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The Impact of Accreditation on Patient Safety and Quality of Care Indicators at King Abdulaziz University Hospital in Saudi Arabia

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Abstract: This study aimed to determine if the accreditation process has a positive impact on patient safety and quality of care. A 4 year retrospective and prospective study design was used. A total of 119 performance indicators were collected through various processes and were lately transformed into 81 patient safety and quality indicators. The numbers and rates of hospital mortality, Healthcare-Associated Infections (HAI), medication errors, cardiopulmonary resucutation codes, surgeries and invasive procedures, blood transfusion reaction and adverse events were the main outcome measures. The following areas had the corresponding number of indicators that were found to be sensitive to Canadian accreditation and that significantly improved post-accreditation: Four indicators of perioperative mortality and rates of neonatal mortality per 100 NICU admissions ($p \leq 0.05$). Healthcare-associated Infections: sixteen out of twenty-six measured indicators ($p \leq 0.05$). Blood utilization: one out of two measured indicators, i.e., total number of blood transfusion reactions ($p \leq 0.05$). Surgeries and invasive procedure: two out of seven measured indicators, i.e., total number of unplanned returns to surgery within 48 h and rate of unplanned returns to surgery per 100 operations ($p \leq 0.05$). Two out of eight measured indicators, i.e., total number of patients who survived after the first CPR and rate of survival after first CPR per 100 coded patients ($p \leq 0.05$). Two out of eighteen measured indicators, i.e., rate of pressure ulcers per 1000 admissions and total number of the occurrence variance reports ($p \leq 0.05$). Accreditation has a positive impact on patient safety and quality of care indicators.

Key words: Accreditation, patient safety, quality of care, indicators

INTRODUCTION

Patient safety is moving up the list of priorities for hospitals and health care delivery systems. However, improving safety across a large integrated healthcare delivery organization is challenging (Frankel *et al*., 2003). Leaders of academic medical centers are challenged to ensure consistently high performance in quality and safety across all clinical services (Keroack *et al*., 2007).

Quality of care is now prominent on the agendas of the health policy makers of the governments of several countries in the East Mediterranean region (El-Jardali *et al*., 2008). In the United States, 95% of urban hospitals seek accreditation from the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) (Morlock *et al*., 2005). Although, there is little conclusive evidence that the process of accreditation improves the quality of care accreditation of health care organizations is increasingly being used as a tool for governmental regulation to guarantee quality (Viswanathan and Salmon 2006; Shaw, 2001; Salmon *et al*., 2003). The role of accreditation of hospitals will address the issue of patient safety and risk management as a part of quality improvement and hospital performance.

Accreditation is a process whereby an organization is assessed on a set of pre-determined standards (Klazinga, 2000; Montagu, 2003). The accreditation standards are usually regarded as optimal and achievable and are designed to encourage continuous improvement efforts within accredited organizations (Rooney and Van Ostenberg, 1999). While the degree of compliance with standards could be more easily measured, some researchers have expressed reservations on the methods

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used to measure the real impact of accreditation on risk management. The effect of implementing patient safety practices and their resultant impact on patient outcomes remain relatively unexplained in healthcare (Shojania *et al*., 2001).

In 1999, the Institute of Medicine (IOM) which is an independent, nonprofit organization in Washington, DC that works outside of government to provide unbiased and authoritative advice to decision makers and the public, released a pivotal report on safety in the healthcare system (Kohn *et al*., 2000). This report which identified systemic gaps in patient safety systems, led to the widespread development of new safety practices (Longo *et al*., 2005). Patient safety has been conceptualized as the avoidance, prevention and amelioration of adverse outcomes or injuries stemming from health care (Cooper *et al*., 2000). A goal of patient safety, therefore is to reduce the risk of injury or harm to patients from the structures or processes of care (Battles and Lilford, 2003). Patient safety management is seen as the establishment of operational systems and processes designed to minimize the likelihood of error and maximize the likelihood of intercepting errors when or before they occur (Institute of Medicine, 2001).

Strong evidence suggests that focusing on nursing would improve patient safety (Aiken, 2005). In fact, nurses spend up to 90% of their time caring for patients (O'Brien-Pallas *et al*., 2003). They bring considerable expertise and leadership to the field of patient safety research as they are well poised to design systems and process that protect patients and accomplish the goals of patient safety management (Battles and Lilford, 2003), (Institute of Medicine, 2001).

