INNOVATIONS JOURNALS

Quality Improvement Project

Advancing Staff Safety: Assessment of Quality Improvement Interventions in Reducing Needlestick Injuries Among Staff at Nyaho Medical Centre

Augustine Kumah[1], **Anthony Ocuto Forkuo-Minka**[2]

[1]Quality Directorate, Nyaho Medical Centre, Accra, Ghana
[2]Nursing Services Directorate, Nyaho Medical Centre, Accra, Ghana

Address correspondence to Augustine Kumah (augustinekumah@gmail.com).

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ABSTRACT

Introduction: Needlestick injury, which occurs when the skin is accidentally punctured, is linked to infection transmission of HIV, hepatitis B, and hepatitis C. Because of the associated risks, hospitals are keen to do everything necessary to prevent needlestick injuries to their staff. This is a quality improvement project aimed at reducing needlestick injuries among staff at Nyaho Medical Centre (NMC). **Methods:** A facility-based assessment of the incidence of needlestick injury recorded and quality intervention employed was conducted between 2018 and 2021. Quality improvement tools such as the fishbone (cause and effect analysis) and the run chart were used to analyze and evaluate improvements made over time. **Results:** NMC staff have greatly reduced the incidence of needlestick injuries from 2018 to 2021 (from 11 needlestick injuries in 2018 to 3 recorded needlestick injuries in 2021). **Conclusion:** Using root cause analysis to investigate the possible cause of needlestick injury and use of the run chart to monitor the implemented improvement strategies (interventions) helped reduce the incidence of needlestick injuries among staff and thereby improved staff safety. The introduction of the incident reporting management systems saw an increase in the culture of incident reporting in general. Other incidents, such as medical errors and patient falls, were being reported using the incident reporting system. The inclusion of infection prevention and control training as part of NMC's onboarding for new employees helped in the knowledge and awareness creation of needlestick injuries and safety measures to prevent injury from needles and sharps. Policy changes and audit with feedback sharing key performance indicators with frontline team members were identified to have had the most effect.

Keywords: staff safety, quality improvement, needlestick injury, Nyaho Medical Centre

INTRODUCTION

Needlesticks and sharps injuries (NSSIs) are common occupational injuries among healthcare workers (HCWs).[1,2] NSSIs are wounds caused by needles and other sharp medical devices that accidentally pierce or cut the skin. Such injuries, although small, can be dangerous because these sharps and needles have come into contact with blood and other body fluids, and they may carry the risk of infections. HIV and hepatitis infections can be contracted through NSSIs. HCWs are at risk of injuries with sharps.[3] Among all the health professional groups, the nursing staff had been identified as the highest at risk for sharps-related injuries.[4–6] Nurses had a large percentage of the total burden of NSSIs especially with items that had been used earlier on patients.[7–9]

In Ghana, data collection on NSSIs has been inadequate,[10] and underreporting is a major challenge. As a result, hospital authorities have been unable to quantify exposure level for policymaking. There was also a lack of data to be used for the purpose of prevention and in the case of later infection.[11] Low reporting of NSSIs had been attributed to lack of awareness and perceived low

