

Impact Of Key Performance Indicators on Quality of Healthcare Services in Emergency Department of a General Hospital

Alwaleed Alsuwailem¹, Faisal Asiri², Huda Alsaeed³, Kholoud Alsomali⁴, Ayman Abduljwad⁵, Mona Orief⁵

¹Prince Mutib bin Abdul Aziz Hospital, Ministry of Health, Saudi Arabia

²Mohayil General Hospital, Ministry of Health, Saudi Arabia

³Mental Health Hospital, Ministry of Health, Saudi Arabia

⁴King Fahad General Hospital, Ministry of Health, Saudi Arabia

⁵Directorate of Health Affairs, Ministry of Health, Saudi Arabia

Abstract

Background: Healthcare organizations strive for quality in their service delivery as a way of keeping up with the competing trends in clients' attraction. In the process, they have become cognizant of the key performance indicators to help track progress and performance. Despite the growing interests in healthcare KPIs, little has been done in terms of KPIs in the general hospitals, especially in the emergency units. Therefore, this study was designed to assess the implications of KPIs on the quality of healthcare service delivery in the emergency department in a general hospital in the Kingdom of Saudi Arabia.

Methods: Quantitative descriptive quantitative research was conducted among 300 healthcare workers in the emergency unit of a general hospital in Saudi Arabia. Data was collected after receiving ethical approval and participants' consent. Accordingly, the researcher administered the questionnaires to the selected participants using a pre-made research questionnaire using the 5-point Likert scale. The collected data was analyzed using linear regression and the descriptive statistical tests of SPSS, version 26.

Results: From the descriptive statistical analysis, two key performance indicators stood out in the emergency department of general hospitals. These include experiences with hospital staff (mean=3.143; SD =2.00) and Patient Readmission Rate (mean=3.106; SD=1.419). A statistically significant relationship was also noted between patient readmission rate ($p=.030$), experiences with hospital staff ($p=.070$) and staff's commitment to patients ($p=.016$) and the quality of emergency care services.

Conclusion: Key performance indicators are crucial in tracking the milestones made in healthcare organizations towards meeting patients' needs. Healthcare system management need to develop a means of tracking their key performance indicators for informed improvements in quality of their services.

Keywords: key performance indicators; emergency department; healthcare organizations; Saudi Arabia.

Introduction

With the rising states of service competitiveness, healthcare organizations are currently putting more focus on the quality of services they deliver (Ginter et al., 2018). Quality of healthcare services matters not only for the healthcare organization but also for the patients as crucial bunch of stakeholders. For the organization, quality helps them build an attractive reputation while the for patients, quality directly translates to their outcomes. In the end, a balance is scored between the two parties. Therefore, the desire of every healthcare organization is to track its services by checking on nature of service delivered.

Subsequently, the progress made by any organizations, including the healthcare organizations, towards their set mission or vision is well exhibited in the key performance indicators (KPIs) (Parmenter, 2015). There are several indicators that organizations can use to demonstrate their performance, such as levels of patients' satisfaction, the waiting time in the emergency department, Bed occupancy rate, the average length of stay (LOS) and rate of readmission, mortality and hospital acquired infections (Parmenter, 2015; Gartner & Lemaire, 2022; Gu & Itoh, 2016; Bekbergenova et al., 2020; Toussaint et al., 2015; Burlea-Schiopoiu & Ferhati, 2021). Overall, these KPIs can help to determine the performance of an organization, which determines whether it is needed for a general hospital or an emergency department.

The general hospitals operate many different departments, large number of patients with dynamic health needs, which makes it crucial to include the KPIs for informed operations and progress. Accurate implementation of KPIs in the general hospital is thus critical as it helps to monitor and accurately optimize healthcare operations (Burlea-Schiopoiu & Ferhati, 2021). Moreover, it has many other roles; ensuring the satisfaction of medical staff and patients, acting as an efficient tool to determine the business activities and the performance of the healthcare system towards achieving the goals of the organization (Edmonds & Hajizadeh, 2019). Other scholars also indicate that KPIs also

facilitate the performance of the organization by recording the patients' appointments, cash flows, and charges (Amor & Ghannouchi, 2017). Additional significance has been noted in the literature, including improving employee skills, keeping employees more focused, improving team productivity, impacting the healthcare service delivery, tracking the use of medical equipment, and improving drug cost management (Housawi et al., 2020; Victor & Farooq, 2020).