Although, many healthcare organizations in developing countries are currently considering accreditation, there is little research on its impact (Buetow and Wellingham, 2003). A study by Romano and colleagues (Romano *et al*., 2003) focused on the relation of the patient system to patient safety indicators but did not address patient safety practices. Another study revealed that accredited hospitals performed better than non-accredited hospitals on a range of quality indicators although, there was considerable variation of performance within accredited hospitals (Chen *et al*., 2003). An analysis and clear understanding of the association among hospital systems and processes is a necessary prerequisite to designing patient safety solutions, especially as evidence for incorporating various safety practices currently comes from domains outside of healthcare (Shojania *et al*., 2001).

Therefore, this study is valuable because it provides evidence regarding the impact of accreditation on patient safety and quality of care in an acute care teaching hospital, resulting from the implementation of and compliance with the Canadian accreditation process. This process has been fully complied with and documented at King Abdul-Aziz University Hospital (KAUH), one of the larger governmental hospitals in Saudi Arabia with a total bed capacity of 878.

Objective: This study aimed to determine if patient safety and quality of care indicators will improve post-accreditation.

MATERIALS AND METHODS

A 4 year retrospective and prospective study design was used. The main outcome measures are the numbers and rates of hospital mortality, healthcare-associated infections, medication errors, blood utilization, codes, surgeries and adverse events. A total of 81 clinical indicators were collected through various methods over the period from January 2006 to December 2009 (pre-accreditation: January to December 2006; accreditation period: January 2007 to December 2008; post-accreditation: January to December 2009). The data were defined and collected using standardized methods. The individuals and departments were not aware of the purpose of the collection to avoid bias.

Patient safety and quality indicators were specifically defined and approved by the Medical Board and Ethics Committee as below:

- Mortality (15 indicators)
- Healthcare-associated infections (26 indicators)
- Medication use (5 indicators)
- Blood utilization (2 indicators)
- Surgery/Invasive procedures (7 indicators)
- Cardio pulmonary resuscitation (8 indicators)
- Adverse events (18 indicators)

Data analysis: The data as mentioned above were tested by SPSS version 16 (one-sample Kolmogorov-Smirnov Test) and classified as normal and non-normal distribution. Anova and non-parametric tests and Bonferroni correction were used and all p-values were multiplied by 6 (C^4_2).

RESULTS AND DISCUSSION

Indicators of risk dimensions that were sensitive to Canadian accreditation and that significantly improved

Table 1: Non-parametric distribution of risk dimension between pre-, actual and post-accreditation (n = 48)

No.	Risk dimension	Mean per year Pre accr. 2006	Accreditation period 2007	2008	Post accr. 2009	p-value global	p-value
1.1	Total number of perioperative deaths	1.08	0.42	0.25	0.17	0.020	P1 = 0.04, P2 = 0.41, P3 = 0.04 P4 = 0.18, P5 = 0.02, P6 = 0.56
1.2	Rate of perioperative mortality per 1000 surgeries	1.81	0.61	0.40	0.22	0.006	P1 = 0.01, P2 = 0.46, P3 = 0.04 P4 = 0.17, P5 = 0.01, P6 = 0.47
1.3	Rate of perioperative death per 1000 total deaths	22.28	7.30	4.10	2.38	0.009	P1 = 0.03, P2= 0.35, P3 = 0.03 P4 = 0.12, P5 = 0.01, P6 = 0.47
1.4	Rate of perioperative mortality per 100 cancelled operations	1.61	0.64	0.36	0.10	0.006	P1 = 0.05, P2 = 0.46, P3 = 0.05 P4 = 0.05, P5 = 0.01, P6 = 0.47
1.5	Rate of health care-associated central line BSIs per 1000 device days in MICU	15.18	6.98	6.29	4.21	0.015	P1 = 0.06, P2 = 0.31, P3 = 0.03 P4 = 0.59, P5 = 0.02, P6 = 0.21
1.6	Rate of healthcare-associated Foley catheter UTIs per 1000 device days in PICU	15.64	9.25	1.07	9.86	0.042	P1 = 0.24, P2 = 0.05, P3 = 0.01 P4 = 0.89, P5 = 0.38, P6 = 0.23
1.7	Total number of unplanned returns to surgery within 48 h	2.33	0.83	0.58	1.67	0.011	P1 = 0.06, P2 = 0.52, P3 = 0.01 P4 = 0.30, P5 = 0.23, P6 = 0.07

P1 = 2006 and 2007, P2 = 2006 and 2008, P3 = 2006 and 2009, P4 = 2007 and 2008, P5 = 2007 and 2009, P6 = 2008 and 2009, p-value with Bonferroni correction was not significant

from 2006-2009 between pre-, actual and post-accreditation are presented in non-parametric (Table 1) and parametric distribution (Table 2).