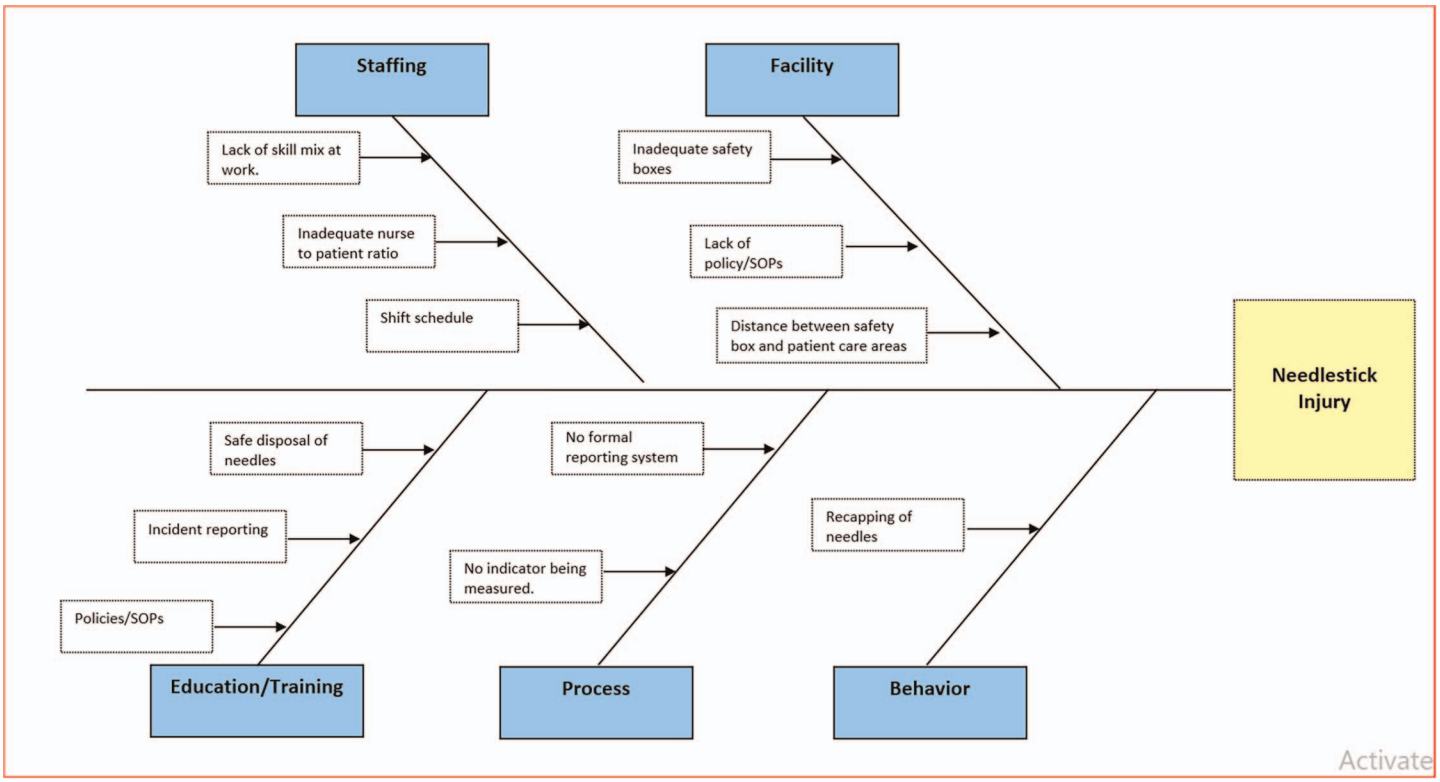

Figure 1. Fishbone diagram: root cause analysis of needlestick injuries at Nyaho Medical Centre Centre. SOP, standard operating procedure.

risk of transmission of infection.[12] This meant that when nurses and perhaps other HCWs within Nyaho Medical Centre (NMC) became exposed to bloodborne pathogens such as hepatitis B, hepatitis C, and HIV, most were unreported.

NMC recorded a high number of injuries to nurses in 2018 (Fig. 1). This led to the launch of a campaign to raise awareness of needlestick injury risks, processes for reporting and collecting data, and the initiation of a quality improvement project aimed at reducing needlestick injuries among staff at NMC.

METHODS

Ethical approval was not required for this quality improvement project. A facility-based assessment of the incidence of needlestick injury recorded and quality intervention used was conducted between 2018 and 2021. Quality improvement tools such as the fishbone (cause and effect analysis) and the run chart were used to analyze, monitor, and evaluate the improvements made over time.

Study Setting

NMC is in Ghana, is the oldest group medical practice, and represents the highest standards of primary and specialist healthcare in Ghana and the West African subregion. It is a multispecialty medical center committed to excellent clinical practice and specialist healthcare delivery grounded in core values such as innovation, teamwork, quality care, patient and family centerd-care, and a culture of trust. NMC has four branches in the Greater Accra region (one in Tema, one in Accra Central, and two in Airport Residential) and one branch in the Western region (Takoradi). Nyaho's vision is to become Africa's most trusted name in healthcare and its mission is to transform the lives of patients by surpassing expectations in healthcare, inspiring hope for a better Africa.

