KEYWORDS: PERSONAL PROTECTIVE EQUIPMENT, PERIOPERATIVE, TEAM, LEADERSHIP, COMPLIANCE.

USING THE TEAM TO REDUCE RISK OF BLOOD AND BODY FLUID EXPOSURE IN THE PERIOPERATIVE SETTING

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ABSTRACT:

Introduction: Despite the substantial risks posed in the surgical environment, compliance in wearing appropriate personal protective equipment (PPE) in the operating room (OR) and the post-anaesthetic care unit (PACU) amongst health care workers is considered poor globally. Lack of awareness and limited access to information about the appropriate precautions to prevent exposure contribute to continued high-risk behaviours amongst the team in the perioperative setting.

Aim: The aim of this project was to assess current compliance rates of staff in the use of PPE and to develop and implement an educational program to increase staff compliance in the perioperative setting of a large, private hospital (450 beds).

Method: A convenience sample of perioperative nurses were invited to complete a questionnaire.

Results: Eighty (80) registered nurses (RNs) were invited to participate (response rate of 69%), giving a sample size of n=55. Questionnaires not completed in full were not included in the final analysis, leaving n=31 fully completed questionnaires. There was an education group (n=14) and a control group (n=17). Between the groups, educational background, type of work and patient contact were very similar. Of those that did respond regarding exposure, only 20% reported the incident. Both groups identified their manager and team as frequently discussing safer work practices and being supportive. PPE was identified as essential; however, participants reported not enough time to always follow standard precautions (education 15%; control 25%).

Conclusions: Team and good leadership was identified as essential to ongoing professional knowledge and support with regard to risk minimisation in the perioperative setting.

The aim of this project was to assess current compliance rates of staff in the use of PPE and to develop and implement an educational program to increase staff awareness and compliance in the perioperative setting.

INTRODUCTION

The nature of the perioperative setting and the conditions in which surgical procedures take place put perioperative staff at increased risk for occupational exposure (such as blood splash) and occupationally acquired blood-borne viruses (BBV).[1] Despite the considerable risks for exposure in the surgical setting,[2,3] wearing appropriate personal protective equipment (PPE) in the operating room (OR) and post-anaesthetic care unit (PACU) is poor globally.[2] Osborne[14] examined the level of observance in the use of PPE among scrub nurses in Australia and findings revealed that, contrary to other studies, respondents rated their compliance rate at a high percentage of 86% in the use of eyewear protection. A limitation of Osborne's study was that it focused on nurses undertaking work in the scrub role. This high compliance rate is dissimilar when compared to other results[5] that indicate 67% of injuries to health care workers (HCW) in anaesthetics and PACU were due to splashes where staff were not wearing appropriate protective eyewear. The difference may be attributed to the role and perceived risk differences for splashes between scrub nurses (in theatre) and nurses working in anaesthetics and PACUs.[6]

Education has been identified as an important aspect to increasing awareness and compliance with infection control standards such as wearing PPE. Literature, however, fails to indicate the length of time staff are compliant with following PPE[7] standards after attending PPE education/professional development.[3,8,9] Education is not the only factor which predisposes adherence to self-protective behaviours; a number of factors within the individual, the organisation and the environment predispose, enable, and reinforce these protective behaviours.[10] Organisational influences such as communication, feedback from other staff members and social approval from management and the team including the safety climate of the unit impacts staff acceptance and adherence to PPE.[10] The team in the OR and PACU may have an effect on individual compliance with PPE. Teams that are supportive and foster a culture of compliance/safety are more likely to have greater compliance overall.[11] Supervisors and senior staff members who support a safe work culture and model compliant behaviours are more likely to influence their staff to comply with safe work practice.[12] Other barriers to compliance with PPE often include lack of time, perceived low risk of patient, PPE interfering with care or unavailability.[13]

The aim of this project was to assess current compliance rates of staff in the use of PPE and to develop and implement an educational program to increase staff awareness and compliance in the perioperative setting. The overall objective for this study was to assist staff in risk assessment and appropriate PPE selection by: (a) developing and delivering best practice infection control education to OR staff; (b) increasing OR staff knowledge of risk assessment and PPE selection; and (c) determining an improvement in compliance with PPE standards six months following the education. The expected outcomes of the results of this study are anticipated to be: (a) the development and delivery of best practice infection control education to OR staff; (b) an increase in OR staff knowledge of risk assessment and PPE selection; and (c) at least 80% compliance within the OR and PACU with PPE standards six months following the education.