Mortality: Five indicators are presented in the tables. These are total number of perioperative deaths (p<0.020), rate of perioperative mortality per 1000 surgeries (p<0.006), rate of perioperative mortality per 1000 total deaths (p<0.009), rate of perioperative mortality per 100 cancelled operations (p<0.006) and rate of neonatal mortality per 100 NICU admissions (p<0.001).

Healthcare-Associated Infections (HAI): About 16 indicators are shown in the Table 1 and 2 (1.5-1.6 and 2.2-2.15). These are the rate of healthcare-associated central line BSI per 1000 device days in MICU (p<0.015), rate of healthcare-associated Foley catheter UTI per 1000 device days in PICU (p<0.042), average of the surveyed overall HAI (p<0.001), average of the surveyed HAI in general units (p<0.001), average of the surveyed HAI in ICUs (p<0.048), rate of HAI per 1000 discharges (p<0.001), rate of HAI per 1000 hospital patient days (p<0.001), average of clean surgical site infections (p<0.002), rate of clean surgical site infections per 1000 operations (p<0.001), rate of HAI in neonates per 1000 patient days (p<0.008), rate of blood stream HAI per 1000 patient days (p<0.001), rate of central line BSI per 1000 device days in NICU (p<0.008), rate of urinary tract HAI per 1000 patient days (p<0.001), rate of healthcare-associated Foley catheter UTI per 1000 device days in MICU (p<0.001), rate of healthcare ventilator associated pneumonia infections per 1000 device days in MICU (p<0.001) and rate of skin and soft tissues HAIs per 1000 patient days (p<0.003).

Blood utilization: One indicator is shown in Table 2, namely, total number of blood transfusion reactions (p<0.002).

Surgeries and invasive procedure: Two indicators are shown in the Table 1 and 2 (1.7 and 2.17). These are total number of unplanned returns to surgery within 48 h (p<0.011) and rate of unplanned returns to surgery per 100 operations (p<0.013).

Cardiopulmonary Resuscitation (CPR) codes: Two indicators are shown in Table 2 (2.18 and 2.19). These are the total number of patients who survived after the first CPR (p<0.001) and the rate of survival after first CPR per 100 coded patients (p<0.012).

Adverse events: Two indicators are shown in Table 2 (2.20 and 2.21). These are the rate of pressure ulcers developed per 1000 admissions (p<0.020) which decreased and the total number of the occurrence variance reports (p<0.002) which increased.

In this study, we assumed that no alteration of variables occurred such as operational plan, staff qualification and manpower ratio. The only change implemented was the accreditation process with its related requirements.

Mortality: The method of auditing death in this study does not deal directly with degree of disease or with patient acuity on admission to hospital. Therefore, we must tread with caution in interpreting the data produced in the results. Moreover, we do not provide a cause and effect relationship. We believe that mortality data should be interpreted by departmental practice, review meetings and Hospital Morbidity and Mortality Committee as established at KAUH.

Most of the mortality indicators, however were not sensitive to accreditation, except for perioperative mortality which was defined as death within ≤48 h of

Table 2: Parametric distribution of risk dimension between pre, actual and post accreditation (n = 48)