Fishbone (Cause and Effect Analysis) Used to Analyze the Contributing Factors and Most Likely Causes

A fishbone analysis (Fig. 1) of the most significant cause was carried out to determine the factors that could be responsible for NSSIs. After several case reviews, the following were identified as the contributory and most likely causes of needlestick injuries in the NMC:

1. Staffing: There were gaps in skill mix, shift schedule, and clinical staff-to-patient ratio (nurses and doctors).
2. Facility issues: There were no accessible sharps containers around the bed space for safe disposal, which meant that nurses had to walk distances to access designated containers to dispose of used needles.
3. Education and training: There was a lack of awareness on the need to report and knowledge of

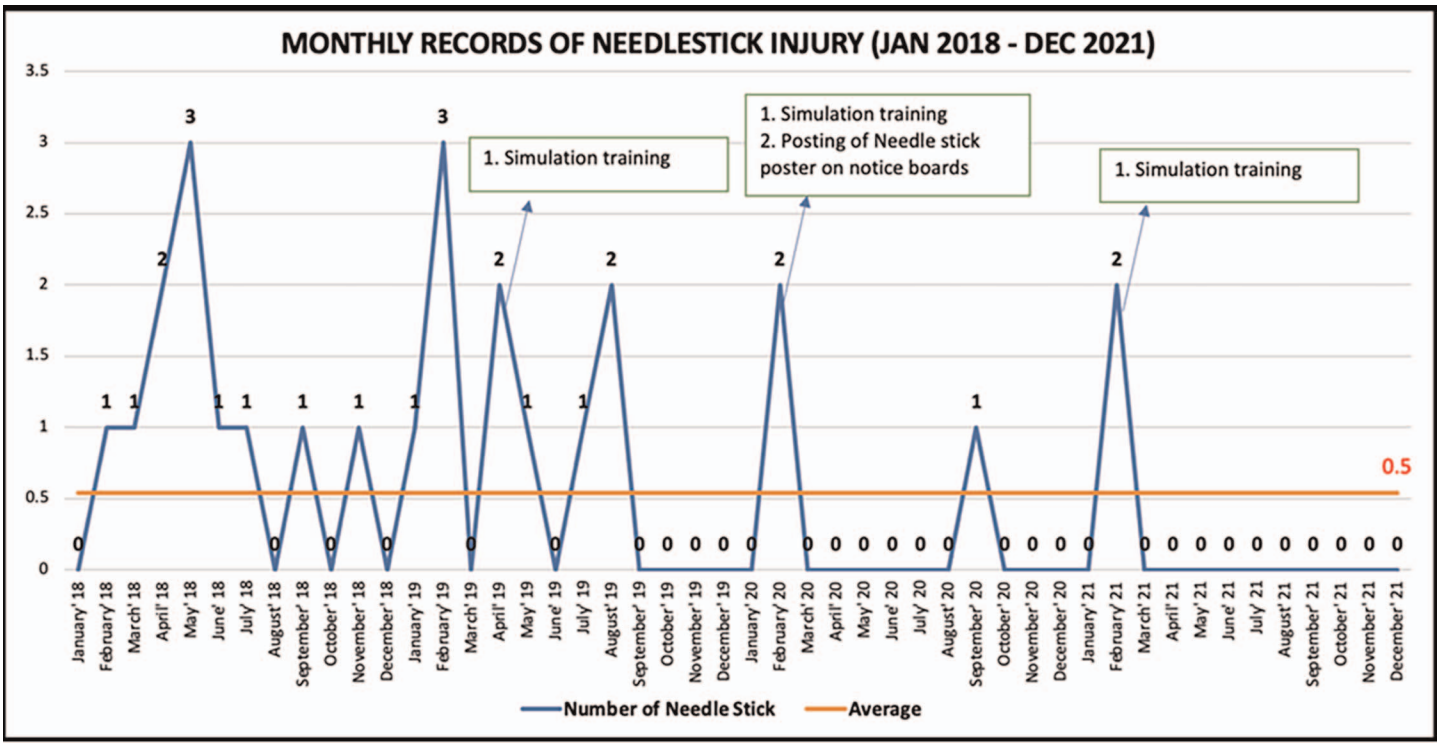

Figure 2. Monthly records of needlestick injuries (Jan 2018–Dec 2021).

how to document needlestick injuries. There was no training on the safe disposal of needles and sharps.
4. Process: There was no formal reporting system and no indicators of needlestick injury being measured regularly.
5. Behavior: There was evidence that recapping and other hand manipulations of needles existed.

Improvement Strategies

The performance improvement project team used brainstorming to create change ideas (interventions) aimed at reducing needlestick injuries at NMC. The team then applied the fishbone (cause and effect analysis) and the run chart to analyze, monitor, and evaluate the improvements made over time. The team applied a bundle of improvement strategies (interventions) that included the following:

1. Developing and reviewing policies and standard operating procedures (SOPs); monitoring compliance.
2. Developing indicators for measuring and reporting needlestick injuries.
3. Training staff, increasing knowledge and awareness, and ensuring a supportive environment to model behaviors.
4. Building a culture of safety.
5. Instituting safer staffing measures; i.e., ensuring a skill mix at work, instituting a nurse-to-patient ratio of 1:2 on shifts, and monitoring these indicators on a daily basis.
6. Instituting a no-needle-recapping campaign.
7. Installing proximal sharp containers.