Participating site

The participating site was a large, metropolitan, private hospital with 450 beds employing 1100 nurses and midwives. The hospital has a total of 23 theatres across three sites and annually has an excess of 36,000 theatre cases per year. Major specialities include orthopaedics, neurosurgery, obstetrics, gastrointestinal, cardiac, ear, nose and throat and plastic surgery.

Method

A convenience sample of perioperative nurses was invited to complete a questionnaire. Each study participant was provided with a sealed envelope, which consisted of a participant information letter, a consent form, and a link to an online survey. The education intervention was a booklet of information divided into modules and self-assessments in the form of quizzes related to PPE for staff working in the OR and PACU. It was evidence-based and peer-reviewed. The education package was placed in half of the envelopes and was provided to half of the participants. The participants were randomly assigned to either an education group (intervention group) or a non-education group (control group). Randomisation was undertaken by the participants' self-selection of the sealed envelope containing either an education pack and information package or information package only. The researchers were unaware of which participants were in the intervention group. The participants were instructed to provide a contact email address for follow-up in six months' time to complete the same online survey at the second time point. The surveys were completed online anonymously. The first time point (baseline) was immediately prior to the PPE education (provided only to the intervention group). All participants completed the same online questionnaire. At the second time point (six months post-education) all participants undertook a second self-administered questionnaire (the same content as the initial questionnaire). This was analysed for compliant behaviours from baseline for both group participants. The questionnaire comprised reliable and valid tools that measured practices with standard precautions and staff perceptions of their employer's safety program.11 Data collected included staff-centred characteristics (that is, demographic variables), job-related variables (that is, number of patients seen and number of hours worked in a typical week); self-reported compliance with standard precautions using a well-characterised, 12-item compliance scale[14]; patient-centred characteristics (that is, type of patient and level of care); organisational factors (that is, infection control training) and perception of employer's safety program.[11] Ethical clearance was received by the hospital's ethics committee.

Results

Eighty (80) RNs were invited to participate in this pilot study. The response rate of 69% produced a final sample of n=55. Questionnaires not completed in full were not included in the final analysis, leaving n=31 fully completed questionnaires for the first time point data collection. This number decreased to 17 fully completed surveys in the second time point post-intervention data collection, with a high attrition rate of 45%.

At time point one there was an education group (n=14) and a control group (n=17). Between the groups their

educational background, type of work and patient contact were very similar. Of those that did report experiencing an occupational exposure, only 20% reported the incident to their employer/manager. Both groups identified that regularly discussing safe work practices in an environment that provides support had a positive effect on their PPE compliance. PPE was identified as essential; however, participants report not enough time to always follow standard precautions (education 15%; control 25%).

At time point two (six months post education) with education n=7 and control group n=10, there was an increase in self-reported compliance in following standard precautions in both groups (100% reported always following standard precautions). In the education group there was a decrease in hand washing after glove removal (79%