No.	Risk dimension	Mean per year: Pre accr. 2006	Accreditation period 2007	Accreditation period 2008	Post accr. 2009	p-value global	p-value
2.1	Rate of neonatal mortality per 100 NICU admissions	46.14	20.24	23.83	18.32	0.001	P1 = 0.00*, P2 = 0.58, P3 = 0.00* P4 = 0.77, P5 = 0.00*, P6 = 0.39
2.2	Average of the Surveyed HAIs	62.25	51.75	38.25	42.33	0.001	P1 = 0.04, P2 = 0.01, P3 = 0.00* P4 = 0.06, P5 = 0.00*, P6 = 0.41
2.3	Average of the surveyed HAI in general units	35.75	33.33	15.00	22.83	0.001	P1 = 0.49, P2 = 0.00*, P3 = 0.00* P4 = 0.00*, P5 = 0.00*, P6 = 0.03
2.4	Average of the surveyed HAI in ICUs	26.50	18.42	23.25	19.50	0.048	P1 = 0.01, P2 = 0.13, P3 = 0.30 P4 = 0.73, P5 = 0.03, P6 = 0.23
2.5	Rate of HAIs per 1000 discharges	21.31	16.93	11.64	12.17	0.001	P1 = 0.01, P2 = 0.00*, P3 = 0.00* P4 = 0.01, P5 = 0.00*, P6 = 0.74
2.6	Rate of HAIs per 1000 hospital patients days	4.18	3.00	2.15	2.27	0.001	P1 = 0.00*, P2 = 0.01, P3 = 0.00* P4 = 0.02, P5 = 0.00*, P6 = 0.69
2.7	Average of clean surgical site infections	4.42	3.17	1.00	3.04	0.002	P1 = 0.16, P2 = 0.02, P3 = 0.00* P4 = 0.63, P5 = 0.34, P6 = 0.01
2.8	Rate of clean surgical site infections per 1000 operations	7.12	4.52	1.81	4.30	0.001	P1 = 0.04, P2 = 0.03, P3 = 0.00* P4 = 0.86, P5 = 0.03, P6 = 0.05
2.9	Rate of healthcare-associated neonatal infections per 1000 patient days	11.40	9.22	7.87	4.79	0.008	P1 = 0.25, P2 = 0.47, P3 = 0.06 P4 = 0.02, P5 = 0.00*, P6 = 0.10
2.10	Rate of healthcare-associated BSI per 1000 patient days	1.17	0.78	0.17	0.52	0.001	P1 = 0.01, P2 = 0.00*, P3 = 0.00* P4 = 0.08, P5 = 0.00*, P6 = 0.02
2.11	Rate of central line BSIs per 1000 device days in NICU	17.34	30.04	40.17	12.81	0.008	P1 = 0.13, P2 = 0.23, P3 = 0.01 P4 = 0.04, P5 = 0.59, P6 = 0.00*
2.12	Rate of urinary tract health care infections per 1000 patient days	1.34	0.90	0.28	0.88	0.001	P1 = 0.02, P2 = 0.00*, P3 = 0.00* P4 = 0.88, P5 = 0.01, P6 = 0.00*
2.13	Rate of Foley catheter UTIs per 1000 device days in MICU	12.68	6.88	2.45	2.79	0.001	P1 = 0.01, P2 = 0.05, P3 = 0.00* P4 = 0.07, P5 = 0.00*, P6 = 0.88
2.14	Rate of healthcare ventilator-associated pneumonia infections per 1000 device days in MICU	23.78	8.53	7.35	8.12	0.001	P1 = 0.00*, P2 = 0.73, P3 = 0.00* P4 = 0.91, P5 = 0.00*, P6 = 0.82
2.15	Rate of skin and soft tissue HAIs per 1000 patient days	0.62	0.62	0.49	0.16	0.003	P1 = 0.97, P2 = 0.34, P3 = 0.32 P4 = 0.00*, P5 = 0.00*, P6 = 0.02
2.16	Total number of blood transfusion reactions	3.25	1.33	1.25	3.17	0.002	P1 = 0.01, P2 = 0.90, P3 = 0.00* P4 = 0.01, P5 = 0.90, P6 = 0.01
2.17	Rate of unplanned returns to surgery per 100 operations	0.37	0.13	0.10	0.19	0.013	P1 = 0.01, P2 = 0.73, P3 = 0.00* P4 = 0.45, P5 = 0.05, P6 = 0.27
2.18	Total number of patients who survived after first CPR	21.08	23.08	33.08	38.08	0.001	P1 = 0.43, P2 = 0.00*, P3 = 0.00* P4 = 0.00*, P5 = 0.00*, P6 = 0.05
2.19	Survival rate of patients after first CPR per 100 coded patients	54.97	55.64	65.42	61.11	0.012	P1 = 0.84, P2 = 0.01, P3 = 0.00* P4 = 0.12, P5 = 0.08, P6 = 0.22
2.20	Rate of pressure ulcers developed in the hospital per 1000 admissions	2.83	1.74	1.95	1.56	0.020	P1 = 0.01, P2 = 0.61, P3 = 0.04 P4 = 0.67, P5 = 0.00*, P6 = 0.36
2.21	Total number of OVRs	186.08	257.25	320.08	247.50	0.002	P1 = 0.01, P2 = 0.02, P3 = 0.00* P4 = 0.83, P5 = 0.18, P6 = 0.01

