A Framework for Performance Management of Clinical Practice

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Abstract: In this paper, we present a framework for performance management of clinical practice. The framework defines a performance management participation model, which identifies the processes that need to be managed at the micro, meso, and macro levels for a clinical practice, and which identifies the key actors and tasks relevant to performance management. It defines a performance measurement model, which maps goals and indicators to the performance management participation model. In addition, it includes a methodology for implementation and evaluation of tools that can be integrated into care processes to support the data collection and report notification tasks identified in the performance management participation model. We revisit the case study of implementing a resident practice profile app, in light of the proposed framework, to support performance management of a family health practice. We demonstrate how the framework is useful for explaining why the use of the app was abandoned after two years of its introduction and, therefore, how the framework is an improvement to our previous methodology for development of performance management apps for clinical practice.

1 INTRODUCTION

Performance management frameworks are implemented in healthcare organizations in response to an increasing need for accountability and transparency and to stimulate improvements in quality of care (Marshall et al., 2018). Adoption of performance management in the healthcare industry is slower compared to other industries (Crema and Verbano, 2013). One key reason for this is the complexity of the healthcare system compared to other domains. Healthcare delivery encompasses multiple stakeholder groups (patients, families, health plans, practitioners, communities, regulators, etc.) and actors (Voelker et al., 2001; Lipsitz, 2012). Synchronization of data, people, processes, and technology is needed to achieve seamless integration in support of performance management across patient and healthcare providers routines (Avison and Young, 2007; Benson, 2012).

We propose a performance management framework for clinical practice that provides:

a. A performance management participation model, which identifies the processes that need to be managed at the micro, meso, and macro levels for a clinical practice, and which identifies the key actors and tasks relevant to performance management.

b. A performance measurement model which maps goals and indicators to the performance management participation model.

c. A methodology for implementation and evaluation of tools that can be integrated into care processes to support the data collection and report notification tasks identified in the performance management participation model.

The motivation for this framework, grew out of previous work to create a development methodology for performance monitoring apps (Mata et al., 2015). The methodology was successful for quickly developing user-friendly apps for collecting and reporting on performance monitoring data. However, organizational adoption was limited because it did not provide a broad enough perspective on the context in which the apps would be used as part of a complete performance management system for an entire clinical practice. We define a clinical practice as a collection of processes that, together, support a particular type of healthcare for a particular

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community of patients. This work focuses on our main research question of how to effectively and efficiently guide the implementation and adoption of performance management systems for a clinical practice, considering the complexity of healthcare systems. We revisit a case study of implementing a resident practice profile app to support performance management of a family health practice in order to demonstrate the usefulness of our proposed performance management framework.

2 BACKGROUND

Performance management involves systematic planning, execution, monitoring and evaluation of goals in order to improve business effectiveness (Dresner, 2008).

(Marshall et al., 2018) review implementations of healthcare quality report cards (also called report cards or, performance cards) in the United States and United Kingdom. Their work shows that although reporting is perceived as a key factor for improving accountability and quality in the health care system, often there are challenges in engaging the stakeholders on these initiatives.

The Sunnybrook Hospital in Ontario, published its Balance Scorecard & Patient Safety Indicators in June 2018, with the goal to increase transparency for the community (Sunnybrook, 2018). The Balanced Scorecard includes the dimensions: quality of patient care, research and education, and sustainability and accountability. Despite the complexity of implementing performance management systems like Balanced Scorecard in healthcare organizations, research shows some progress in this area. Achieving a successful implementation of it requires communication, commitment and, support from all stakeholders and at all the different organizational levels (Voelker et al., 2001).

While information technology is critical for performance management in healthcare, interoperability is an ongoing challenge for healthcare information systems (HIS) (Kuziemsky and Peyton, 2016). However, HIS to support performance management must go beyond a single technological solution. The complexity of healthcare system means a single vendor cannot have the best solution for all functions, even within a single hospital (Gaynor et al., 2014).

There are different types of interoperability and these can be grouped, at a high level, into three main categories: technical, semantic and processes interoperability (Benson, 2012).