Figure 1: Communication about PPE with nurse unit managers

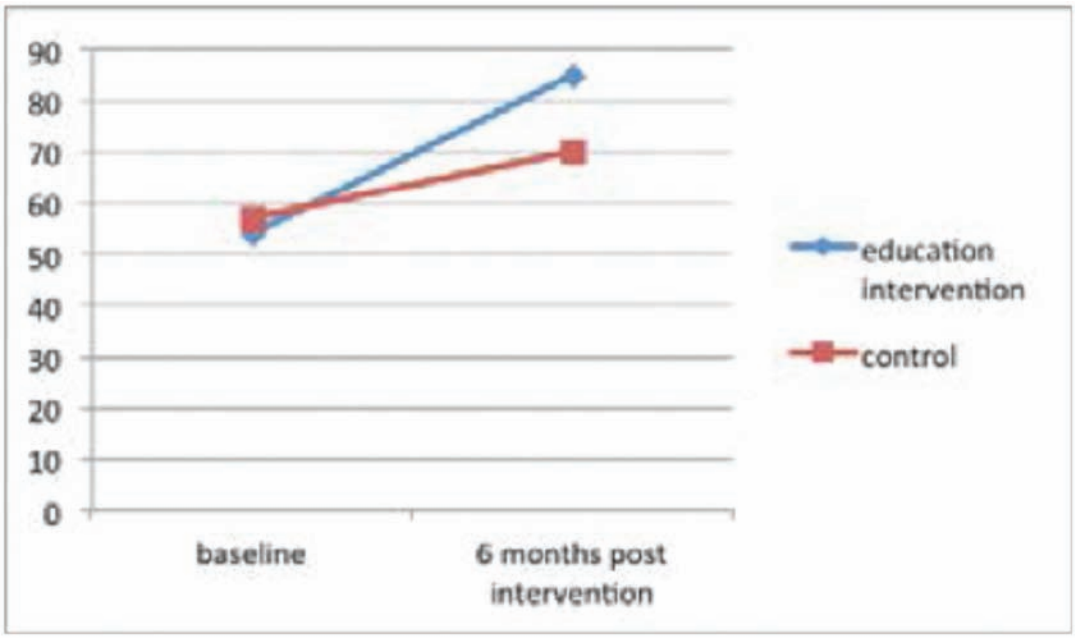
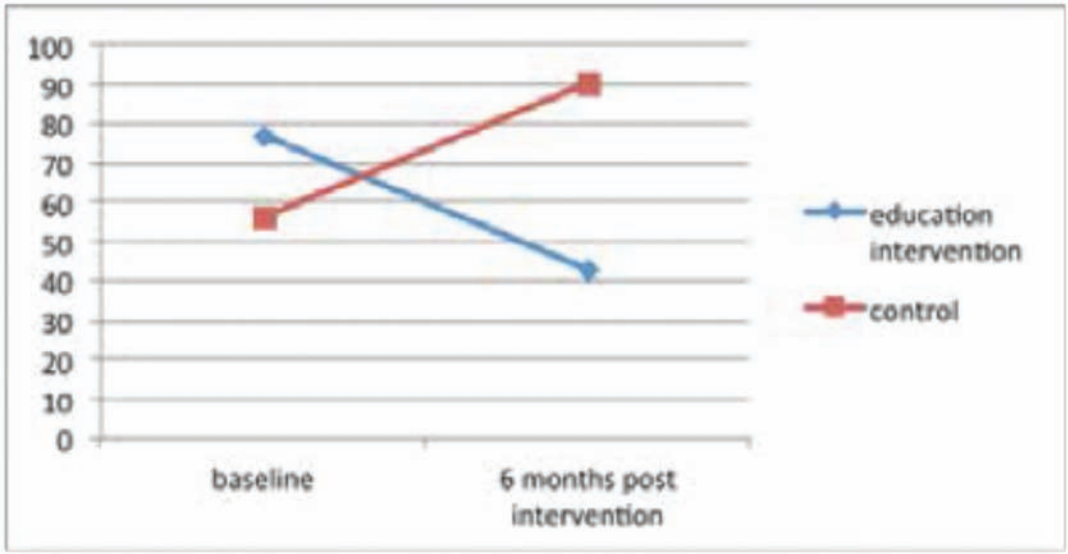


Figure 2: Members of the unit supporting one another in communications about PPE



to 71%) and a decrease in compliance in wearing eye protection when there was a possibility of splashes (100% to 86%). Additionally, there was an improvement in awareness of systems for care following exposure in the education group (86% to 100% awareness) and in the control group (20% to 30% awareness). PPE was for the majority of the time readily available for both groups.

