Information management practices in public tertiary health-care facilities: an empirical investigation from the state of Kuwait

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Abstract

Purpose – This paper aims to gain insights about information management practices in public health-care organizations in Kuwait and offer recommendations to improve these practices.

Design/methodology/approach – This study involves secondary analysis of quantitative and qualitative accreditation-related data pertaining to the compliance with the Information Management standard at seven public tertiary health-care facilities over two accreditation cycles.

Findings – Overall, organizations improved their compliance with the Information Management standard. However, issues exist with effectively and efficiently transmitting data, aggregating clinical and administrative data and using the information for both strategic planning and quality improvement initiatives.

Research limitations/implications – The analysed data set does not provide information about the improvements done between the accreditation cycles. Caution should be applied before assuming generalizability of the results, considering the context and social constructs around the health-care system is essential.

Practical implications – Compliance with predetermined criteria through accreditation can improve information management practices. Without proper management of information at health-care facilities, achieving safe and effective patient care is futile. The role of health information technology (IT) should not be sidelined; robust health IT solutions can help support good information management practices thereby improving care quality and aiding health-care reform.

Originality/value – Concerning information management, health-care organizations providing focused services have clear advantages over organizations providing general care services. Considering the type of care organization (general vs specialized) can provide insights into how information management practices can affect the operations of the organization.

Keywords Kuwait, Health care, Information management, Records management, Governance, Hospital

Paper type Research paper

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Introduction

The rising burden of chronic non-communicable diseases (NCDs) is straining the ability of health-care systems globally, including countries with high per-capita GDP, to sustain performance as well as deliver effective and efficient services (Mokdad *et al.*, 2014; Tordrup *et al.*, 2013). Similar to many developed countries with an affluent population, the demand for health-care services in the State of Kuwait has been rising as its population continues to grow older (Younis *et al.*, 2015). Additionally, the sedentary lifestyle and high-calorie diet in the post-oil era have negatively impacted the population's health (Allafi *et al.*, 2014) evident by the widespread of hypertension (Channanath *et al.*, 2015), cardiovascular diseases (Alarouj *et al.*, 2013) and diabetes (Shaltout *et al.*, 2017).

Therefore, health-care reform efforts targeting higher quality of care, improved health outcomes and reduced costs become a top priority for health-care leaders (Berwick *et al.*, 2008). The effective adoption of health information technologies (IT), such as electronic health records (EHRs), becomes important for improved care coordination among health-care providers (Buntin *et al.*, 2010; Williams *et al.*, 2017). While adopting health IT can support health-care reform efforts; it is not the silver-bullet solution. Merely implementing EHRs does not mean that the information in patients' records are sufficient for safe and effective health-care practice (Weiskopf *et al.*, 2013).

Appropriate management of information and records is critical for safe and effective health-care delivery (Marutha and Ngoepe, 2018). The health IT environment is constantly changing, at lightning speeds, and is only expected to accelerate with a tsunami of data (Fenton *et al.*, 2017). The mountains of health data are growing at astronomical rates; 153 exabytes (one exabyte = one billion gigabytes) produced back in 2013 and an estimate of 2,314 exabytes will be produced by 2020 (Stanford University, School of Medicine, 2017). Today's integrated patient-centred health care requires linked data with valid coding for appropriate billing and funding; standards for documentation, including nomenclatures, are necessary to enable EHRs to retrieve and analyse data while supporting decision-making processes for health-care staff (Hoyle, 2019).

Studies highlight limitations related to data captured by health IT solutions, including incompleteness and miscoding (Wright *et al.*, 2015). Inadequate management of health information can have dire consequences that not only hinder health-care reform but also threaten patients' safety. Adequately managing health information is an imperative prerequisite for the effective adoption of health IT.

Currently, there is a scarcity of published evidence about the pressing challenges concerning information management practices in Kuwait's public tertiary care organizations. This empirical research aims to address this gap by uncovering the status-quo of information management practices in public health-care organizations that provide tertiary care services. We also compare the information management practices with organizations offering secondary care services. This research builds on previously published work focusing on information management practices in public health-care facilities in the State of Kuwait. Previous research has focused on secondary care facilities (Alhuwail, 2019), while the focus of the current article is on tertiary health-care organizations that provide highly specialized and more focused care services.

In this paper, we define information management practices as the activities concerned with the management of health-care data and information resources to improve the quality of information for decision-making (LaTour *et al.*, 2006). Due to the uptake of health IT tools and systems, adoption by many health-care organizations, health information management professionals are no longer confined to the "records room"; health information management professionals are more involved today in the digital health-care environment. The primary

focus of this study is on information management practices; however, discussing the digitization of these practices is inescapable due to the uptake of health IT systems by many health-care organizations.

Background

In Kuwait, nearly three-quarters of health-care services are provisioned by the Ministry of Health (MoH) (Ministry of Health, 2015). This public health-care system is organized into three levels of care with increasing specialization of services provided: primary, secondary and tertiary (Katoue *et al.*, 2014). In each of the six health regions in Kuwait, primary care centres, or local general practice care, are the first point of contact for patients within the health-care system when encountering any health issues. If required, primary care centres refer patients to the secondary level general hospital in the health region. If necessary, clinicians can also refer patients to more specialized tertiary level care health-care organizations, including hospitals and centres.

