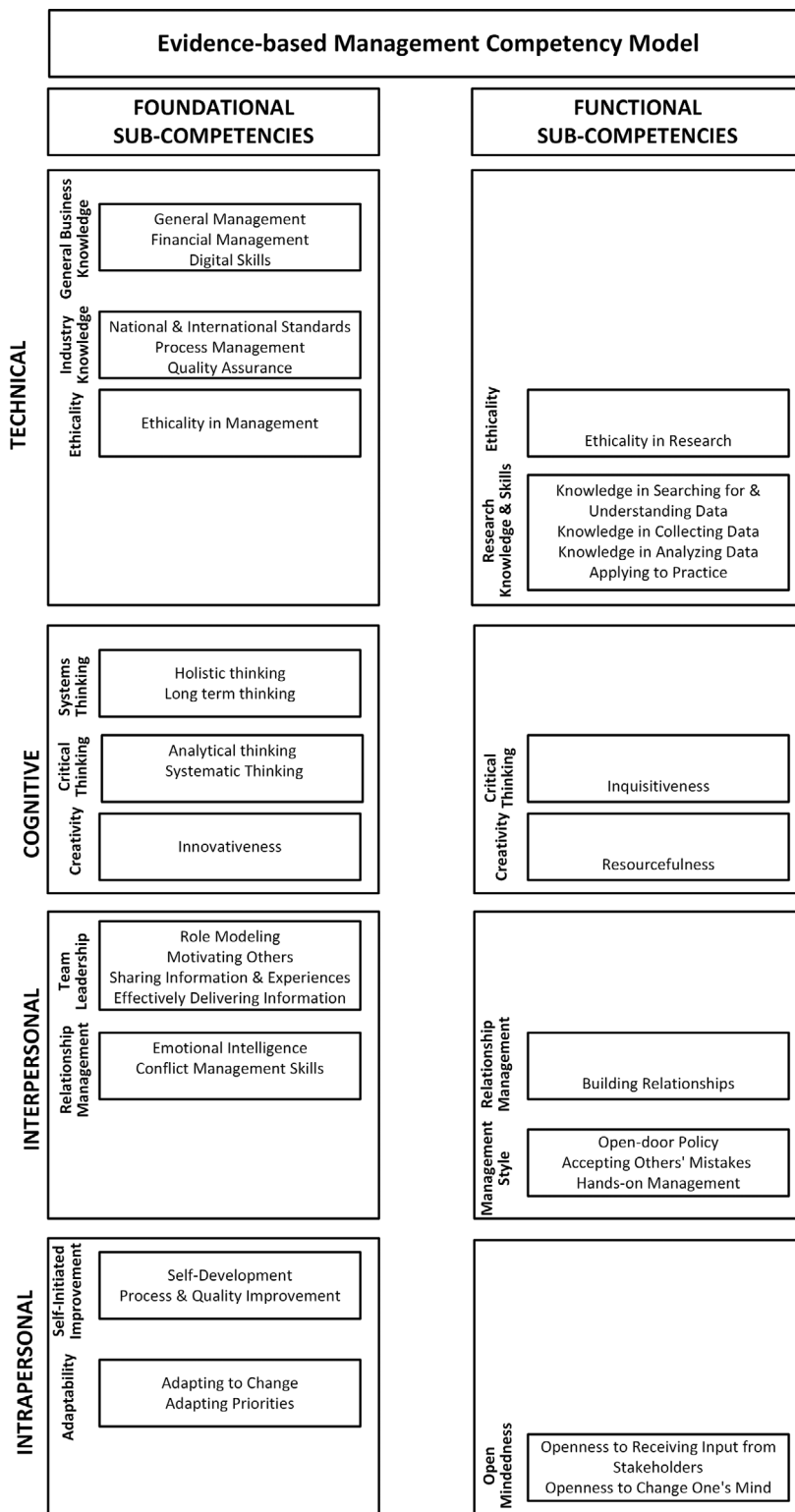


Figure 1. Evidence-based management competency model: mapping onto Roussau and Gunia (2016)

the average processing time of laboratory tests was not available because of a lack of documentation. To collect this data, the manager decided to conduct observations over a 1-month period; however, considering the limited human and financial resources, the manager partnered with a career service at a university and hired student volunteers.

