



# The Compliance of Healthcare Providers to Care Bundles in a Tertiary Hospital in Riyadh Region

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## **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## **ABSTRACT**

This study aimed to describe the compliance rate of healthcare providers to care bundles in a tertiary hospital in Riyadh Region. The overall compliance rate of hand hygiene was low (less than 80%). The overall compliance rates of urinary catheter bundle, central line insertion bundle, and central line maintenance bundle were high (more than 95 %). The compliance rate to SSI bundle, ventilator bundle, safe injection practice, and using personal protective equipment was high. It is important to increase the compliance rate of the care bundles elements to 95 percent or greater, particularly the compliance to hand hygiene to improve patient care.

**Keywords:** Care Bundles; compliance; healthcare providers; healthcare associated infections.

## **1. INTRODUCTION**

Healthcare associated infections are an important threat to patient safety and include

central line-associated bloodstream infections (CLABSIs), ventilator-associated pneumonia (VAP), catheter-associated urinary tract infection (CAUTI) and surgical site infection (SSI) [1]. To

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reduce rates of healthcare associated infections, a group of bundled evidence-based clinical practices have been developed and implemented in several healthcare facilities [2-5].

The Institute for Healthcare Improvement (IHI) developed the concept of “bundles” to help health care providers more reliably deliver the best possible care for patients undergoing particular treatments with inherent risks [6]. A care bundle identifies a set of key interventions deriving from evidence-based guidelines that, when implemented, are expected to improve patients’ health outcomes [7]. The aim of care bundles is to improve health outcomes by facilitating and promoting changes in patient care and to encourage guideline compliance [8]. Adherence to bundles helps to deliver consistent and reliable patient care. A previous study informed that the IHI bundles are much more than tying some interventions together. It is a strategy that aims to implement a culture of safety, which assumes full adherence to all bundle elements in all patients [9].

Care bundles that have shown significant impact on the prevention of HAI include sets of bundles for the prevention of central line-associated bloodstream infections (CLABSIs), bundle for the prevention of catheter-associated urinary tract infections (CAUTIs), bundle for the prevention of VAP, and bundle for the prevention of SSIs. Moreover, other important interventions include safe injection practices, using personal protective equipment and hand hygiene.

Previous studies showed that a bundle of infection control measures was shown to be extremely successful in reducing catheter-related blood stream infections [2] and ventilator-associated pneumonia [10]. Jaffe et al reported that SSI rates is 0.9% when there is a compliance to all care bundle components and the SSI rate is 17.9% when bundle adherence was lowest [11]. Moreover, Richards et al stated that the application of evidence-based practices

to reduce catheter-associated urinary tract infections decrease the infection ratio from 2.34 to an infection ratio of less than 1.0 [12].

It is important to know and to implement these care bundles to improve patient outcomes. In our region, there is limited research about care bundles. So, the aim of the present study was to describe the compliance rate of healthcare providers to care bundles in a tertiary hospital in Riyadh Region.

## 2. METHODOLOGY

This is a descriptive cross-sectional study that was conducted to describe the compliance rate of healthcare providers to care bundles during 2020. The study was conducted in a tertiary hospital in Riyadh Region that is a region of Saudi Arabia, located in the geographic center of the country.

The data included in the study were overall hand hygiene compliance rate, personal protective equipment compliance rate, overall safe injection practice compliance rate, overall urinary catheter bundle compliance rate, overall ventilator bundle compliance rate, overall central line insertion bundle compliance rate, overall central line maintenance bundle compliance rate, and overall SSI bundle compliance rate.

The data were collected by the infection control unit in the hospital after the approval of the study by IRB ethical committee of the hospital with a number: 4101728. The descriptive data were presented as numbers and percentages.

## 3. RESULTS

The compliance rate to hand hygiene practice was 79% in the first 4 months of 2020 and after that decreased to 76% in the last 3 months. The overall hand hygiene compliance rate in 2020 was 77% as shown in Table 1.

**Table 1. Overall hand hygiene compliance rate**

Months	Hand hygiene compliance rate
January to April, 2020	79%
May to August, 2020	77%
September to December, 2020	76%
Overall	77%

Table 2 shows the compliance rate to personal protective equipment in male, female and pediatric ward. The compliance rate was 86% in female ward and 80% in male ward. The average personal protective equipment compliance rate was 81%.

Table 3 shows the compliance rate of safe injection practice. The highest compliance rate was in pediatric ward (94%) followed by female ward (93%). The overall compliance rate of safe injection practices was 89%.

Table 4 shows the overall urinary catheter bundle compliance rate. The highest compliance rate was in pediatric ward (100%) followed by female ward (98%). The average urinary catheter bundle compliance rate was 98%.

Table 5 shows the overall ventilator bundle compliance rate. The highest compliance rate was in pediatric ward (100%) followed by male

ward (93%). The overall ventilator bundle compliance rate was 94%.

Table 6 shows the overall central line insertion bundle compliance rate. The highest compliance rate was in pediatric ward (100%) and female ward (100%). The overall central line insertion bundle compliance rate was 95%.