In attempts to better manage information and to keep up with the pace of the rapidly advancing developments in technology, MoH has made significant investments in health IT solutions since the early 2000s (Weber *et al.*, 2017). These health IT solutions include EHRs at primary health-care centres and hospitals, as well as Picture Archiving and Communication Systems (Alhuwail *et al.*, 2018; Al-Jafar, 2013). However, the adoption rates and maturity of these solutions vary greatly among health-care facilities. MoH continues its journey of sharing the relevant patient information across the three care levels; however, the progress remains far from complete. To date, all primary care centres use a unified EHR. However, some secondary and tertiary care hospitals and centres still use antiquated paper filing systems.

Reaching certain maturity milestones established by globally recognized standards can increase the impact of information management on health-care delivery. Accreditation activities can facilitate such improvements (Devkaran and O'Farrell, 2015). The Quality and Accreditation Directorate (QAD) at MoH instituted the National Accreditation Program for Hospitals (NAPH) to improve care quality and enhance patient safety via creating, implementing, monitoring and evaluating programs and standards across all sectors of MoH. The NAPH provides a program for hospitals to assess, monitor and improve their performance on an ongoing basis. The program is composed of 12 standards covering a wide range of functions which cover the following: Diagnostic Imaging Services, Emergency Services, Environment, Human Resources, Information Management, Laboratory Services, Leadership, Medical Care, Pharmacy Services, Specialized/Intensive Care, Surgical Care, as well as Obstetrics and Gynaecology Services.

Despite the current debate in the literature about the benefits of accreditation, many health-care organizations and systems around the world are engaged in accreditation activities (Lam *et al.*, 2018). We acknowledge that complying with accreditation standards cannot guarantee the attainment of superior quality; however, it establishes a baseline of minimum expectations. Therefore, in this research, we focus on the benefits of compliance with the standards as a result of accreditation and not necessarily the benefits or value of accreditation itself.

Methods

Data set

This study uses a secondary analysis of anonymized accreditation-related data about information management practices in public tertiary health-care organizations in Kuwait. The data was originally collected by the QAD at MoH for operational and quality

Table 1. Criteria of the information management standard considered in this study

Criterion no.	Label	Criterion description*
1.0	*Information management plan*	Management develops and implements an information management plan to meet the information needs of all hospital services
2.0	*Technology selection*	Appropriate clinical, managerial, and information technology staff participate on behalf of the hospital in selecting, integrating, and using information management technology
3.0	*Privacy and security*	There are processes to ensure the security and confidentiality of data and information
4.0	*Information transfer*	There are processes for effectively and efficiently transmitting data
5.0	*Aggregating information*	There are processes for aggregating clinical and administrative data
6.0	*Analytics for decision-making*	Management uses the information to make decisions, strategically plan and identify and prioritize quality improvement initiatives
7.0	*Information exchange*	The hospital contributes to external databases in accordance with laws or regulations
8.0	*Access to the internet*	There is internet access for staff to obtain information which supports safe patient care
9.0	*Quality and safety performance indicators*	Indicators of performance for quality and safety are identified for information management and are monitored as part of the quality improvement and safety activities

Note: *Descriptions are extracted from the Information Management Standard provided by QAD at MoH

improvement purposes. Prior to obtaining the data, the necessary ethical approvals were obtained. The data set contains numerical self-assessment scores and surveyors' scores in addition to the surveyors' comments over nine criteria as illustrated in Table 1. Overall, the data set covers two accreditation cycles with the first cycle taking place in 2012–2013 and second cycle taking place in 2016–2017.

Accreditation process

Initially, the QAD encouraged hospitals to begin the accreditation process by completing a self-assessment survey evaluating their compliance with the set by the national standards on a predetermined five-point scale ranging from "no compliance" to "substantial compliance". After the self-assessment is completed, a team of surveyors comprised MoH experts conducts an on-site survey. The on-site surveys serve as a means of external peer-review that validates the hospitals' self-assessment scores. The onsite-survey entail interviewing hospital staff, reviewing all relevant documentation, facilitating various focus group sessions and finally completing the survey report. After the onsite-survey, a final report outlining actions and recommendations is issued, and the organization is encouraged to follow-up and make ongoing improvements to their services.

Participants

The data set provides information about 7 out of 13 of the health-care organizations that provide tertiary care. These organizations provide specialized care services targeting specific body systems or diseases. The included organizations ranged in size: small organizations ($n = 2$) had less than 100,000 outpatient visits; medium organizations ($n = 3$) had between 100,000 and 200,000 outpatient visits; and large organizations ($n = 2$) had more than 200,000 visits. Given the small population size and to protect the identity of the

participating organizations as required by the data set owners, no further demographic information can be provided.