Measures

To understand the existing process and the needlestick injury situation in NMC, the team used the fishbone (Fig. 1). We used the following key performance indicators (KPIs) to monitor and document improvement.

1. Number of needlestick injuries recorded per month.
2. Staff-to-patient ratios (nurse-to-patient ratio and doctor-to-patient ratio).
3. Personal protective equipment (PPE) compliance rate.
4. Percentage availability of proximal sharp boxes.
5. Participation rate in infection prevention and control (IPC) and culture of safety training.
6. Percentage of staff who scored above the 80% pass mark during the IPC and culture of safety training.

RESULTS

In 2018, 11 needlestick injuries were recorded (Fig. 1), with the highest number (3) of reported needlestick injuries recorded in May 2018. However, the main concern for NMC was that many incidents might not have been reported. The reason underreporting was

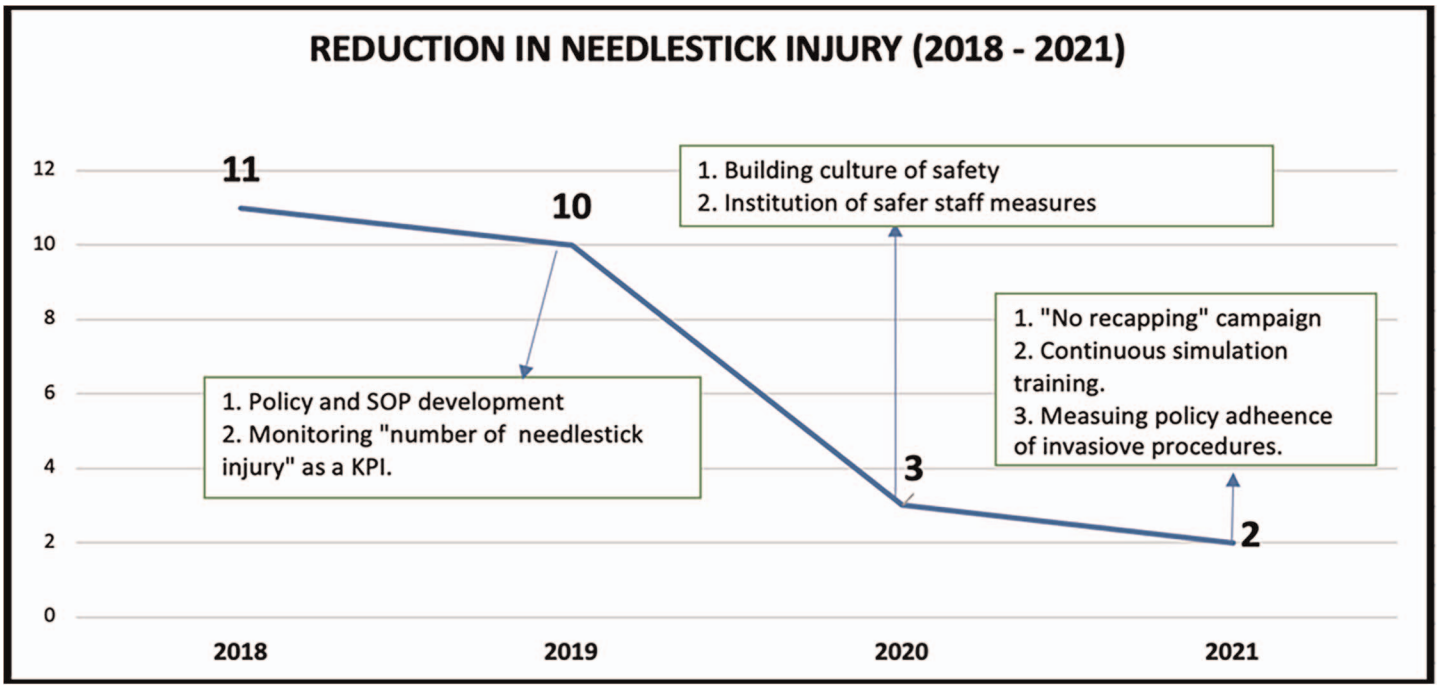

Figure 3. Annual recorded needlestick injuries (2018–2021). KPI, key performance indicator; SOP, standard operating procedure.

expected was from anecdotal evidence from interactions with staff from some departments and root cause analysis (RCA).