Both the intervention and control group showed an improvement in communication with nurse unit managers about PPE (see Figure 1 shown in percentages).

The nursing staff in the education intervention group reported a decline in supporting one another's communication about PPE amongst their peers, while nurses in the control group reported an increase in supporting communication about PPE amongst their peers (see Figure 2 shown in percentages).

Discussion

The findings revealed that education had a positive effect on compliance for wearing PPE in the perioperative setting, where both groups had a 100% compliance self-rating in the second time point. The findings also revealed that leadership and the team were important in enhancing compliant behaviours with PPE in the perioperative setting. Interestingly, there was a decrease in perceived collegial support after education related to PPE. The reason for this decrease is unknown; however, it may be attributed to potentially moving the focus of support from colleagues (informal support) to management (formal support) post education. This finding appears supported by the increase in awareness of protocols to follow post incident/exposure in both groups. PPE was identified as essential; however, in the first time point participants reported that they did not always have enough time to follow standard precautions. Education had a positive impact on compliant behaviours revealing increased compliance over time. Of concern was the finding that staff exposed to splashes and sprays of blood and bodily fluid demonstrated under-reporting behaviours.

Leadership and team support central to enhancing PPE compliance

Manager and team were described in this study's findings as important to safer work practices and support related to PPE use. Activities such as surveillance of exposures, managerial support and team educationrelated to PPE and standard precautions contributed to an improved culture of adherence in the use of PPE.[15] Central to staff awareness is knowledge related to supports that are available for them post incident/exposure. Immediately following a blood or bodily fluid exposure, it is essential that appropriate follow-up procedures occur; immediate

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notification of the incident to appropriate staff members is a means to ensure that timely and adequate follow-up can occur. For instances in which an exposure has occurred, post-exposure management is an important part of workplace safety. The employer must ensure that the exposed health care worker is able to obtain every available support they require following the incident.[16]

Education made a difference to PPE compliance

Education had a positive impact on compliance where staff reported not enough time to always follow standard precautions. Health care practices worldwide recognise the use of education to prevent and control health care-associated infections.[17] A review of the available literature investigating the role of education on compliance with infection control standards was conducted and revealed that while education may increase knowledge, it may not necessarily improve practice.[7] This gap in knowledge to practice was identified in the current study that while staff reported increased knowledge about PPE the constraints of their working environment (that is, the reported perception of lack of time to adhere to PPE) resulted in non-compliance of PPE standards. This finding was consistent with findings from Atack and Luke[18], where participants who completed on-line competency training in infection control reported that the feasibility to transfer learning into practice was predicted by the individual's perception of organisation support to do so. Education in the current study increased communication about PPE between staff and management. This may be explained by the fact that education also improved awareness and may have increased staff confidence to discuss PPE matters with management.

The literature review also revealed that there is a paucity in the literature investigating the sustained effects of education on compliance of infection control practices. A study by Panhotra et al.[19] investigated the effects of education to improve hand-washing behaviours and found that over a three-year period, the effects of continuous education programs resulted in a significant increase in compliance among health care staff. The researchers noted, however, that the lasting effect resulted from a combination of multiple interventions (that is, lectures, demonstrations, written handouts, reminder posters, education materials) rather than a single intervention, which had a limited effect. A later study[20] found that education programs had a significant increase in hand hygiene practices in neonatal health care professionals. The researchers concluded that the results may be an indication of not only the 30-minute education program, but also that infection control became an important issue for staff in this area and that the positive feedback may have resulted in increased compliance. The researchers concluded that in complex clinical environments it may be difficult to isolate education as a primary reason for behavioural changes and the effects on compliance for using PPE in this study. Their findings may have also been attributed to other factors in the environment that could not be measured or controlled.