Analysis

The convergent-design mixed methods approach is used for the secondary analysis of the anonymized accreditation-related data to gain a comprehensive contextual understanding of the information management practices through integrative collection and analysis of both quantitative and qualitative data at similar times (Bazeley, 2012; Guetterman *et al.*, 2015). Basic descriptive analysis was performed on the numerical surveyor-reported scores across the two accreditation cycles, and for each criterion along with its sub-parts. The surveyor scores are considered because the scores represent an evaluation by external experts and are based on evidence supplied by the organization. While overall there is a high level of agreement between the self-reported scores and surveyor-reported scores, investigating the surveyor scores is more reliable, as scores are evidence-based as explained earlier. Additionally, to investigate any associations between the provided demographic factors and the scores, we ran the Pearson's Chi-squared test. The qualitative data formed by the surveyors' comments are analysed using the Framework method (Gale *et al.*, 2013). The analysis of the qualitative data was iterative, and the data were sorted, summarized and synthesized in key themes according to the criteria in the Information Management standard.

Results

Overview

Overall, health-care organizations made progress in compliance with the Information Management standard. Pearson's Chi-squared test yielded a p-value of 1.00 ($\chi^2 = 0.50428$, df = 16), hence indicating no significant differences in relation to organization demographics and scores obtained. Notably, the analysis does not reveal any interesting patterns according to the organization's size or the types of services it provides. For an overview of the improvement rates in compliance over the two-accreditation cycles (Table 2). We graphically illustrate the rate of change in each of the criteria across the accreditation cycles in Figure 1.

Substantial improvements

Criteria 8.0 and 9.0 are the most to witness big improvements over the two accreditation cycles. These criteria are concerned with accessibility to the Internet and the identification of indicators of performance for quality and safety, respectively. Notably, the results from the most recent accreditation cycle indicate "partial" and "substantial" compliance with all criteria (range: 3.29–4.00). Particularly for criterion 7.0 related to contributing data to external databases for statistical and public health purposes, all organizations achieved "substantial" compliance.

Below we discuss each criterion in the data set and use *H* to refer to a health organization followed by an anonymized number referring to the specific organization. *S* refers to a representative quote by the surveyor team followed by an anonymized number referring to a particular team.

Health information plan

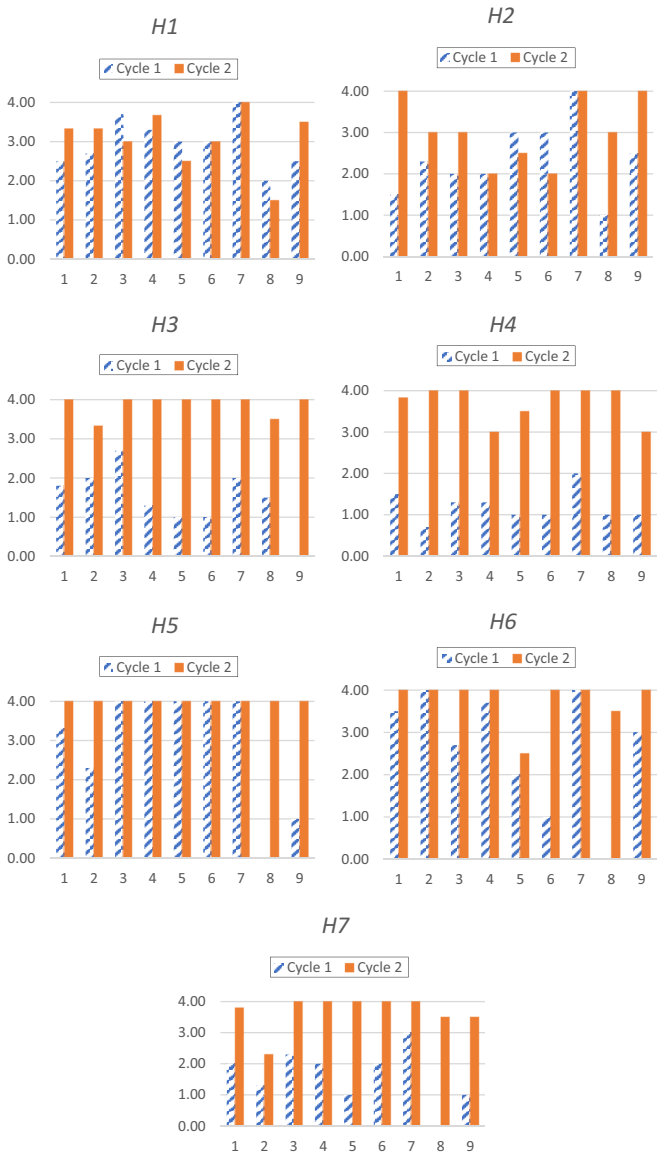
All organizations have made significant improvements in developing and establishing an information management plan for their organization. Initially, only 2/7 (*H5* and *H6*) organizations had high-levels of compliance with this standard, while the remaining five