Technical interoperability is defined as the ability to move data from system A to system B regardless of the meaning of what is being exchanged (Benson, 2012). Technical interoperability is achieved through mHealth and eEhealth. “mHealth” is defined as the use of mobile technologies in the healthcare industry to support public and clinical care (Kahn et al., 2010), while “eHealth” involves the use of any type of electronic devices, e.g desktops, in the provision of health care (Dicianno et al., 2015).

Semantic interoperability is defined as the ability of sender and receiver to understand data without ambiguity. It refers to the ability of two computer systems to be able to interpret and understand data that is exchanged (Benson, 2012). Standards developed to support semantic interoperability include HL7 and terminology models such as Systematic Nomenclature of Medicine-Clinical Terms (SNOMED-CT) and Logical Observation Identifiers Names and Codes (LOINC) (Dixon et al., 2014).

Process interoperability refers to the coordination of business and work processes and common understanding between human beings across a network (Benson, 2012). The latter includes one of the key dimensions in healthcare delivery - the interpersonal nature of care delivery (Avison and Young, 2007). Encounters between care providers and patients (e.g doctors and patients, patient and nurses, patient and therapists, nurses and doctors) to discuss diagnosis, treatment options, treatment progress, etc. is an important dimension to consider in healthcare interoperability; however, the process interoperability is often forgotten when designing systems to support healthcare delivery.

Clinical performance management can be approached in two ways. First, performance can be seen as the outcome of a process. An example of performance monitoring in this case would be monitoring mortality rates. Second, clinical performance can be seen at the process level, which in the end, impacts outcome (Goddard et al., 2002). An example of performance monitoring of a clinical process would be monitoring a patient from diagnosis to end of treatment to gain insights of patient status and progress against goals. Performance monitoring of clinical process can facilitate timely actions during the treatment of the condition.

Information, process and personnel issues can contribute to gaps in data support for decision-related processes in Canadian Healthcare organization (Foshay and Kuziemsky, 2014). To

address these issues organizations should employ a process framework to define information needs when implementing performance management systems. Further, the impact of data on clinical practice needs to be analysed in different user contexts (Kuziemsky et al., 2014). A process framework should distinguish between the micro level (direct patient care), the meso level (management and evaluation of care providers), and the macro level (public health and regulatory processes).

3 FRAMEWORK

In this section we describe the components of our proposed framework for performance management of a clinical practice (Figure 1). Research methods used for the development of the framework include: 1) literature review 2) Gap analysis of existing frameworks (Perlin et al., 2004; Parsons et al., 2012; Voelker et al., 2001; Sullivan et al., 201; Potter et al. 2011) 3) Use of Design Science Method (Peffers et al., 2007) for defining, designing, and building the conceptual framework. The developed framework is comprised of a performance management participation model, a performance measurement model, and a methodology for implementation and evaluation of supporting tools.

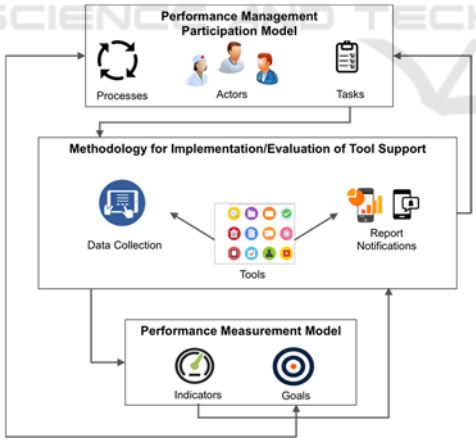

Figure 1: Framework for Performance Management of Clinical Practice.

In the 'Performance Management Participation Model' we identify which tasks are performed by which actors in the context of a process, and then model processes that need to be monitored for performance management. This is done at a conceptual level and includes identifying the actors, tasks and task types for each process. The participation model is intended to facilitate discussion among stakeholders and achievement of a common vision of the process in terms of performance management. The 'Performance Measurement Model' is used to define which goals and indicators will be used for performance management of each process, based on what report notifications the actors need and for which processes the reports are needed. Relationships between the 'Performance Management Participation Model' and the 'Performance Measurement Model' imply iterative cycles for the development of conceptual models - mapping processes to goals, tasks to data collection, data collection to indicators, indicators to report notifications and report notifications to tasks.