A few of studies have been conducted in Saudi Arabia healthcare sectors to assess various factors around the role and significance of KPIs (Khalifa & Khalid, 2015; Aljuaid et al., 2016; Alazwari et al., 2023). Based on the noted significance of KPIs in the literature, this study seeks to examine seven KPIs in a general hospital in Saudi Arabia with the main focus on assessing their influence on the quality of patient care services. These KPIs include Average Hospital Stay (AHS), Emergency Room waiting Time (ERWT), Patient Follow up rate (PFR), Experiences with Hospital Staff (EXPH), Staff's explanation of Procedures (SPREX), Staff's Commitment to Patients (SCP), Patient Readmission Rate (PRR), and Response Quantitative Equivalent (RQE). Studying the relationships of these KPIs with the quality of patient care would inform the healthcare management about the significance of these KPIs and which one add more weight to the performance of the general hospital.

Methods

This cross-sectional, descriptive quantitative research was conducted in a general hospital in Saudi Arabia. Primary data was collected using interviews, conducted by the researcher among a sample of participants which consisted of the healthcare workers in the emergency department. These participants were samples through the techniques of simple random sampling approach, where every prospective participant had equal chance of being included in the study. A total of 300 participants were included in the study. Through the interviews, the questionnaires were used to collect and

record the participants' responses, which were all quantitative, using the 5-point Likert scale. Subsequently, the collected data was analyzed using two statistical packages of SPSS, version 26 – the descriptive statistics and multiple linear regression.

Results

A response rate of 100% was attained for the questionnaires. The descriptive statistics shown

in Table 1 shows that the data for each of the KPIs had a kurtosis value of -1.3, which indicates that the distribution has lighter tails than a normal distribution. This means there are fewer extreme values (outliers) in the data than expected the normal distribution curve. It is also apparent that the KPI with highest mean is the Experiences with Hospital Staff (mean =3.143; SD=2.00) and Average Hospital Stay has the lowest mean (mean =2.9; SD=2.11).

Table 1. Descriptive statistics of the KPIs

KPIs	Mean	SD	Variance	Kurtosis	Skewness
Average Hospital Stay	2.9	1.452	2.110	-1.395	0.036
Emergency Room waiting Time	3.066	1.433	2.055	-1.341	-0.069
Patient Follow up rate	2.953	1.348	1.817	-1.154	0.052
Patient Readmission Rate	3.106	1.419	2.015	-1.313	-0.140
Experiences with Hospital Staff	3.143	1.417	2.000	-1.241	-0.198
Staff's explanation of Procedures	3.076	1.439	2.071	-1.333	-0.080
Staff's Commitment to Patients	2.913	1.370	1.878	-1.230	0.078

The individual responses to the questionnaire items about the impact of KPIs on various aspect of quality of healthcare service delivery

was also done. The outcome is summarized in Table 2.

Table 2. Aspects of KPIs on quality of healthcare services

Aspects of KPIs	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly agree (%)
KPIs improve job performance in healthcare	15	11.1	14.3	37.2	22.5
KPIs have an impact on healthcare treatment costs	11.8	8.5	21.3	38.9	19.6
KPIs improve overall team performance in a hospital	10.4	8.7	14.5	39.6	26.8
KPIs affect patient waiting time to improve quality	11.8	9.7	22.2	30.4	25.8
KPIs have an impact on healthcare quality	11.8	8.2	18.6	36.7	24.6
KPI successfully measures patient care over time	10.1	5.0	17.9	39.4	26.6
Implementation of KPIs in healthcare is successful without limitations	12.1	10.1	17.9	36.2	23.7
KPIs affect the performance of the healthcare sector	9.2	8.7	16.4	41.8	23.9
Analyzing KPIs improves the business results of healthcare organizations	11.1	8	18.1	36.2	26.6
KPIs are effective for managing a large healthcare organization	9.1	8.5	17.4	37.7	27.3
KPIs are helpful in evaluating emergency department performance	10.2	9.2	16.9	38.6	25.1
KPIs help solve the problems in the hospital sector	8.3	10.1	16.4	39.4	25.8