Criterion	H1	H2	H3	H4	H5	H6	H7	Average
(1) Info. Mgmt. Plan								
Cycle 1	2.50	1.50	1.80	1.50	3.30	3.50	2.00	2.30
Cycle 2	3.33	4.00	4.00	3.83	4.00	4.00	3.80	3.85
% Δ*	16.60	50.00	44.00	46.60	14.00	10.00	36.00	31.00%
(2) Tech. selection								
Cycle 1	2.70	2.30	2.00	0.70	2.30	4.00	1.30	2.19
Cycle 2	3.33	3.00	3.33	4.00	4.00	4.00	2.30	3.42
% Δ*	12.60	14.00	26.60	66.00	34.00	0.00	20.00	24.70%
(3) Privacy and security								
Cycle 1	3.70	2.00	2.70	1.30	4.00	2.70	2.30	2.67
Cycle 2	3.00	3.00	4.00	4.00	4.00	4.00	4.00	3.71
% Δ*	−14.00	20.00	26.00	54.00	0.00	26.00	34.00	20.90%
(4) Info. transfer								
Cycle 1	3.30	2.00	1.30	1.30	4.00	3.70	2.00	2.51
Cycle 2	3.67	2.00	4.00	3.00	4.00	4.00	4.00	3.52
% Δ*	7.40	0.00	54.00	34.00	0.00	6.00	40.00	20.20%
(5) Aggregating info.								
Cycle 1	3.00	3.00	1.00	1.00	4.00	2.00	1.00	2.14
Cycle 2	2.50	2.50	4.00	3.50	4.00	2.50	4.00	3.29
% Δ*	−10.00	−10.00	60.00	50.00	0.00	40.00	60.00	22.90%
(6) Analytics								
Cycle 1	3.00	3.00	1.00	1.00	4.00	1.00	2.00	2.14
Cycle 2	3.00	2.00	4.00	4.00	4.00	4.00	4.00	3.57
% Δ*	0.00	−20.00	60.00	60.00	0.00	60.00	40.00	28.60%
(7) Info. exchange								
Cycle 1	4.00	4.00	2.00	2.00	4.00	4.00	3.00	3.29
Cycle 2	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
% Δ*	0.00	0.00	40.00	40.00	0.00	0.00	20.00	14.30%
(8) Internet access								
Cycle 1	2.00	1.00	1.50	1.00	NA	0.00	0.00	0.92
Cycle 2	1.50	3.00	3.50	4.00	4.00	3.50	3.50	3.29
% Δ*	−10.00	40.00	40.00	60.00	NA	70.00	70.00	47.40%
(9) Quality indicators								
Cycle 1	2.50	2.50	0.00	1.00	1.00	3.00	1.00	1.57
Cycle 2	3.50	4.00	4.00	3.00	4.00	4.00	3.50	3.71
% Δ*	20.00	30.00	80.00	40.00	60.00	20.00	50.00	42.90%
Mean Score – Cycle 2	3.09	3.06	3.87	3.70	4.00	3.78	3.68	3.60
Min Score – Cycle 2	1.50	2.00	3.33	3.00	4.00	2.50	2.30	3.29
Max Score – Cycle 2	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00

Note: * The delta reflects the change between the evaluation cycles based on a five-point scale

Table 2. Compliance rates with information management criteria for each organization between accreditation cycles

organizations ranged in compliance from "low partial" compliance (1–25%; score of 1.50) to "medium" compliance (25–50%; score of 2.50). Some surveyors warn that "the plan lacks definition of data, information, security, confidentiality and integrity. As well as a description of how these functions will be carried out. Adverse events are not addressed" (S1).



Note: H refers to an anonymized organization's number

Figure 1. Column chart illustrating each organizations' progress in complying with Information Management standard criteria across the two accreditation cycles

Information technology selection

Almost all organizations improved their compliance with having the appropriate staff participating on behalf of the organization in selecting, integrating, and using health IT systems and solutions. Only one organization, *H7*, remains at "medium partial" compliance (25–50%; score of 2.30). The remaining organizations achieved high compliance scores

ranging from 3.33 all the way to 4.00. In some organizations, the adoption of health IT systems is low; "there is limited information technology in the hospital" (S7). One shortcoming surveyors' note about organizations using health IT solutions is that there are no clearly established criteria for selecting the appropriate solutions: "Some departments (laboratory and diagnostic imaging) use information technology; however, there are no established criteria for the selection" (S3).

Privacy and security

Six out of the seven organizations perform exceptionally well with the grand majority achieving "substantial" compliance. Only one organization, *H1*, declined with respect to compliance with this criterion (from 3.70 to 3.00). The surveyors attribute this to the lack of preventative measures to protect paper records from physical damage: "prevention of physical damage (such as fire) is lacking and should be addressed urgently" (S1). Another surveyor team notes that "there are concerns regarding confidentiality and security of the patient during trancing patient records: unsecured, unlocked transportation of patient files/ patient handling their own records" (S4). Another issue discussed by the surveyors is the potential loss of the sole copy of the patient's paper file when it is carried by the patient or their caregiver: "it is strongly recommended that patients not have access to their own medical records. The Surveyors witnessed patients carrying their own medical records" (S2). The team suggests that "electronic information technology should be incorporated into the service with planned security, and backup systems" (S2).