P1 = 2006 and 2007; P2 = 2006 and 2008; P3 = 2006 and 2009; P4 = 2007 and 2008; P5 = 2007 and 2009; P6 = 2008 and 2009. * p-value with Bonferroni correction is significant (p = 0.00)

surgery. The improvement that was noticed as shown in Fig. 1 with significant p-value was the fruit of the pre-anesthesia clinic that was established during the accreditation process, the pre-op anesthesia/surgeon consensual check list, the Privileging and Credentialing of surgeons and anesthetists and finally the hospital global approach to reduce the Operating Room (OR) cancellation rate.

All the above actions are believed to have contributed to risk reduction factors and therefore to the reduction of patient safety risks. Additionally, the improvement of infection control standards in NICU as shown in Fig. 2 is believed to be correlated with neonatal mortality and subsequently reflected positively in the reduction of neonatal mortality.

Healthcare-associated infections: The review of the HAIs in general was very promising with the outcome findings as shown in Fig. 3. Implementing the accreditation standards and collaboration between the accreditation teams allowed us to approach full compliance with infection control in a more systematic way. The actions were specific and focused on two levels:

- Hospital-wide via full compliance with facility management, environmental protection and hygiene
- Infection control levels through the actions taken and implemented including strong emphasis on hand hygiene and monitoring of performance

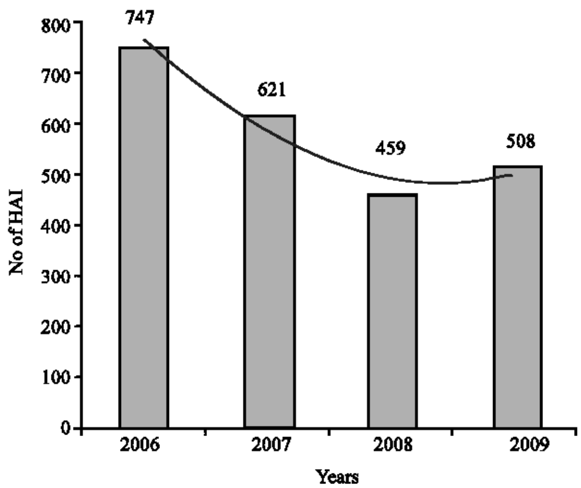

Fig. 1: Total numbers of perioperative deaths at KAUH from 2006-2009

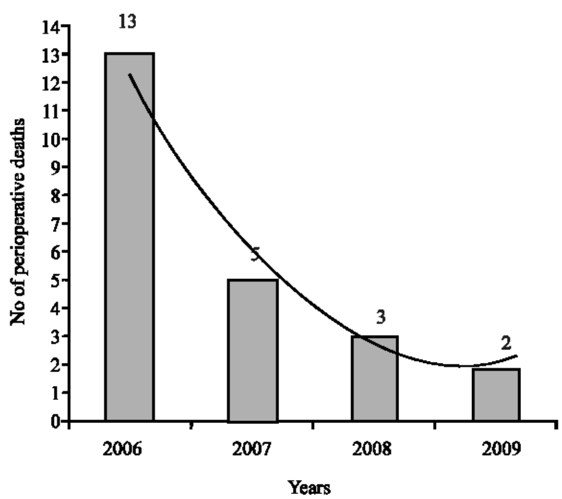

Fig. 2: Numbers of neonatal mortality per 100 NICU admissions at KAUH from 2006-2009

The accreditation process was in the opinion, the engine to the implementation of a culture of change and it contributed positively to the overall improvement in the adherence to hospital policies and procedures. The good collaboration between physicians, infection control specialists, clinical epidemiologists and nurses led to better nosocomial surveillance and strategies.

