

Awareness of ventilator and central venous catheter bundles among critical care providers in Nigeria



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SUMMARY

- Based on the Vienna declaration of 2009 by European societies of intensive care medicine, low implementation of safe patient care practices was identified as a global problem. This issue warrants attention in all healthcare settings irrespective of resources availability. In low resource environments, the World Health Organisation (WHO), in 2011, identified potential risks associated with implementation of healthcare bundles; high case-load; lack of standard medical equipment and low human resources.
- The aim of this project was to explore the level of awareness of ventilator care and central venous catheter bundles with the objective of determining the gaps of implementing these bundles among ICU care providers in Nigeria. • A descriptive cross-sectional survey method through a twopart anonymous survey questionnaire developed by a group of experts was addressed to all ICU care providers. The e-mail list comprised contacts in tertiary teaching hospitals in Nigeria.
- A total of 47 (19%) responders; critical care nurses 25 (53%), physicians 9 (19.15%), residents in training 8 (17%), administrators 1 (2%) and others 1 (2%) completed this survey (response rate: 15%). Awareness was low for both ventilator and central venous catheter bundles, with implementation rates 51% and 46%, respectively.
- The findings demonstrate low level of awareness and implementation of ventilator and central venous catheter bundles among critical care providers in Nigeria. Vigorous staff education and development of unit-based protocol are needed to improve health care provider knowledge for both ventilator and central venous catheter bundles.

INTRODUCTION

The Vienna declaration by the European Society of Intensive Care Medicine (ESICM, 2009) identified gaps in safe patient care as a global problem (Moreno, Rhodes & Donchin, 2009). Consequently, patient safety needs to be addressed in all critical care settings regardless of availability of resources. Studies by Narang (2008), and AL-Taufiq and Abed (2010), reported significant reductions in the cost of care, intensive care unit (ICU) length of stay (LOS), morbidity and mortality as a result of consistent implementation of evidence based care bundles.

According to Lawrence and Fulbrook (2011) and Horner and Bellamy (2012) in the most developed countries efforts by the quality improvement programs and scientific organisations played a significant role in promoting the development and utilisation of care bundles. On the contrary, local efforts to ensure that patient care is safe and effective are lacking in many developing African countries, and a wide information gap exists with regard to implementation of best practices, creation and sustenance of patient safety programs (World Health Organisation 2011).

Scant evidence exists regarding implementation of safety goal bundles in Nigerian critical care settings. This might be related to several factors. Most ICUs do not have the resources for mechanical ventilation. Mechanical ventilators are available mainly in tertiary medical centres. Central line placement does not occur with the same frequency as compared to Western or industrialized countries. Again, this is mostly related to challenges with funding for medical care (Okafor 2009). Thus our aim was to explore the level of awareness and adherence to components of VAP and CLABSI bundles, and to identify barriers to their implementation in Nigerian ICUs.

Definitions and literature review

According to the Institute for Healthcare Improvement (IHI, 2011), care bundles are sets of proven interventions related to a specific disease process that when implemented together resulted in better care outcomes. Care bundles were first developed over two decades ago (Horner & Bellamy, 2012), and they are built on the principles of evidence based medicine.

Ventilator-associated pneumonia (VAP) is a common and leading cause of morbidity and mortality among mechanically ventilated patients in ICUs (Mansoor 2016). There is strong evidence supporting that implementation of all the components of the ventilator bundle (head of bed elevation to 30-40 degrees, daily sedative interruption, peptic ulcer prophylaxis, venous thromboembolism (VTE) prophylaxis and oral care with chlorhexidine gluconate), leads to a significant reduction in VAP rates and to improved care outcomes (Lawrence & Fulbrook 2011; Wip & Napolitano 2009; Raser et al., 2012).

Central venous catheters (CVC) are commonly used in ICUs for invasive monitoring, fluid/blood products administration, medication and parenteral nutrition (Carrie, et al., 2012). Central line-associated blood stream infections (CLABSI) are common where proper

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catheter insertion and maintenance guidelines are not adhered to, leading to increased ICU LOS and cost of care (Mermel, 2000; Pittet, Tarara, & Wenzel 1994). The Centre for Disease Control (CDC) (2011) CLABSI bundle consists of: hand hygiene and maximal barrier precaution, chlorhexidine skin preparation, optimal catheter site selection and daily review of line necessity and prompt removal.