Information transfer

Four out of seven organizations achieved "substantial" compliance with this criterion. One organization, *H2*, has a "low partial" compliance score with the criterion related to having processes for effective and efficient data transmission. Two other organizations achieved "high partial" compliance (50–75%; scores 3.00 and 3.67). Information transfer issues still exist despite the adoption of some health IT systems: "even though [organization] acknowledges the importance of an electronic medical record, there is no evidence of integration of information technology between departments" (S4).

Information aggregation

Only three organizations achieved "substantial" compliance. Another three organizations achieved "medium partial" compliance (26–50%; scores of 2.50) and only one achieved "high partial" compliance. Notably, two organizations dropped in compliance (from 3.00 to 2.50). The surveyors highlight some issues that lead to declining scores including "statistical data not being utilized for hospital strategic planning" (S6). Surveyors suggest "to use aggregated data to support the functions" (S2).

Decision-making support

Five out of the seven organizations achieved "substantial" compliance with respect to management using the information to plan, make strategic decisions and prioritize quality improvement initiatives. One surveyor team notes that "there is significant evidence in place to support the analysis of information by management and towards quality assurance initiatives" (S5). On the other hand, one organization, *H1*, achieved a "high partial" compliance score (50–75%; score 3.00), while another organization, *H2*, declined to a "low partial" compliance score from 3.00 to 2.00. Surveyors attribute this decline to the lack of benchmarks with best practices: "there is no benchmarking against best practices" (S2).

Exchanging information

All organizations achieved "substantial" compliance with respect to contributing and reporting information to external databases for statistical and public health purposes. The surveyors noted that data from the organizations are sent to MoH as per the regulations in place; "Data are being provided by the [organization] to the ministry" (S3).

Internet accessibility

The compliance with this criterion varied among organizations. Only two organizations achieved "substantial" compliance with providing access to the World Wide Web. Another four organizations achieved "high partial" compliance (50–75%; score range 3.00 – 3.50). Only one organization declined from "medium partial" compliance to "low partial" compliance (1–25%; score 1.50). Surveyors note that "there limited access to Internet" (S1). In another organization, surveyors state that while "the guideline for Internet use are in place. However, no physical Internet in place" (S6). Surveyors also suggest to "develop, implement and monitor policy for on acceptable use of data and information sources" (S7).

Quality indicators

The majority of organizations achieved substantial compliance in identifying performance indicators for quality and safety in the information management plan. One team mentions that "there is evidence that the [organization] has developed and monitored indicators of performance regarding information management activities that are hospital-wide and service-based" (S2). Only three organizations achieved high partial compliance with scores ranging from 3.00 to 3.50.

Discussion

Principal findings

This is the first study to investigate the compliance rates of the NAPH Information Management standard at tertiary care facilities. Areas for improvement were highlighted for each health-care organization as a result of the accreditation process thereby assisting the quality improvement teams at each organization to improve their compliance with the standard. While the results show significant improvements in compliance with the standard, there is a need to investigate the quality of the information and not only the processes associated with its management. There has to be a deliberate effort to improve the quality of information being captured and showcase the importance of high-quality documentation.

Preserving the security and confidentiality of data and information is a primary concern for health-care organizations globally. With rising rates of adopting health IT solutions, cybersecurity has been a major topic of interest (Perakslis, 2014). While the evidence indicates that hospitals have improved their security practices, it is still concerning that some hospitals are still facing issues with unauthorized access to patients' physical records. Adopting EHRs with the appropriate privacy and security mechanisms in place can be an effective solution to address the limitations of securing physical files as indicated in the results of this study (Fernández-Alemán *et al.*, 2013). In this study, the surveyors recommended that patients not have access to their own medical records. While this may be interpreted as an anti-patient-centred approach, this stems from fears of losing the only copy of the patient's history.

Evidence in the literature denotes that the use of health IT systems can enable the health-care organization to become more effective and efficient in delivering care and improving patient experience (Buntin *et al.*, 2011; Lee, 2015). At present, and as illustrated via the results, the Information Management standard does not distinguish between organizations

that have adopted health IT solutions from those that have not. The standard does not specifically quantify the rate or amount of "digitization" at a particular health-care facility. This illustrates that the standard does not discriminate on the medium used for managing information and records (paper vs EHR), which in turn is useful because it allows standards to withstand the test of time. However, it can be useful to introduce separate standard measuring health IT adoption in the organization and examining its impact on the information and record management processes.

Involving the appropriate stakeholders is necessary because implementing health IT solutions is complex and encompasses "a complex web of inter-related social and technical issues situated within a wider organizational environment" (Cresswell and Sheikh, 2013). The evidence uncovered in this study indicates that tertiary care organizations in Kuwait do involve the appropriate staff participating on behalf of the organization in selecting, integrating and using health IT systems and solutions. Yet, there remains ample opportunities to actively involve all the stakeholders, including patients and their advocate groups, throughout the information management and health IT lifecycles on a national level.