From Table 2, there is an apparent indication that KPIs play critical role in the quality of

healthcare services. For instance, 39.4% and 26.6% of participants agree and strongly agree,

respectively, that KPI effectively measures the performance level of healthcare workers and patient care. Moreover, more than 41.8% of the participants agreed that KPI affect the services provided by the health sector recently. It was also observed that 39.4% and 25.8% of the participants believe that KPIs are a factor that solves problems in the health system.

However, further statistical analyses were done using the simple linear regression model to

Table 3. Regression model showing relationships of KPIs and quality of healthcare services

Variables (KPIs)	Coefficients	Standard Error	<i>t</i> Statistics	P-value
Intercept	3.888	0.448	8.666	5E-40
ERW	-0.041	0.061	-0.671	0.502
PFR	0.013	0.063	0.205	0.837
PRR	-0.130	0.060	-2.169	0.030
EXPH	-0.228	0.060	-0.377	0.070
SPREX	.0046	0.062	0.738	0.461
SCP	-0.154	0.064	2.407	0.016

From Table 3, it is apparent that only three KPIs have a statistically significant impact on the quality of healthcare services. These KPIs include, patient readmission rate ($p=.030$), experiences with hospital staff ($p=.070$) and staff's commitment to patients ($p=.016$). However, EXPH and SCP only describe a negative relationship.

Discussion

This study aimed at determining the role, significance and overall impact of various KPIs on the quality of healthcare services delivered in a general hospital. From the analysis, three kinds of indicators were noted; structural indicators, which measure the quality of management of human, material and financial resources required to implement the maintenance process, (2) process indicators, which measure the quality of the implementation of the maintenance activity, and (3) outcome indicators, which directly measure the benefits or risks for the patient in terms of performance, satisfaction and safety. In the process, three KPIs stood out with their impact on quality of services - patient readmission rate, experiences with hospital staff and staff's commitment to patients.

examine the impact of these KPIs on the quality of patient care delivery. The mode summary showed that influence of the KPIs is not statistically significant from the regression model summary and ANOVA analysis, and the models show that these factors only described a less than 1% of the variance in the quality of patient care services delivered $\{F(1, 298) = 0.164, p=.685, R^2 \text{ Adjusted} = .002\}$.

From the analysis, the participants noted various benefits and positive implications of KPIs on the quality of healthcare service delivery. Regarding the cost of treatment, KPIs are useful in improving overall performance by reducing the cost of the healthcare process through the implementation of an e-commerce system that is effective for patients. According to Hidayat et al. (2020), performance measures for e-commerce allow e-commerce companies to track progress against sales, marketing, and customer service goals. The organizations can report the number of visits to a website, provide information on the amount of revenue per thousand page views, or even the percentage of new visits. The KPIs offer critical guidance to businesses decisions and have been used to take action to improve sales, marketing, or customer service.

According to Hariman et al. (2020), data freshness can be an important indicator for evaluating the performance level of the healthcare industry. Moreover, MayelAfshar et al. (2021), also express that the healthcare data record is an important tool for evaluating its costs; the CIO is more likely to identify problems before they escalate. Unfortunately, the matrix usually does not estimate costs until IT and finance come together, when it's already too late to solve rapidly evolving problems. In

today's cloud-based world, this is a critical issue. According to McCabe et al. (2019), cloud costs can get out of hand in a matter of days. If an entire quarter goes by before the treasury adds up the costs, there's a good chance it will get a nasty surprise.