Finally, tools used to implement performance management of a clinical practice are identified and mapped to data collection and report notification tasks that use the tools to populate the performance management model. Relationships are defined for the processes at all organizational levels to ensure all actors receive the appropriate information to perform their tasks. Once data needs are clear (from collecting and reporting), the next step in the framework is a systematic approach to implementing and evaluating tools that support the set of tasks defined in the performance management participation model. We update and integrate a methodology for development of performance monitoring apps (Mata et al., 2015).

4 CASE STUDY OF A RESIDENT PRACTICE PROFILE FOR FAMILY HEALTH

Resident Practice Profile (RPP) is a tool for tracking patient encounters seen by medical residents in Family Health, to ensure they gain competency across a broad range of family health diagnoses, and a diverse range of patients (based on age, gender, and social circumstance). Residents log data for patient encounters and the data is used to show residents where residents are spending their time. RPP was successfully developed as a user-friendly app using a development methodology for performance monitoring apps (Mata et al., 2015). However, two years after its introduction, it was no longer used by the organization.

In this case study, we take a broader view of performance management for the clinical practice as a whole in order to understand why RPP did not succeed. Since RPP was developed previous to the

proposed framework, we evaluate the app, using the framework, to demonstrate how the framework can be used to validate any existing tool within a performance management system and how the framework is an improvement to our previous methodology (Mata et al., 2015) for development of performance management apps for clinical practice. In the following sections, based on our framework, we evaluate the use of RPP to support performance management of medical residents in a family health practice.

4.1 Evaluation of RPP using the Framework

4.1.1 Participation Model

In this section, we identify processes, actors, tasks and task types relevant for performance management of medical residents in a family health practice. Figure 2 depicts actors, and processes for performance management of residents at the different organizational levels (macro, meso, and micro).

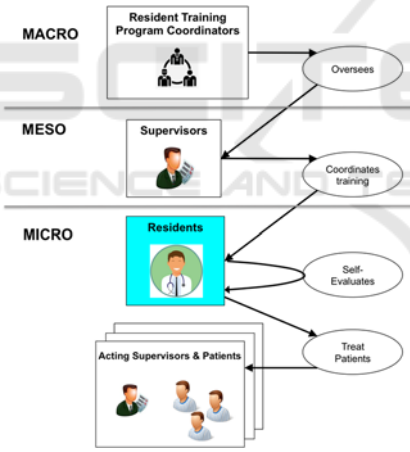

Figure 2: Performance management of training of family medicine residents – Actors and processes.

At the macro level, Residents Training Program Coordinators oversee supervisors who coordinate training for the family health practice. They must ensure the program adheres to guidelines specified by The College of Family Physicians of Canada.

At the meso level, supervisors coordinate training tasks, assigning residents to various clinical settings and providing feedback on training to ensure residents are exposed to a variety of clinical conditions and demographics that lead to successful attainment of required competencies outlined in the program curriculum.

At the micro level, residents work under the supervision of acting supervisors at each clinical location. Residents are responsible for keeping a log of conditions seen during practice in order to demonstrate their competence in all program requirements - clinical domains and demographic groups (Chamney et al., 2014). Residents are also responsible for sharing logs with their supervisors and flagging visits they want to discuss with their supervisors to receive feedback and develop a learning plan, if need be. Also, they are responsible for proactively identifying and completing self-learning opportunities. Supervisors use the information provided by residents for guiding training and correcting any deficiencies in practice, e.g. assignment of residents to specific locations where they can see more cases of a given clinical condition, creating a learning plan, etc.

Table 1: RPP Performance Management Participation Model.