Under-reporting incidents of exposure

Of those that did respond regarding occupational exposure, only 20% reported the incident. The level of under-reporting in this study's findings is alarming and may relate to a number of factors. Alarmingly, nurses tended not to report incidents due to potential or actual organisational barriers (that is, poor management response, no clear policy for during the incident and/or post incident) and personal barriers (that is, fear of stigma and/or vote of no confidence from peers and managers, previous experience of no action from management, normalising the event). Nurses would, however, utilise support from other staff members (informal supports) rather than using formal support structures where they existed.

Under-reporting of these serious work injuries is a significant problem and is common in HCW for a number of reasons, including fear of losing their job, stigmatisation and lack of knowledge of reporting protocols.[21]

Under-reporting of these serious work injuries is a significant problem and is common in HCW for a number of reasons, including fear of losing their job, stigmatisation and lack of knowledge of reporting protocols.[21] A study by Winchester and Tomkins[22] investigated HCW perceptions of the risks of developing a BBV infection in the health care setting and possible barriers to reporting such incidents. They found that the majority of HCW (dental health care) worried about contracting a BBV, especially those who had been more frequently exposed to such patients and while most (92%) of participants agreed that it was important to report body-fluid exposure incidents, only 58% had reported such incidents. Under-reporting of exposures was also found in the current study and as Winchester et al. suggest[22], the use of education to increase awareness and the use of an universal electronic reporting system may improve reporting numbers. Exposure risks such as needle stick injuries (NSI) are often under-reported for a number of reasons in the clinical setting including: lack of time and the perceived low risk of

The limitations of this study include the small sample size impacting on the generalisability of the findings.

transmission at the time of exposure. An exposure injury can be a traumatic event, having a lasting psychological effect on HCW where anxiety and depressive symptoms can affect their everyday functioning.[21] Further studies using qualitative methods may be used to ascertain the reasons why health care professionals in this clinical setting are not reporting such incidents.

Limitations

The limitations of this study include the small sample size impacting on the generalisability of the findings. The sample type (convenience) also impacts on generalisability to other speciality nurses outside of the perioperative setting. Additionally, much of the reporting was self-reported, which may be influenced by a number of unknown confounding variables not accounted for in this pilot study. Moreover, participants' self-reporting of compliance with PPE may result in them answering favourably to wearing PPE as this is an organisational expectation but in practice they may not always comply with PPE. Data related to participants not participating in the study or who dropped out of the study were not collected.

The education package was provided in a written booklet form for feasibility and anonymity. The presentation of written information may limit the learning style of individual participants who may prefer other modes of learning such as online modules, practical demonstration (face-to-face) or lectures. The researchers also had no confirmation that the participants in the education group completed the education booklet (that is, read and completed self-assessment tasks). Further studies could investigate the learning potential of education packages such as this by getting

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participants to show a learning effect (that is, examination or competency assessment). Evaluation of the learning package was not done.

Participants who volunteered for this study may have an affinity/interest in compliance with PPE. Simply completing a questionnaire related to PPE may have increased awareness and therefore compliance. The adherence of PPE at the second time point may have been due to extraneous factors that could not be controlled (for example, hospital accreditation or staff member having an exposure).

CONCLUSIONS

Team support and good leadership were identified as essential to ongoing professional knowledge and support with regards to risk minimisation in the perioperative setting. The findings of this study suggest leadership was essential to PPE compliance enhancement in the perioperative setting and an examination of the type of leadership and its impact on PPE compliance would be interesting. PPE, especially protective eyewear, is crucial in protection to occupational exposure in the perioperative environment for all staff. This study revealed a level of under-reporting of staff exposure incidents, which has organisational and personal implications.

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ORNAC Standards pertaining to this article can be found in the Operating Room Nurses Association of Canada (ORNAC) (October 2015) *Standards, Guidelines, and Position Statements for Perioperative Registered Nursing Practice* (12th edition). Section 4, pg 274, Standard 4.10 - 4.10.8 and Section 2, pg 124, Standard 2.9.14.

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