Lastly, the results indicate notable improvements in access to the internet at the health-care facilities. This presents the organization with multiple opportunities to leverage this rich information resource. For example, clinicians can use the internet to search for relevant and most recent evidence-based articles that can help them better manage their clinical cases (Gartrell *et al.*, 2018). Clinicians can also leverage the Internet to enrich the patient-clinician interaction during the visit by presenting images or clips explaining complex medical conditions or procedures (Koya *et al.*, 2012).

Hospitals as service factories or shops

A recent study investigating information management practices in secondary care hospitals in Kuwait (Alhuwail, 2019) reports similar results: Secondary care hospitals made positive improvements overall in their compliance with the Information Management standard. However, the role and focus of tertiary care hospitals are different from secondary care hospitals. Considering the theory of "Swift, Even Flow" by Schmenner (2004), we argue that tertiary hospitals can be considered as "Service Factories" for their focused range of services, which in turn enables more efficiency-focused care delivery through repetitive service delivery.

On the other hand, secondary hospitals can be considered "Service Shops" that provide a variety of services customized to the needs of their customers thus allowing them to focus more on responsiveness to the needs of their customers rather than efficiency through repetitiveness (Schmenner, 2004). Interestingly, the results from this study indicate that tertiary care hospitals achieved significant improvements in compliance with the Information Management standards in comparison with secondary care hospitals. Refer to Table 3 for the overall aggregate compliance scores among the public secondary and tertiary care hospital across two accreditation cycles.

Implications for practice

Considering the type of the hospital (i.e. Service Factory vs. Service Shop) can provide insights into how information management practices can impact the operations of the hospital. It is clear from this study that tertiary care hospitals have a clear advantage of being a "Service Factory" which could contribute towards attaining better information management compliance scores. Future studies should investigate the relationship between information management practices and hospital type. Studies are needed to examine how information management practices can enable hospitals to increase their productivity

through reducing the unnecessary variations in information supplied to clinicians and reducing the time it takes to complete a transaction or procedure.

The results from this study also highlights different gaps facing tertiary care hospitals than those facing secondary care hospitals. Tertiary care hospitals face issues with effectively and efficiently transmitting data, aggregating clinical and administrative data, and using information to plan, make strategic decisions, and prioritize quality improvement initiatives. On the other hand, secondary care hospitals have different issues related to developing and implementing an information management plan, involving the appropriate stakeholders in selecting health IT solutions, and access to the internet by staff and patients (Alhuwail, 2019).

Strengths and limitations

The data set used captures the impartial expert surveyors' perspectives. The assessments of compliance were applied consistently over two consecutive cycles that are several years apart. The dataset is also rich with both qualitative data (comments from surveyors) and quantitative data (surveyors' evaluations). The comments were useful to validate the scores and start to understand the reason behind some of the trends observed. However, some surveyor teams did not provide in-depth or detailed comments in the report thereby hindering the ability to further interpret the results. The analysed data set does not provide information about the improvements done between cycles to improve compliance with the standard. While the data set mentions health IT solutions, no formal evaluation is provided. Given the similarities between the health-care system in Kuwait and many of the developed countries with similar socioeconomic conditions, caution should be exercised before assuming generalizability of the results. Carefully considering the context and the social constructs around care delivery are essential.

Conclusions

Overall, information management practices improved in public tertiary care organizations; however, gaps remain in effective data transmission, aggregation and strategic use for health-care planning. The global financial hardships facing health-care systems necessitate vital and rapid improvement in health information management practices supported via the adoption of health IT solutions. We can no longer afford to rely on outdated and inefficient recording and exchange of health information and hope health-care reform efforts will be achieved. The results from this study showcase the overall improvements in information

Table 3. Rate of compliance with information management criteria for public secondary and tertiary care hospital across two accreditation cycles

Hospital type/Criterion	C1	C2	C3	C4	C5	C6	C7	C8	C9
Secondary◆									
Cycle 1	2.2	1.6	2.5	2.6	2.3	2.2	3.5	1.1	2.0
Cycle 2	2.8	2.9	3.3	3.6	3.1	3.3	3.8	2.8	3.4
% Δ*	*12.3*	*25.3*	*16.0*	*20.0*	*16.7*	*23.3*	*6.7*	*35.0*	*28.3*
Tertiary									
Cycle 1	2.30	2.19	2.67	2.51	2.14	2.14	3.29	0.92	1.57
Cycle 2	3.85	3.42	3.71	3.52	3.29	3.57	4.00	3.29	3.71
% Δ*	*31.0*	*24.7*	*20.9*	*20.2*	*22.9*	*28.6*	*14.3*	*47.4*	*42.9*

Notes: ◆The cited results are from work done by Alhuwail (2019) using the same measures and standard; *the delta reflects the change between the evaluation cycles based on a five-point scale

management practices in the public tertiary care organizations in the State of Kuwait. Gaps remain in the areas of effective and efficient data transmission, data aggregation and leveraging data for strategic health-care planning. Further work is needed to refine the Information Management standard and its associated criteria in addition to measuring the "digital-maturity" and preparedness of health-care facilities. There is also a need for more empirical research to investigate the quality of the information captured in either paper or electronic formats. Without proper management of information at health-care facilities, achieving safe and effective patient care can be a far-fetched reality.