Within the interpersonal dimension, the building relationship sub-competency under Relationship Management and the Management Style competency can be considered functional as they may facilitate access to information from employees, colleagues and patients. Both of these represent an ability to develop relationships and create an atmosphere where employees can safely share information with a manager who has a hands-on approach and is accepting of mistakes. Such an atmosphere allows the acquisition of information, and accurate information at that, of events that are happening within the organization.

Finally, within the intrapersonal dimension, the competency Open Mindedness can be considered functional because in the EBMgt context, it involves being receptive to information and accordingly open to changing one's mind. Such openness is critical to EBMgt, given how managers' beliefs, knowledge and interests might come into play in determining what information they take into account and utilize in decision-making (Rynes, Colbert and O'Boyle, 2018).

Having identified the competencies and sub-competencies necessary for acquiring and appraising evidence as functional, what remained were the foundational competencies and sub-competencies. These included the competencies General Business Knowledge, Industry Knowledge, Systems Thinking, Team Leadership, Self-initiated Improvement and Adaptability. They also included the sub-competencies ethicality in management under Ethicality, analytical and systems thinking under Critical Thinking, innovativeness under Creativity and emotional intelligence and conflict management skills under Relationship Management. These are necessary to engage in all aspects of EBMgt practice. To illustrate, General Business Knowledge and Industry Knowledge are foundational because they provide managers with the mental models that allow them to anticipate and recognize problems, identify necessary and relevant solutions, and the best way to apply those solutions (Ericsson and Lehmann, 1996; Rousseau and

Gunia, 2016). Furthermore, Adaptability and Self-initiated Improvement are foundational because the overall process of EBMgt can be long and arduous (Barends *et al.*, 2014), and these competencies give managers the drive and capacity to initiate processes of continuous improvement and adapt to changes throughout the process.

Discussion

The aim of this study was to empirically identify the foundational and functional competencies necessary for EBMgt practice in hospital settings and develop an empirically based competency model for evidence-driven managers in hospital settings. The outcome was the formulation of the EBMgt competency model comprising four dimensions, 13 competencies and 35 sub-competencies, categorized into foundational and functional competencies according to Rousseau and Gunia's (2016) conceptualization. The model developed in this study is the first attempt to empirically delineate the competencies necessary for the practice of EBMgt among managers in a hospital setting. The model builds on and contributes empirically and theoretically to Rousseau and Gunia's (2016) conceptualization by identifying the EBMgt competencies that fall under their conceptualization, and by situating the EBMgt competencies within the overall literature on managerial competencies. The value of the proposed model lies in its contribution to understanding the specific competencies necessary for the practice of core EBMgt activities, examined in both the general management as well as the healthcare management literatures.

Competencies unique to the EBMgt competency model

Several of the competencies we identified in the proposed model overlapped with existing competency models in the healthcare management literature (Calhoun *et al.*, 2008; Garman *et al.*, 2004; Liang and Howard, 2010; Liang *et al.*, 2013; McCarthy and Fitzpatrick, 2009), although some of these overlapping competencies contribute uniquely to the practice of EBMgt. For example, ethicality as a competency has been highlighted in many existing managerial models in healthcare and outside. However, its emergence in

the proposed model is critical because the EBMgt literature has been criticized for ignoring issues of power, politics and ethics and the role they play in EBMgt practice. Therefore, although ethicality has not been at the centre of discussions in the EBMgt literature, it is an integral part of its practice and requires more in-depth investigations. Additionally, some other competencies were unique to our model, and some other popularly cited competencies were not mentioned by our informants. Here we will discuss the competencies that were unique to the current model, or had unique contributions. These potentially provide an indication of the skills that are critical to the practice of EBMgt and its core activities, and extend our ideas about the practice of EBMgt in hospital settings.