The adherence to hand washing, the utilization of hand disinfectant displayed all over the hospital, the compulsory educational activities on infection control for all staff (healthcare providers), the implementation of the newly developed hospital infection control manual, the environmental hygiene, the guidelines that have been developed (e.g., central line and foley catheter insertion)

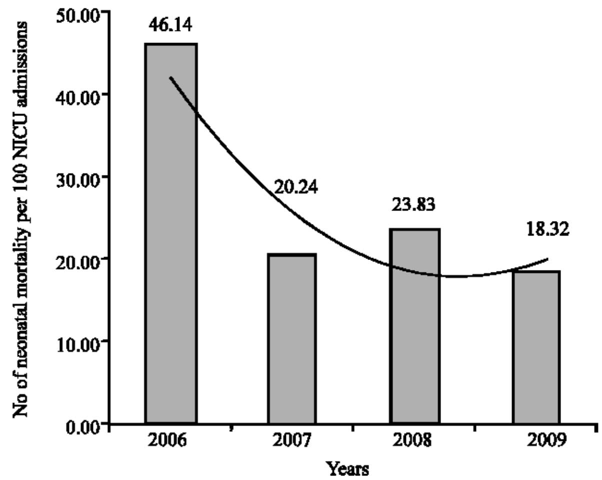

Fig. 3: Total numbers of surveyed health care associated infection at KAUH from 2006-2009

and the implementation of Centers for Disease Control and Prevention recommendations have in the opinion, improved the overall awareness of the staff on the importance of reducing the risk factors associated with nosocomial infections.

Medication use: The overall medication errors were broadly defined as any error in prescribing, dispensing or administering of a drug. The utilization of electronic prescribing may help reduce the risk of errors associated with illegible hand writing. However, such systems may in turn create a further potential hazard due to incorrect drug selection by the physician with increased prevalence due to the hospital being a teaching facility.

The majority of medication errors at KAUH are reported by nursing staff as a last filter and the root cause analysis proved difficult. The teaching environment has a general belief that reporting a medication error may turn blame to the reporting person as having played a role in underreporting.

In a survey that was conducted earlier in our hospital, 46% of the nursing staff surveyed felt that such reporting of errors may in turn be held against them. At the same time, 68% in the same survey felt that KAUH has a good system for preventing an error from happening.

Improvements of the reporting mechanism through Occurrence Variance Reports (OVRs) increased during and after the accreditation process and the medication error per 100 beds per month increased from 0.1-0.33%. Similarly, there was an increase in medication error reporting per 100 admissions from 0.02-0.07% post-accreditation. This increase in reporting is believed to be the consequence of newly implemented policies and the fear-free and no-blame culture that we are trying to implement in the daily working environment. The increase in reporting however, does not necessarily mean that there is more medication error but a healthier environment for reporting.

Blood utilization: The Blood Transfusion Reaction (BTR) is a reflection and indicator of Blood Transfusion Safety and Quality Assurance. The results in the hospital were between 0.15 and 0.32% of transfusions and these results were phased in 29 months. BTR are reported on the Hospital Information System (HIS) automatically by the nursing staff.

The overall concern is that the benchmark in the hospital is closer to the 0.12-0.19% range of others (Lowe *et al*., 2005). The overall organization and management of blood, recruitment of blood donors, screening of blood, storage, clinical use of blood, the training and education and the blood bank accreditation by an international body three years ago contributed to the lower BTR rate as shown in Fig. 4.

Surgery/Invasive procedures: The early return to OR due to post-operative complication is a reflection of the quality of care of the anesthesia services and surgeons. Complications within 48 h post-surgery are directly linked to post-operative mortality as mentioned in the study on mortality.

The significant reduction in the return to surgery within 48 h post-operatively dropped from an average of 2.33-0.58 patients/month in 2008. This was the consequence of the quality and patient safety culture and of having a clear hospital mission that is patient centered, focusing on quality. Additionally, it was due to the creation of the pre-operative anesthesia clinic and the establishment of the OR reviews committee where such adverse events are reported and discussed with root cause analysis.

The improved performance in services and preparation of blood and/or blood components with implementation of the newly developed policies and procedures and Medical Staff by-laws, rules and regulations may have contributed positively to the overall improvement, as shown in Fig. 5.

CPR codes: The employment of a life support training center that provides Basic Life Support (BLS), Advanced Cardiac Life Support (ACLS), Neonatal Resuscitation Provider (NRP) and Pediatric Advanced Life Support (PALS, Basic and Advanced) training and the implementation of mandatory certification of all medical and paramedical staff in BLS (minimum) have no doubt