METHODS

Design

A descriptive cross sectional survey was conducted from 28/5/2015 to 3/8/2015 using online SurveyMonkey software. We developed a survey questionnaire based on IHI's ventilator bundle and the Center for Disease Control (CDC) CLABSI bundle. The questionnaire was developed by a group of experts comprising of two intensivists based in the US and two critical care nurses based in Nigeria, with the author being the second nurse in the group. The total number of questions in the survey was 11. The questionnaire consisted of two parts; part 1 (5 questions) addressed demographics covering respondents speciality, years of ICU experience, location of the ICU in Nigeria, number of ICU beds, nurse: patient ratio. Part 2 (6 questions) addressed daily number of mechanically ventilated patient, familiarity and implementation of ventilator bundle, familiarity and implementation of CLABSI bundle, number of patients with CVC on daily bases, and finally the challenges affecting implementation of the care bundles.

Ethics

This study was approved by the ethics committee of Aminu Kano Teaching Hospital.

Sample

A convenience sample was used in this survey. A list of available e-mail contacts of ICU doctors and nurses was obtained from the secretariat of National Association of Nurse Intensivists of Nigeria.

Data collection

Data were collected using the web based SurveyMonkey® software. E-mail invitations were sent with the link to the research survey. Confidentiality and anonymity were maintained throughout the data collection, facilitated by the software's feature that allows anonymous data collection. Informed consent was inferred upon voluntary completion of the survey questionnaire.

Statistical analysis

Data were analysed using Microsoft Excel 2010 version. Variables were described in percentages and range.

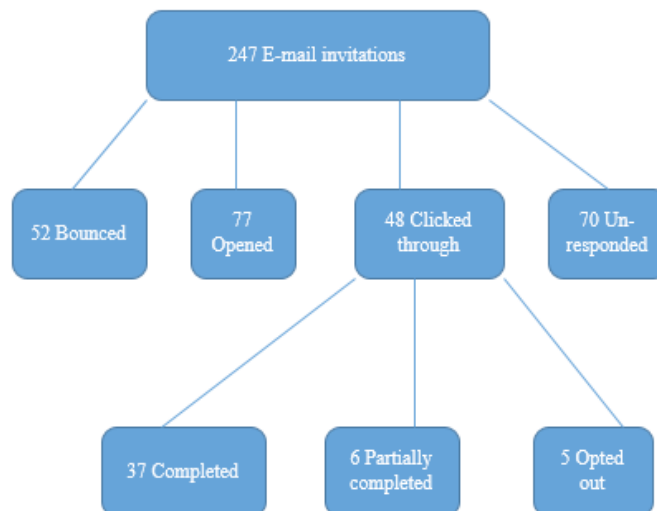
RESULTS

A total of 247 e-mail invitations were sent out, 37 responders (14.97%) completed the survey, 21.1% were bounced, 46% opened the survey, 28.34% were not completed, 2.42% partially completed, 2.0% opted out as shown in Figure 1.

The breakdown of the respondents by speciality, experience, ICU location, number of ICU beds, and nurse:patient ratio are shown in Table 1. Daily rates of mechanically ventilated patients are shown in Figure 2: 15% reported no mechanical ventilation (MV), 68% had 1-2 patients with MV, 15% had 3-4, while 2% had more than 4 patients with MV. Of the responders, 53.7% were familiar with the ventilator bundle, 31.7% were unfamiliar, while 14.6% indicated to have read about it, as shown in Figure 3.

When asked about implementation of discrete components of the ventilator bundle, 73.3% of responders reported to be

Figure 1. Flowchart describing responses to e-mail invitation



Respondents		n (%)
Profession	Critical care nurse	25 (53.2)
	Physician	9 (19.2)
	Paediatrician	3 (6.4)
	Resident in training	8 (17.0)
	Hospital administrator	1 (2.1)
	Other	1 (2.1)
Work experience (years)	1-3	3 (6.4)
	4-6	3 (6.4)
	7-9	10 (21.3)
	> 9	31 (66.0)
Location of ICU in Nigeria	North east	8 (17.0)
	North west	22 (46.8)
	South east	3 (6.4)
	South west	10 (21.3)
	North central	4 (8.5)
Number of ICU beds	2-4	26 (55.3)
	5-6	15 (31.9)
	7-8	5 (10.6)
	> 8	1 (2.1)
Nurse to patient ratio	1: 1	24 (51.1)
	1: 2	20 (42.6)
	1: 3	3 (6.4)

Table 1. Respondents' demographics and ICU characteristics

maintaining head elevation during MV, 22.2% interrupting sedation on daily basis, 66.7% administering peptic ulcer prophylaxis, 60% administering VTE prophylaxis and 57.85 performing oral care with chlorhexidine gluconate (Figure 4).