The healthcare KPIs were also noted to increase employee engagement in the healthcare sector. KPIs are important for measuring performance and improving the quality of employee productivity in a healthcare organization (Botje et al., 2016). According to Almasi et al. (2021), if these employees have a good understanding of the organization's strategy, they can make daily decisions that follow this strategic line. The researchers refer to employees who understand the company's strategy and are committed to employee engagement. The most engaged employees are, for example, top-level employees and the most experienced employees who are satisfied with their salary and work-life balance. According to Hidayat et al (2020), around 65.5% of survey respondents strongly agreed that KPIs help to keep healthcare workers engaged, which is highly related to productivity and standard performance.

Overall, this study noted that KPIs help to solve problems in the hospital sector. In terms of KPI, healthcare has several factors to take into consideration, such as safety and providing quality services to patients (Ashton et al. 2018; Isba et al., 2020). The management system of different hospital sectors can reduce the mortality rate of patients by improving the quality of services through the implementation of KPIs. As such, KPIs are useful for developing standard management systems and maintaining the overall level of performance.

Conclusion

This study has outlined the importance and application of the KPI system in healthcare, which can effectively help to measure the performance of healthcare workers in the emergency departments of general hospitals. In addition, it has outlined the application of KPI

to improve the overall performance level of health care workers, such as nurses, physicians, and so on. It is noted that various KPIs play an important role in healthcare operations and monitoring, and employees prefer the use of KPIs to improve the level of performance, especially for emergency department staff. KPIs are needed to influence implementation in the emergency department of general hospitals.

Recommendation

Based on the positive perspectives with which the employees view the implication of KPIs on the healthcare sector, it would be crucial for the healthcare administrative systems to implement the KPI monitoring to improve the organizational performance level and the performance level of the employees. Nevertheless, more studies are need to assess the managerial perspectives into the role of KPIs in the quality-of-service delivery.

Conflict of Interest: authors hold no conflict of interest as far as this research is concerned

Reference

- [1] Alazwari, A., Johnstone, A., Tafakori, L., Abdollahian, M., AlEidan, A. M., Alfuhigi, K., Alghofialy, M. M., Albunyan, A. A., Al Abbad, H., AlEssa, M. H., Alareefy, A. K. H., & Alshamrani, M. A. (2023). Predicting the development of T1D and identifying its Key Performance Indicators in children; a case-control study in Saudi Arabia. *PloS one*, 18(3), e0282426. <https://doi.org/10.1371/journal.pone.0282426>
- [2] Aljuaid, M., Mannan, F., Chaudhry, Z., Rawaf, S., & Majeed, A. (2016). Quality of care in university hospitals in Saudi Arabia: a systematic review. *BMJ open*, 6(2), e008988.
- [3] Amor, E. A. E. H., & Ghannouchi, S. A. (2017). Towards KPI-Based Health Care Process Improvement. *Procedia computer science*, 121, 767-774.