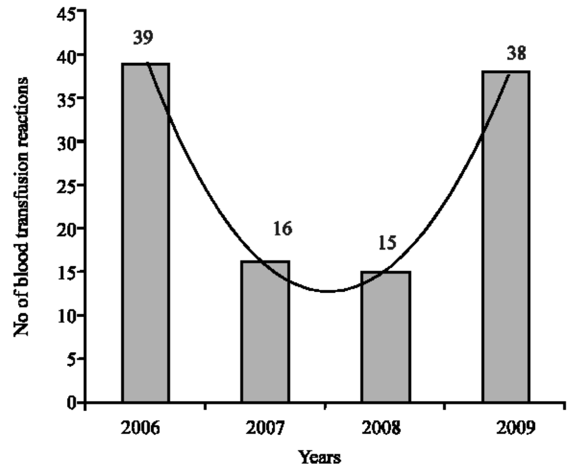

Fig. 4: Total numbers of blood transfusion reactions at KAUH from 2006-2009

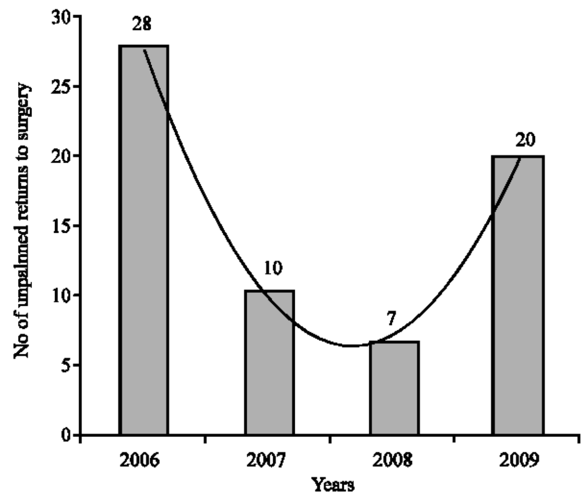

Fig. 5: Total numbers of unpalnned returns to surgery within 48 h at KAUH from 2006-2009

improved the overall CPR management from all aspects as shown in Fig. 6. Also playing a positive role are the continuous CPR drills that are done at ward level and the CPR critique and analysis. It is important to note that the total number of CPRs significantly increased from an average of 46.08-88.17 per month. This increase is linked to higher admission and the higher occupancy rate from 73 in 2006 to 95% in 2009.

The survival rate per 100 patients after first CPR at KAUH improved from 54.97-61.11% with a significant difference across the duration of the study. This result is superior to the findings of other studies which had an average of 29% (Winslow *et al*., 2001).

Adverse events In studying adverse events and patient safety, the lack of a universal nomenclature and taxonomy

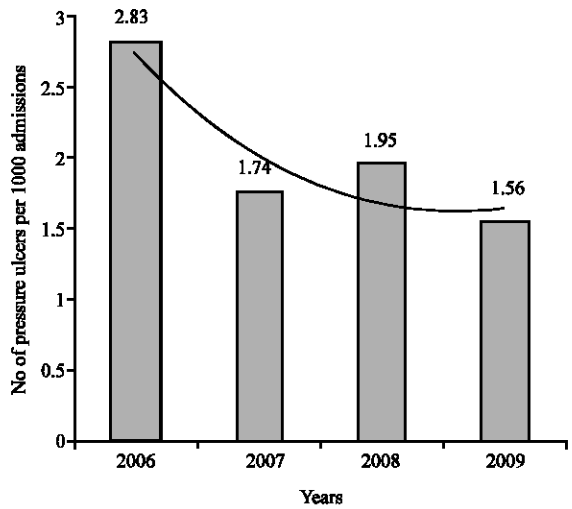

Fig. 6: Total numbers of patient who survived post first cardiopulmonary resuscitation at KAUH from 2006-2009

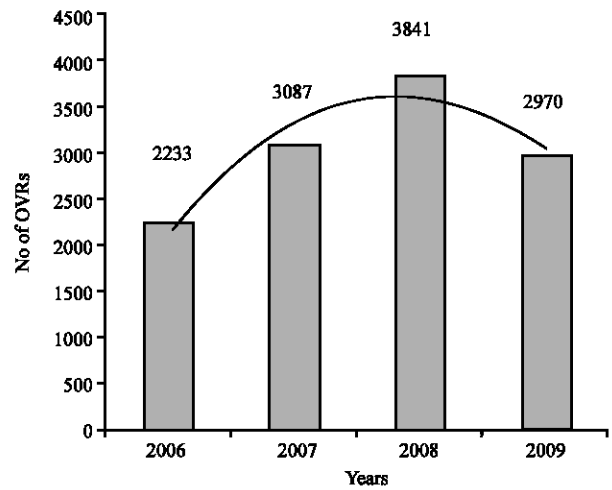

Fig. 7: Numbers of pressure ulcers developed per 1000 admission at KAUH from 2006-2009

is the first challenge to be faced (Zhan *et al*., 2005). Many terms are used but they are not clearly defined and they overlap. No one standard definition of the term adverse event exists (Kellogg and Havens, 2003). The term is most often defined as injuries caused by medical management (rather than by the underlying disease) that result in either prolonged length of stay, disability at discharge, or both (Thomas and Brennan, 2000).