	Actors	Process	Task Type/Task	Tool
Micro	Residents	Treat Patients	Data Collection: Log every patient visit	RPP
			Data Collection: Record selected Patient field note	Field Note
		Self-Evaluate	Report Notification: Self-Evaluation with RPP reports	RPP
Meso	Supervisors	Coordinates Training	Data Collection: Log Direct observation/Complete examination/procedure or delivery observed	Field Note
			Report Notification: Review RPP Reports	**RPP**
			Report Notification: Review Field Note	Field Note
			Report Notification: Provide Feedback	Field Note
			Data Collection: Assess level of competency	Field Note
Macro	Program Coordinators	Oversees	Report Notification: Review compliance of training program against standards	Field Note

In Table 1 we summarize processes, actors, tasks, task types and tools by organizational levels for RPP. Actors, tasks and task types shaded in grey represent those that are not supported by the implementation of RPP. Tasks in bold indicate those that should have been supported by RPP when it was implemented, but were not. The RPP app was designed to be used by residents. As such, it was

Table 2: RPP Performance Management Participation/Measurement Model.

	Actors	Process	Goals	Indicators	Task
Micro	Residents	Treat Patients	Ensure full competency across clinical domains and population types	Total Visits	Log every patient visit
				Completed field notes and sent to supervisors	Record selected patient field note
		Self-Evaluates	Close gaps in learning	Total visits flagged for self-learning activities	Self-Evaluation with RPP reports
Meso	Supervisors	Coordinates Training	Ensure graduated residents is fully competent	**Total visits**	**Reviews RPP reports**
				Field Notes completed	Review Field Note
				Field Notes completed	Provide feedback
				Field notes signed off	Assess level of competency
				Total direct observations	Assess level of competency
				Level of competency achieved	Asses level of competency
Macro	Program Coordinators	Oversees	Ensure compliance of program to standards	**Total visits**	**Review compliance of training program against standards**
				Average success rate: field notes signed off/total field notes	Review compliance of training program against standards

good for self-evaluation. However, the data was also relevant to the supervisors of the residents. In the original case study, it was assumed that supervisors would review with the resident what patients they were seeing, but procedures were not put in place to do ensure this was done, nor was there any mechanism for notifying and providing supervisors with RPP reports relevant to a resident they were supervising.

4.1.2 Measurement Model

The next component of the proposed framework involves the development of a performance measurement model. This includes definition of goals to gauge progress and indicators for report notifications. Table 2 summarizes the performance measurement model for RPP. Goals and indicators are grouped by organizational level. Goals and indicators shaded in grey represent those that are not supported by the implementation of RPP. Goals and indicators in bold indicate those that should have been supported by RPP when it was implemented, but were not.

The most important aspect of the performance measurement model in this case study is the clinical practice as it relates to the training of medical residents. The main questions to answer are; which goals we need to measure, what report notifications are needed for supporting and monitoring these goals, which tasks are needed to collect data, and, therefore, what data model (dimensions and indicators) needs to be implemented.

With respect to the RPP tool, the main indicators supported were total visits and total visits flagged for self-learning activities. This included the ability to analyse based on the age, gender and social circumstances of patients. RPP was designed to support actors, tasks, and goals at the micro level. However, as is clear in Table 2, for effective integration into a system of performance management, RPP also needed to provide support for actors at the meso and even the macro level. Because RPP was not integrated at this level, its use was not reinforced by supervisors. Therefore, there was less interest from residents, and it was eventually phased out of use in the family health practice.

4.1.3 Methodology

The original methodology was intended for development of a stand-alone app for performance monitoring. We have updated the methodology, to integrate it into a framework for performance management across an entire clinical practice, with the focus on the implementation and evaluation of a set of tools to support data collection and reporting tasks at all organizational levels (micro, meso, macro).

Figure 3 shows the updated methodology, with changes highlighted in Bold. This included defining clearly who needed to not only use the app for data collection, but also who needed to see reports created from the data collected. Adoption criteria were extended beyond ease of use, to also include an understanding of the full context for performance management in which the app would be used.