References

Alarouj, M., Bennakhi, A., Alnesef, Y., *et al.* (2013), "Diabetes and associated cardiovascular risk factors in the state of Kuwait: the first national survey", *International Journal of Clinical Practice*, Vol. 67 No. 1, pp. 89-96, doi: 10.1111/ijcp.12064.

Alhuwail, D. (2019), "Understanding health information management practices in public hospitals in Kuwait", *Health Information Management*, p. 1833358319837247, doi: 10.1177/1833358319837247.

Alhuwail, D., AlMeraj, Z. and Boujarwah, F. (2018), "Evaluating hospital websites in Kuwait to improve consumer engagement and access to health information: a cross-sectional analytical study", *BMC Medical Informatics and Decision Making*, Vol. 18 No. 1, p. 82, doi: 10.1186/s12911-018-0660-4.

Al-Jafar, E. (2013), "Exploring patient satisfaction before and after electronic health record (EHR) implementation: the Kuwait experience", *Perspectives in Health Information Management*, Vol. 10, p. 1c.

Allafi, A., Al-Haifi, A.R., Al-Fayez, M.A., *et al.* (2014), "Physical activity, sedentary behaviours and dietary habits among Kuwaiti adolescents: gender differences", *Public Health Nutrition*, Vol. 17 No. 9, pp. 2045-2052, doi: 10.1017/S1368980013002218.

Bazeley, P. (2012), "Integrative analysis strategies for mixed data sources", *American Behavioral Scientist*, Vol. 56 No. 6, pp. 814-828, doi: 10.1177/0002764211426330.

Berwick, D.M., Nolan, T.W. and Whittington, J. (2008), "The triple aim: care, health, and cost", *Health Affairs*, Vol. 27 No. 3, pp. 759-769, doi: 10.1377/hlthaff.27.3.759.

Buntin, M.B., Burke, M.F., Hoaglin, M.C., *et al.* (2011), "The benefits of health information technology: a review of the recent literature shows predominantly positive results", *Health Affairs (Project Hope)*, Vol. 30 No. 3, pp. 464-471, doi: 10.1377/hlthaff.2011.0178.

Buntin, M.B., Jain, S.H. and Blumenthal, D. (2010), "Health information technology: laying the infrastructure for national health reform", *Health Affairs*, Vol. 29 No. 6, pp. 1214-1219, doi: 10.1377/hlthaff.2010.0503.

Channanath, A.M., Farran, B., Behbehani, K., *et al.* (2015), "Association between body mass index and onset of hypertension in men and women with and without diabetes: a cross-sectional study using national health data from the state of Kuwait in the Arabian Peninsula", *BMJ Open*, Vol. 5 No. 6, p. e007043, doi: 10.1136/bmjopen-2014-007043.

Cresswell, K. and Sheikh, A. (2013), "Organizational issues in the implementation and adoption of health information technology innovations: an interpretative review", *International Journal of Medical Informatics*, Vol. 82 No. 5, pp. e73-e86, doi: 10.1016/j.ijmedinf.2012.10.007.

Devkaran, S. and O'Farrell, P.N. (2015), "The impact of hospital accreditation on quality measures: an interrupted time series analysis", *BMC Health Services Research*, Vol. 15 No. 1, p. 137, doi: 10.1186/s12913-015-0784-5.

Fenton, S.H., Low, S., Abrams, K.J., *et al.* (2017), "Health information management: changing with time", *Yearbook of Medical Informatics*, Vol. 26 No. 1, pp. 72-77, doi: 10.15265/IY-2017-021.

Fernández-Alemán, J.L., Señor, I.C., Lozoya, P.Á.O., *et al.* (2013), "Security and privacy in electronic health records: a systematic literature review", *Journal of Biomedical Informatics*, Vol. 46 No. 3, pp. 541-562, doi: 10.1016/j.jbi.2012.12.003.

Gale, N.K., Heath, G., Cameron, E., *et al.* (2013), "Using the framework method for the analysis of qualitative data in multi-disciplinary health research", *BMC Medical Research Methodology*, Vol. 13 No. 1, p. 117, doi: 10.1186/1471-2288-13-117.

Gartrell, K., Brennan, C.W., Wallen, G.R., *et al.* (2018), "Clinicians' perceptions of usefulness of the PubMed4Hh mobile device application for clinical decision making at the point of care: a pilot study", *BMC Medical Informatics and Decision Making*, Vol. 18 No. 1, p. 27, doi: 10.1186/s12911-018-0607-9.

Guetterman, T.C., Fetters, M.D. and Creswell, J.W. (2015), "Integrating quantitative and qualitative results in health science mixed methods research through joint displays", *The Annals of Family Medicine*, Vol. 13 No. 6, pp. 554-561, doi: 10.1370/afm.1865.