Pressure ulcers have been reported by OVRs. We did not find any significant impact in numbers during the whole study however, there was significant improvement between pre-accreditation and first stage of accreditation and also pre-accreditation and one year post-accreditation as shown in Fig. 7.

Pressure ulcers decreased significantly per 1000 admissions as compared with the other international benchmarks of 5-6% (Van Gilder *et al*., 2009). We believe that this could be due to the young population and the short duration of stay of patients that ranged from 5-7 days on average. As an indicator, this could be classified as one of the best international practices. The reporting of incidents and variations of standard practice in occurrence reports as per KAUH policy gives an indication of problems encountered on a daily basis in the hospital which reflects the culture of reporting to higher authority, the existence of a culture of quality and a degree of transparency. There is no doubt that accreditation has improved the OVR reporting with a significant increase in reporting as shown in Fig. 8.

The quality and risk management personnel who are charged with studying all those OVRs and performing root-cause analysis subsequently give recommendations such as review of existing and/or development of new policies and procedures, correction of process deficit and educational empowerment.

The review of data reflected by OVRs indicates that there was an increase in reporting incidents wherein staff were not complying with existing policies and procedures. The increase was significant from the monthly average of 3.17-4.67 per month ($p<0.026$). In the opinion, this could be explained by the increased voluntary reporting process. This was most likely due to a better understanding of the OVR as an opportunity to improve. However, still we need to keep observing the degree of compliance with existing policies and procedures which is in the process of implementation at the hospital. In general, there is no doubt that all accreditation organizations have considered patient safety and risk management as a vital aspect of their programs. However, we discovered during the process that their approach to patient safety was not exhaustive and that the true value of accreditation may lie in its ability to generate discussion and stimulate change in general.

The literature suggests that few hospital CEOs have made safety a top priority or devoted the necessary resources to patient safety initiatives (Leape and Berwick, 2005). Research indicates that hospitals have been slow and inconsistent in meeting patient safety goals and (Longo *et al*., 2007) and and few have succeeded in making substantial transformations needed to achieve those aims (Lukas *et al*., 2007). Myer *et al*. (2007) studied four hospitals that had achieved superior performance in mortality and length of stay and identified four common factors: CEO commitment, an explicit mission statement focused on quality, a collaborative culture and efforts to get real time (Meyer *et al*., 2007).

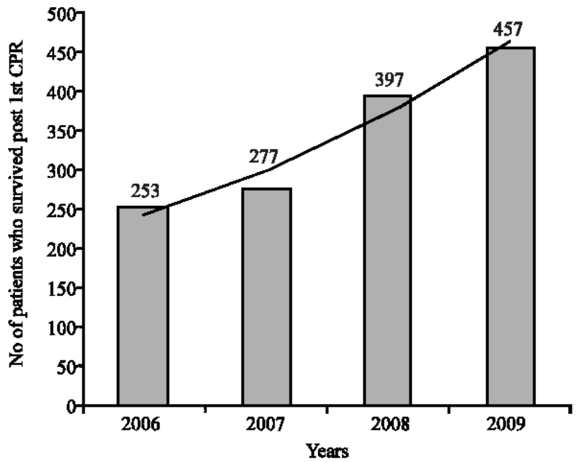

Fig. 8: Total numbers of occurrence variance reports at KAUH from 2006-2009

At KAUH, the key to success in improving patient safety culture and quality of care indicators post-accreditation was the commitment and support of top leadership, since the leaders understanding of safety concepts represents an essential component (Frankel *et al*., 2003).

CONCLUSION

With the strong support of Hospital Management, the Canadian accreditation process conducted at King Abdulaziz University Hospital has had a positive impact on the quality of care and patient safety indicators tackled in this study, i.e., mortality, healthcare-associated infections, blood transfusion reactions, surgery/invasive procedures, CPR codes and adverse events.

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