- [4] Ashton, R. A., Morris, L., & Smith, I. (2018). A qualitative meta-synthesis of emergency department staff experiences of violence and aggression. *International emergency nursing*, 39, 13-19.
- [5] Bekbergenova, Z., Derbissalina, G., Umbetzhanova, A., & Koikov, V. (2020). *Georgian medical news*, (299), 151–157.
- [6] Botje, D. et al. (2016). Are performance indicators used for hospital quality management: a qualitative interview study amongst health professionals and quality managers in The Netherlands. *BMC Health Services Research*, 574(16). doi.org/10.1186/s12913-016-1826-3.
- [7] Burlea-Schiopoiu, A., & Ferhati, K. (2021, January). The managerial implications of the key performance indicators in healthcare sector: A cluster analysis. In *Healthcare* (Vol. 9, No. 1, p. 19). Multidisciplinary Digital Publishing Institute.
- [8] Edmonds, S., & Hajizadeh, M. (2019). Assessing progressivity and catastrophic effect of out-of-pocket payments for healthcare in Canada: 2010–2015. *The European Journal of Health Economics*, 20(7), 1001-1011.
- [9] Gartner, J. B., & Lemaire, C. (2022). Dimensions of performance and related key performance indicators addressed in healthcare organisations: A literature review. *The International journal of health planning and management*, 37(4), 1941–1952. https://doi.org/10.1002/hpm.3452
- [10] Ginter, P. M., Duncan, W. J., & Swayne, L. E. (2018). *The strategic management of health care organizations*. John Wiley & Sons.
- [11] Gu, X., & Itoh, K. (2016). Performance indicators: healthcare professionals' views. *International journal of health care quality assurance*, 29(7), 801–815. https://doi.org/10.1108/IJHCQA-12-2015-0142
- [12] Housawi, A., Al Amoudi, A., Alsaywid, B., Lytras, M., bin Moreba, Y. H., Abuznadah, W., & Alhaidar, S. A. (2020). Evaluation of key performance indicators (KPIs) for sustainable postgraduate medical training: an opportunity for implementing an innovative approach to advance the quality of training programs at the Saudi Commission for Health Specialties (SCFHS). *Sustainability*, 12(19), 8030. https://doi.org/10.3390/su12198030
- [13] Hariman, K., Lam, J., Leung, S.K. and Lui, S.S., 2020. Clinical risk model to predict 28- day unplanned readmission via the accident and emergency department after discharge from acute psychiatric units for patients with psychotic spectrum disorders. *BJPsych open*, 6(1).
- [14] Hidayat, N., Ahsan, A., Rahayu, M. and Lestari, R. (2020). Response time, waiting time and service quality in emergency department. *International Journal of Public Health*, 9(3), pp.199-204.
- [15] Isba, R., Edge, R., Jenner, R., Broughton, E., Francis, N., & Butler, J. (2020). Where have all the children gone? Decreases in paediatric emergency department attendances at the start of the COVID-19 pandemic of 2020. *Archives of disease in childhood*, 105(7), 704- 704. https://doi.org/10.1136/archdischild-2020-319385
- [16] Khalifa, M., & Khalid, P. (2015). Developing strategic health care key performance indicators: a case study on a tertiary care hospital. *Procedia Computer Science*, 63, 459-466. https://doi.org/10.1016/j.procs.2015.08.368
- [17] Liu, A., Miller, W., Crompton, G., & Ma, Y. (2020, November). Principles to Define Energy Key Performance Indicators for the Healthcare Sector. In *2020 International Conference on Smart Grids and Energy Systems (SGES)* (pp. 898-903). IEEE.
- [18] MayelAfshar, M., Noohi, F., Riahi, L. & Nikravan, A. (2021). Identification of the Key Performance Indicators for Designing an Emergency Department Dashboard in a Referral Cardiac Hospital. *Iranian Red Crescent Medical Journal*, 23(7). https://ircmj.com/index.php/IRCMJ/article/view/714
- [19] McCabe, A., Brenner, M., Larkin, P., Nic An Fhailí, S., Gannon, B., O'Sullivan, R.,

- & Wakai, A. (2019). Capturing data for emergency department performance monitoring purposes. *HRB open research*, 2, 18. <https://doi.org/10.12688/hrbopenres.12912.1>
- [20] Parmenter, D. (2015). *Key performance indicators: developing, implementing, and using winning KPIs*. John Wiley & Sons.
- [21] Toussaint, N. D., McMahon, L. P., Dowling, G., Soding, J., Safe, M., Knight, R., Fair, K., Linehan, L., Walker, R. G., & Power, D. A. (2015). Implementation of renal key performance indicators: promoting improved clinical practice. *Nephrology (Carlton, Vic.)*, 20(3), 184–193. <https://doi.org/10.1111/nep.12366>
- [22] Victor, S., & Farooq, A. (2021). Dashboard visualisation for healthcare performance management: Balanced scorecard metrics. *Asia Pacific Journal of Health Management*, 16(2), 28-38.