Of the respondents, 38.9% reported they were familiar with the CLABSI bundle and 61.1% were unfamiliar. With regard to the implementation of CLABSI bundle components; 91.1% reported that they complied with hand hygiene, 45.9% adhered to maximal barrier precautions, 48.6% used chlorhexidine skin antiseptic preparation,

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Figure 2: Daily rate of mechanically ventilated patient

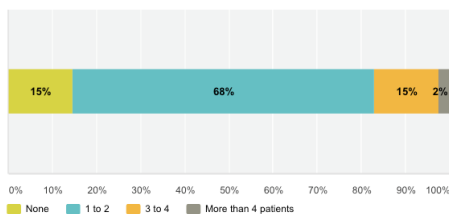


Figure 3: Familiarity with VAP bundle

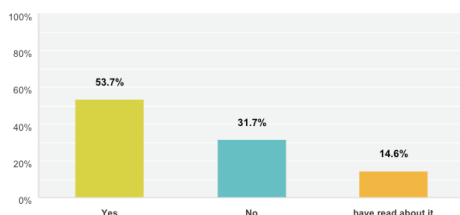


Figure 4: implementation of VAP bundle

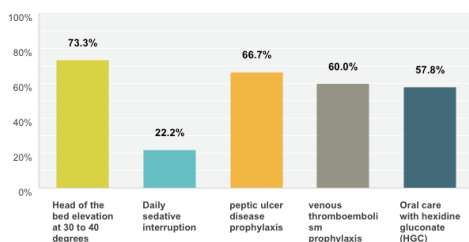


Figure 5: CLABSI bundle implementation

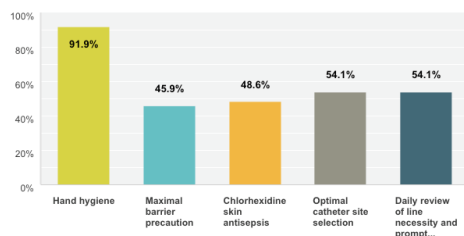
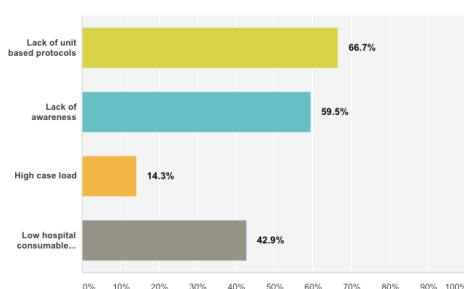


Figure 6: Barriers to implementing VAP and CLABSI bundles



54.1% followed optimal catheter site selection, while 54.1% reviewed the line on a daily basis for its necessity and removal (Figure 5). Moreover, as main barriers to implementing ventilator and CLABSI bundles, 66.7% of respondents reported lack of unit-based protocols, 59.5% lack of awareness, and 14.3% high case-load (Figure 6).

DISCUSSION

The results of this survey in a convenience sample of critical care providers in Nigeria showed low levels of awareness on ventilator and CLABSI bundles. Previous systematic reviews and international studies (Nahla 2013; Johnson, Kyngäs & Kääriäinen, 2014; Jordi et al., 2002) demonstrated similarly low knowledge on evidence-based guidelines for the prevention of ventilator associated pneumonia. This knowledge gap, according to WHO (2011), is a major problem affecting utilisation of proven care guidelines in developing countries. This trend can be successfully reversed through education programs for ICU care providers.

Equally, participants reported low implementation of specific components of the ventilator and CLABSI bundles. Adherence to care bundles depends on the knowledge base of clinical staff, availability of resources, cost of care and fear of adverse events (Rello, et al., 2002). Our results showed that lack of unit-based protocols, awareness, and shortage of hospital consumables were the main factors affecting proper implementation of care bundles.

An important finding with great implications for clinical practice was that, among the ventilator bundle parameters, the least practiced intervention is the daily sedation interruption, since less than one fourth of responders reported adherence to this practice. Interruptions of daily sedation have a beneficial role in reducing prolonged MV, ICU LOS, cost of care and overall reduction in morbidity and mortality (Narang 2008; Al-Tawfiq & Abed 2010; Lawrence & Fulbrook 2011). Moreover, sedation interruption reduces the risk for ICU delirium and improved long term quality of life (Ely, et. al., 2001).

Limitations

These results need to be interpreted with caution due to the small sample size and low response rate, which might have introduced bias. The low response could be associated with poor internet access and invalid E-mail contacts. Moreover, due to the small sample size we only report descriptive statistics. Future studies need to explore associations between unit and care provider characteristics with awareness of ICU bundles. We suggest that future study should specifically focus on ICU specialists' educational level, years of experience and utilisation of care bundles, and to assess the long term outcomes of mechanically ventilated patients.

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