Hoyle, P. (2019), "Health information is central to changes in healthcare: a clinician's view", *Health Information Management Journal*, Vol. 48 No. 1, pp. 48-51, doi: 10.1177/1833358317741354.

Katoue, M.G., Awad, A.I., Schwinghammer, T.L., *et al.* (2014), "Pharmaceutical care in Kuwait: hospital pharmacists' perspectives", *International Journal of Clinical Pharmacy*, Vol. 36 No. 6, pp. 1170-1178, doi: 10.1007/s11096-014-0013-z.

Koya, K.D., Bhatia, K.R., Hsu, J.T.S., *et al.* (2012), "YouTube and the expanding role of videos in dermatologic surgery education", *Seminars in Cutaneous Medicine and Surgery*, Vol. 31 No. 3, pp. 163-167, doi: 10.1016/j.sder.2012.06.006.

Lam, M.B., Figueroa, J.F., Feyman, Y., *et al.* (2018), "Association between patient outcomes and accreditation in US hospitals: observational study", *British Medical Journal*, Vol. 363, p. k4011, doi: 10.1136/bmj.k4011.

LaTour, K.M., Eichenwald, S. and Oachs, P.K. (Eds) (2006), *Health Information Management: Concepts, Principles, and Practice*, AHIMA, Chicago, IL.

Lee, J. (2015), "The impact of health information technology on disparity of process of care", *International Journal for Equity in Health*, Vol. 14 No. 1, p. 34, doi: 10.1186/s12939-015-0161-3.

Marutha, N.S. and Ngoepe, M. (2018), "Medical records management framework to support public healthcare services in Limpopo province of South Africa", *Records Management Journal*, Vol. 28 No. 2, pp. 187-203, doi: 10.1108/RMJ-10-2017-0030.

Ministry of Health (2015), World health survey in Kuwait: summary report 2013, Report no. 064/2015, Sulaibikhat, Kuwait.

Mokdad, A.H., Jaber, S., Aziz, M.I.A., *et al.* (2014), "The state of health in the Arab world, 1990-2010: an analysis of the burden of diseases, injuries, and risk factors", *The Lancet*, Vol. 383 No. 9914, pp. 309-320, doi: 10.1016/S0140-6736(13)62189-3.

Perakslis, E.D. (2014), "Cybersecurity in health care", *New England Journal of Medicine*, Vol. 371 No. 5, pp. 395-397, doi: 10.1056/NEJMp1404358.

Schmenner, R.W. (2004), "Service businesses and productivity", *Decision Sciences*, Vol. 35 No. 3, pp. 333-347, doi: 10.1111/j.0011-7315.2004.02558.x.

Shaltout, A.A., Wake, D., Thanaraj, T.A., *et al.* (2017), "Incidence of type 1 diabetes has doubled in Kuwaiti children 0-14 years over the last 20 years", *Pediatric Diabetes*, Vol. 18 No. 8, pp. 761-766, doi: 10.1111/pedi.12480.

Stanford University, School of Medicine (2017), *Harnessing the Power of Data in Health*, Stanford Medicine 2017 Health Trends Report, June, Stanford, CA, Stanford Medicine, available at: https://med.stanford.edu/content/dam/sm/sm-news/documents/StanfordMedicineHealthTrendsWhitePaper2017.pdf

Tordrup, D., Angelis, A. and Kanavos, P. (2013), "Preferences on policy options for ensuring the financial sustainability of health care services in the future: results of a stakeholder survey",

Applied Health Economics and Health Policy, Vol. 11 No. 6, pp. 639-652, doi: 10.1007/s40258-013-0056-7.

Weber, A.S., Turjoman, R., Shaheen, Y., *et al.* (2017), "Systematic thematic review of e-health research in the Gulf Cooperation Council (Arabian Gulf): Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates", *Journal of Telemedicine and Telecare*, Vol. 23 No. 4, pp. 452-459, doi: 10.1177/1357633X16647894.

Weiskopf, N.G., Hripcsak, G., Swaminathan, S., *et al.* (2013), "Defining and measuring completeness of electronic health records for secondary use", *Journal of Biomedical Informatics*, Vol. 46 No. 5, pp. 830-836, doi: 10.1016/j.jbi.2013.06.010.

Williams, K.S., Shah, G.H., Leider, J.P., *et al.* (2017), "Overcoming barriers to experience benefits: a qualitative analysis of electronic health records and health information exchange implementation in local health departments", *Egems (Generating Evidence and Methods to Improve Patient Outcomes)*, Vol. 5 No. 1, p. 18, doi: 10.5334/egems.216.

Wright, A., McCoy, A.B., Hickman, T.-T.T., *et al.* (2015), "Problem list completeness in electronic health records: a multi-site study and assessment of success factors", *International Journal of Medical Informatics*, Vol. 84 No. 10, pp. 784-790, doi: 10.1016/j.ijmedinf.2015.06.011.

Younis, M., Al-Hajeri, M., Celik, Y., *et al.* (2015), "Healthcare of aging population of Kuwait", *Ageing International*, Vol. 40 No. 1, pp. 36-43.

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