Unique competencies. The competency Research Knowledge and Skills was not prominent in the existing literature, and even when it was identified, it tended to be subsumed under other competencies such as Business Knowledge and Skills (Steffl and Bontempo, 2008). This supports the existing EBMgt literature, where the scarcity of such skills has been identified as a barrier to EBMgt (Barends *et al.*, 2017; Liang and Howard, 2011; Niedzwiedzka, 2003) and our identification of these skills as a standalone competency highlights its central role for acquiring and assessing evidence in EBMgt. Open Mindedness was also unique to this model, referring not to the personality trait, but rather to being open to changing one's mind even after having made a decision, in case the evidence proves otherwise. The EBMgt literature has tended to associate poor decision-making, or non-evidence-based decision-making, with an absence of knowledge (Rynes, Colbert and O'Boyle, 2018). Research has shown, however, that managers' lack of reliance on evidence might be a choice to ignore evidence that contradicts one's beliefs, knowledge and self-interest (Rynes, Colbert and O'Boyle, 2018). Thus, our identification of this competency is in line with the EBMgt literature pinpointing the necessity of managers being receptive to evidence (Rynes, Colbert and O'Boyle, 2018).

Competencies uniquely contributing to EBMgt practice. Relationship Management has been identified in several existing models of healthcare management competencies (Calhoun *et al.*, 2008; Garman *et al.*, 2004; Liang and Howard, 2010; Liang *et al.*, 2013; McCarthy and Fitzpatrick,

2009). However, its contribution to the practice of EBMgt is unique, in that it plays a critical role in enabling managers to establish and maintain positive relationships with different stakeholders. These relationships, according to the informants, facilitate access to and acquisition of data. This is also true of the Management Style competency (McCarthy and Fitzpatrick, 2009), which plays a critical role in facilitating EBMgt practice. It contributes to creating a working environment where healthcare professionals feel safe to share information (Katz, 1955), thus allowing managers direct access to more valid data from their subordinates. These skills might be especially important in the healthcare context, where fostering relationships has been challenging given the environment that has traditionally encouraged autonomy but where work is highly interdependent (Hoffer Gittel, 2016).

The acquisition of evidence is also facilitated by the competency Creativity, which is prominent in the healthcare management competencies literature (Calhoun *et al.*, 2008; Garman *et al.*, 2004). However, its contribution to EBMgt practice is unique because it might help managers adapt evidence-based solutions to fit the organizational context. It might also help managers find solutions in the absence of certain resources, such as accessing evidence when it is not easily accessible and collecting evidence when it is absent. Therefore, creativity can help managers overcome challenges to EBMgt, including the dearth of evidence, its applicability to the organization and the lack of resources to create or access evidence (Barends *et al.*, 2017; Liang and Howard, 2011; Niedzwiedzka, 2003).

The dynamic nature of the EBMgt competency model. The EBMgt competency model proposed in this study can be considered dynamic, whereby the foundational competencies form the basis for the development of functional competencies (Rodolfa *et al.*, 2005). Most importantly, not only can the foundational competencies be considered prerequisites to the development of functional competencies within the same dimension, but also to the development of *some* competencies under other dimensions. To illustrate, the foundational technical competencies can be considered necessary prerequisites to the technical and cognitive functional competencies. That is, having general management and industry knowledge

(foundational technical competencies) can be considered prerequisites for managers to know what data to search for or collect and how to interpret it (functional technical competencies). These foundational technical competencies may also be considered prerequisites for managers to know all the resources they can tap into to generate evidence in resource-scarce settings (functional cognitive competencies). Similarly, the foundational cognitive competencies can be considered necessary prerequisites to the cognitive, technical and interpersonal functional competencies. That is, being creative (foundational cognitive competency) can be a prerequisite to the acquisition of resources in resource-scarce settings (functional cognitive competency), and to designing research to acquire necessary evidence (functional technical competency). Additionally, being systematic could be a prerequisite to searching for and collecting data. Indeed, it has been found that in order to formulate a question in a way that would allow searching for and collecting information, one must think in a systematic way, organizing and structuring this thinking (Chi, Glaser and Farr, 1988). Furthermore, thinking holistically and considering long-term goals could be prerequisites to realizing the value of building and maintaining relationships with key stakeholders (functional interpersonal competency). Overall, these examples illustrate that the foundational competencies can be prerequisites to the development of functional competencies within and across dimensions, and that to develop EBMgt competencies, both functional and foundational competencies might be targeted. Future research can focus on more specifically exploring these relationships across the four dimensions.