Table 7 shows the overall central line maintenance bundle compliance rate. The highest compliance rate was in pediatric ward (100%) followed by female ward (97%). The overall central line maintenance bundle compliance rate was 97%.

Table 8 shows the overall SSI bundle compliance rate. The highest compliance rate was in male ward (100%) followed by pediatric ward (90%). The overall SSI bundle compliance rate was 93%.

**Table 2. The compliance rate of using personal protective equipment**

Ward	Personal protective equipment compliance rate
Male	80%
Female	86%
Pediatric	77%
Average	81%

**Table 3. Safe injection practice compliance rate**

Ward	Safe injection practice compliance rate
Male	81%
Female	93%
Pediatric	94%
Average	89%

**Table 4. Overall urinary catheter bundle compliance rate**

Ward	Urinary catheter bundle compliance rate
Male	97%
Female	98%
Pediatric	100%
Average	98%

**Table 5. Overall ventilator bundle compliance rate**

Ward	Ventilator bundle compliance rate
Male	93%
Female	89%
Pediatric	100%
Average	94%

**Table 6. Overall central line insertion bundle compliance rate**

Ward	Central line insertion bundle compliance rate
Male	86%
Female	100%
Pediatric	100%
Average	95%

**Table 7. The overall central line maintenance bundle compliance rate**

Ward	Central line maintenance bundle compliance rate
Male	94%
Female	97%
Pediatric	100%
Average	97%

**Table 8. Overall SSI bundle compliance rate**

Ward	SSI bundle compliance rate
Male	100%
Female	88%
Pediatric	90%
Average	93%

#### 4. DISCUSSION

The study found that the overall compliance rate of hand hygiene was low (less than 80%). The overall compliance rates of urinary catheter bundle, ventilator bundle, central line insertion bundle, central line maintenance bundle, personal protective equipment, safe injection practices, and SSI bundle were high (more than 80 %). Although the compliance rate to SSI bundle, ventilator bundle, safe injection practice, and using personal protective equipment was high; the compliance rate still less than 95% and need improvement. Resar et al informed that compliance with bundles is measured using all-or-none measurement, with a goal of 95 percent or greater [9].

The present study showed that the overall compliance rate of urinary catheter bundle was high (98%). Similarly, Lai et al reported that the overall compliance rates of urinary catheter insertion bundle and urinary catheter maintenance bundle in high-risk units of hospitals in Taiwan was more than 90% [13]. Moreover, Ghazal et al reported that the compliance with the insertion bundle components was 98.5% and with urinary catheter maintenance was 76% [14]. The present study showed also that the overall compliance rate of ventilator bundle was 94%. Similarly, Al-Thaqafy et al reported that ventilator bundle compliance was 90% in 2010 and

significantly increased to 97% in 2013 [15]. Bird et al stated that compliance with the VAP bundle increased over their study period from 53% and 63% to 91% and 81% in in two surgical intensive care units [16].

The overall compliance rate of central line insertion bundle was 95% and the overall compliance rate of central line maintenance bundle was 97% in the present study. Padilla informed that among critically ill patients, the central line maintenance and central line insertion bundles reached 62.9% and 94.7% compliance [17]. The compliance to SSI bundle was 93% in the present study. Lohsiriwat stated that the overall median compliance with Thailand's SSI prevention bundle was 80% [18]. Moreover, Koek et al reported that surgical care bundle compliance increased over time from less than 20% to 64% [19].

The compliance to personal protective equipment was 81%, the compliance to safe injection practices was 89%, and the overall compliance rate of hand hygiene was 77% in the present study. Prakash et al reported that the overall compliance for personal protective equipment among health care workers involved in the surgery of COVID-19 negative cancer patients was 96.3% [20]. Neuwirth et al reported that the total adherence of personal protective equipment use was 85% in the COVID-19 wards and 76% in

the non-COVID-19 wards [21]. Rehan et al stated that regarding injection practices of healthcare professionals in a tertiary care hospital, overall injection practices were satisfactory. However, unsafe practices with respect to not wearing/changing gloves (61.6%), not washing hands (95.4%), wiping of needle with swab (15.4%), recapping of needles (12.2%), and breaking of ampoule with solid object (44.4%) were observed [22]. World Health Organization reported that the adherence of healthcare professionals to recommended hand hygiene procedures has been reported as variable, with an overall average of 38.7% [23]. Moreover, Nepper et al informed that the compliance to hand hygiene remains low, averaging 50% across hospitals nationwide [24].

## 5. CONCLUSION

The compliance to care bundle was high in the study except the compliance to hand hygiene was less than 80%. It is important to increase the compliance rate of the care bundles elements to 95 percent or greater, particularly the compliance to hand hygiene, to improve patient care. It is important also to set a bundle compliance percentage goal for the healthcare team to work toward achieving.

## CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

## ETHICAL APPROVAL

The data were collected by the infection control unit in the hospital after the approval of the study by IRB ethical committee.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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