New components highlighted in red were also added to the methodology. This included selecting which tools were available and could be used, and carefully mapping all tasks (both data collection and report notification) that needed to be supported by the tool. The new methodology provides better gui-

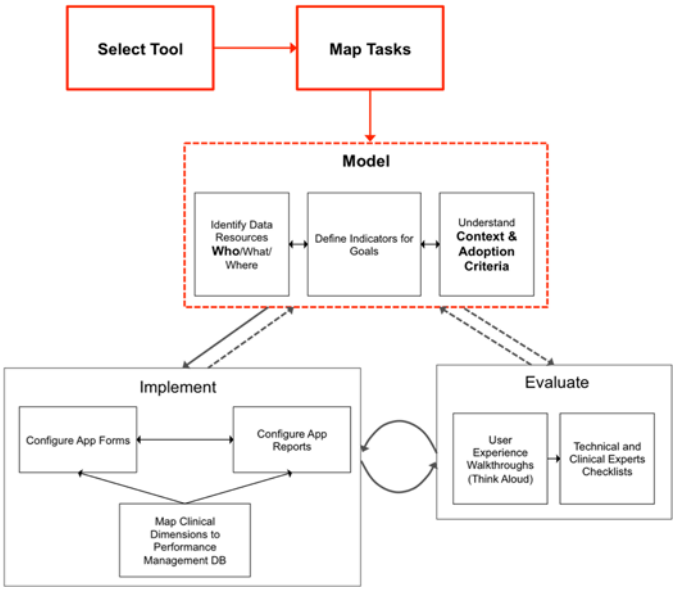

Figure 3: Updated Methodology for Implementation and Evaluation of Tool Support.

dance for understanding who uses the data (actors that receive report notifications), the context in which data is used, and what drives adoption criteria.

4.1.4 Results

After analysing the design of RPP in light of the framework, we identified that the main focus for the development of RPP was on monitoring the process at the micro level by providing residents with a supporting tool for guiding self-learning activities. RPP was also useful for providing residents and program coordinators information about number of clinical conditions seen by demographic groups as well as procedures performed. However, the tool was not used to support supervisors in their task of providing feedback to residents, designing a plan to correct any deficiencies identified during training or completing a formal evaluation of training.

We can say that with our framework, a more complete view of RPP is given within the context of supporting performance management of the family health practice across all levels (micro, meso, and macro). In the original case study, RPP was implemented and adopted with some success at the resident level (micro). Residents found RPP reports useful for self-assessment and for guiding self-learning activities.However, the performance management participation model clearly highlights the need to provide RPP reports to supervisors for the tasks of providing feedback to residents or creating learning plans to address identified gaps in practice. Report notifications were not implemented and review of reports was exclusively driven by the self- motivation of participants of the study.

The performance measurement model also clearly indicates that total visits, especially as broken down to support training related to diversity of patients (age, gender, social circumstance) is relevant to coordinators at the macro level.

Finally, the updates to the methodology for implementing and evaluating tools would have more clearly established the adoption criteria for evaluating tools in the context of selecting what tools would be mapped to what tasks for the overall success of performance management in the family health practice.

This is the essential factor that explains why RPP was abandoned even though it was an easy-to-use app. The fact that the app complied with user requirements at the individual level (micro level) was not a sufficient condition to drive adoption of RPP as a tool for supporting key actors and tasks relevant to performance management at the meso and macro levels. The adoption of RPP at the micro level was exclusively driven by the motivational aspect of residents who saw value in using the app for self-assessment of their practice and for guiding self-learning activities.

The use case provides evidence on the importance to approach performance management from a broad enough organizational perspective and within the context in which the apps would be used, in order to address information needs of stakeholders and ensure adoption of the proposed system. Results

of the case study will be used to cross-validate the usefulness of the framework with clinical experts, other researchers and for different clinical practices.

5 CONCLUSIONS

In this paper we demonstrate the importance of having a clear understanding of areas that need to be addressed for effective implementation of tools and apps that support performance management of a clinical practice. The findings we presented here suggest that defining processes, actors, and performance management tasks across all organizational levels (micro, meso, and macro) are key to ensure adoption of performance management systems for a clinical practice. Our framework provides a systematic approach to gain consensus about who needs to manage performance, what needs to be monitored, how performance will be reported to key actors, and how to evaluate tools to systematically support performance management of a clinical practice.

One limitation of this work is that we used our framework to retrospectively evaluate the deployment of one stand-alone app. Although it let us highlight missing areas for deployment of the app and why the app was only adopted, with some success, at the micro level, more research needs to be done to confirm the framework can also be used for guiding the design and implementation of a performance management system for an entire clinical practice.

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