Practical implications

Selecting and developing evidence-driven managers. The adoption of EBMgt in practice has been challenging. Several barriers have been identified at different levels, including the individual level (Barends et al., 2017; Liang and Howard, 2011; Niedzwiedzka, 2003). With the advent of technology and digitization in the workplace, managers will surely be surrounded with more data that can be critical for optimizing their decision-making. EBMgt is a promising management approach that can allow managers to make better use of this data. The EBMgt competency model

proposed here can aid in refining managerial selection processes, whereby organizations can move beyond the job and more into the managerial competencies that are needed in today's data-driven world.

Many of the competencies necessary for EBMgt can be developed through organizational training programmes. This is an important safeguard, for management training programmes can be designed to target the competencies identified in this model. Furthermore, this competency model can serve as a blueprint to identify which EBMgt practice aspects managers struggle with and direct training initiatives to develop them specifically.

Necessary versus sufficient for the adoption EBMgt practice. While developing managers' ability is necessary for their adoption of EBMgt, it is not sufficient alone since there are also individual, organizational and institutional-level factors that influence the use of data in decision-making (Baba and HakemZadeh, 2012; Wang et al., 2019). That is, the adoption of EBMgt is predicated on a fit between the personal characteristics of the decision-maker and the demands of the context (Wright et al., 2016). So not only do the managers need to possess the EBMgt competencies, they also need to be provided with the opportunity to practice EBMgt from their organization (Rousseau and Gunia, 2016). In order to promote the practice of EBMgt within their context, organizations need to take a proactive approach that transcends developing skills to include creating a supportive culture and structure.

Limitations and future direction

This study has several limitations and opens opportunities for future research. First, while it is limited by the inclusion of only executives, rather than evidence-driven managers who are the main focus of the study, it is important to note that there is a scarcity of tools that can be used to identify evidence-driven hospital managers. Additionally, taking the perspective of 'other' managers may have been beneficial in controlling for self-report bias. Future research can focus on developing assessment methods to evaluate current managers on their level of EBMgt competencies and to direct the design of EBMgt development programmes.

Second, the competency model developed in the current study was based on managers working in

hospital settings in Lebanon. This context might have influenced the competencies identified and defined (Campion *et al.*, 2011). To illustrate, building relationships as a KSAO seems core to the work of healthcare managers generally; it might be even more central in Lebanon given the lack of updated census and norms (Hamdan, 2014). In such cases, managers noted the necessity of building professional relationships with key players in the field to gain access to information. Despite this limitation, the depth of the data led to the identification of competencies which overlapped with the literature, as well as others unique to the current model. Additionally, the fact that the data was collected from 11 hospitals provided a variety of perspectives that takes into account multiple organizational contexts.

Third, several healthcare management competencies from the literature, such as negotiation skills and professionalism, were not identified in the proposed model (Calhoun *et al.*, 2008; Garman *et al.*, 2004; Liang and Howard, 2010; Liang *et al.*, 2013; McCarthy and Fitzpatrick, 2009; Stefl and Bontempo, 2008). More research is needed to elucidate whether these are general managerial competencies and, as such, not core to EBMgt practice or whether their lack of identification is a function of the current study context.

Conclusion

In the current study, we set out to identify the foundation and functional competencies necessary for EBMgt practice and develop an empirically based competency model for evidence-driven managers in hospital settings. We developed the EBMgt competency model, which included a conglomerate of 13 different KSAOs grouped into four dimensions; the first attempt to empirically delineate the competencies necessary for EBMgt practice in a hospital setting. Taking the Rousseau and Gunia (2016) conceptualization as our theoretical framework, and building on it, we empirically identified the EBMgt competencies that fall under their foundational and functional conceptualization, depending on their contribution to EBMgt practice. We also situated these competencies within the overall literature on managerial competencies by grouping the competencies under four dimensions that represent a widely used approach to classifying managerial skills. We also built on

their framework by arguing that the model could be considered dynamic, whereby the foundational competencies form the basis for the development of functional competencies within and across the dimensions. The value of the proposed model lies in its contribution to understanding the specific competencies necessary for the practice of core EBMgt activities. Its value also lies in that it can serve as a blueprint, to develop training initiatives for healthcare managers. While this study was conducted in a healthcare setting, its implications extend to general management, considering the exponential growth in data that has been witnessed across all industries.

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