The data showed that the highest reported incidence of needlestick injuries among staff was in the first quarter of each year under review (Fig. 2). This might be because of the high number of new joiners in the first quarter of each year.

The data showed great improvement in the incidence of needlestick injuries among staff at NMC in the years 2020 and 2021 compared with 2018 and 2019 (Figs. 3 and 4).

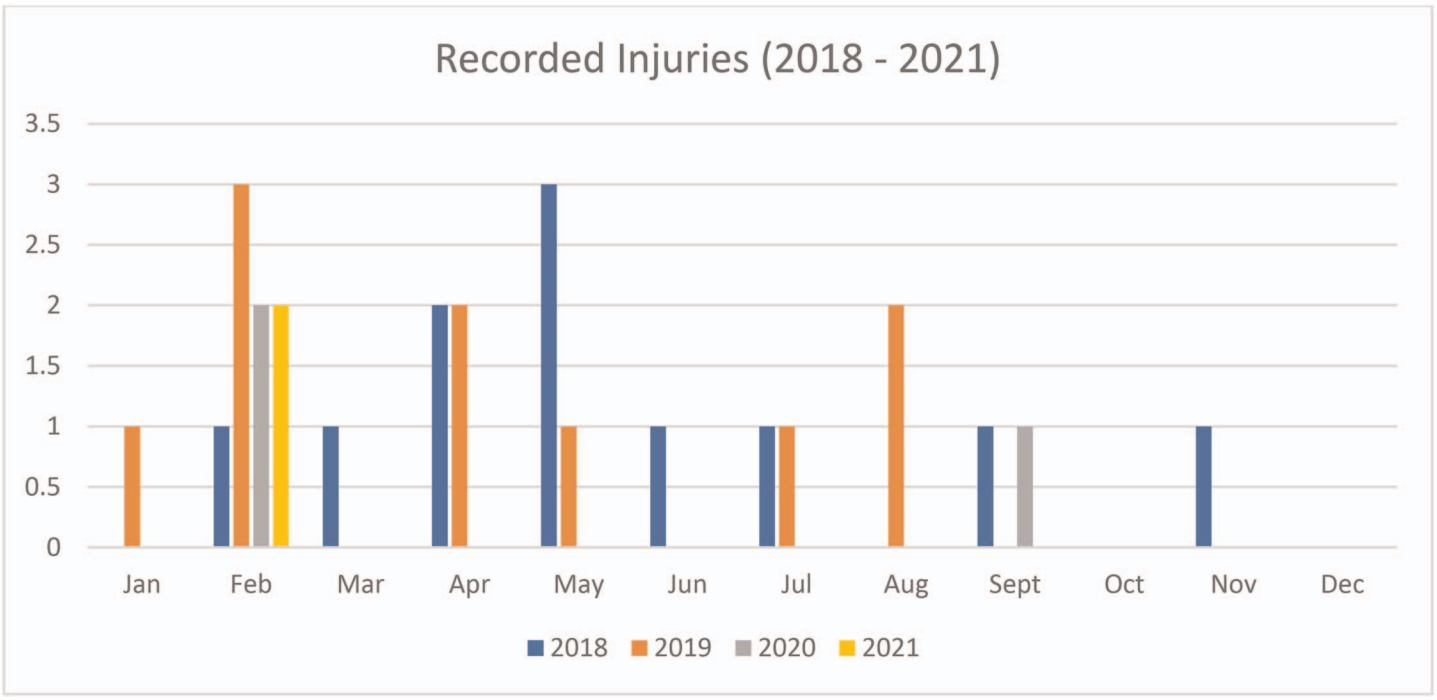

Figure 4. Monthly recorded injuries from 2018 to 2021.

DISCUSSION

Key Findings

- NMC staff have greatly reduced the incidence of needlestick injuries from 2018 to 2021 (from 11 needlestick injuries in 2018 to 3 recorded needlestick injuries in 2021).
- Using RCA to investigate the possible causes of needlestick injury and use of the run chart to monitor the improvement strategies (interventions) implemented helped reduce the incidence of needlestick injuries among staff and thereby improved staff safety.
- The introduction of the incident reporting management systems saw an increase in the culture of incident reporting in general.
- Other incidents, such as medical errors and patient falls, were being reported using the incident reporting system.
- The inclusion of IPC training as part of NMC's onboarding for new employees helped in the knowledge and awareness creation of needlestick injuries and safety measures to prevent injury from needles and sharps.
- Policy changes and audit with feedback sharing KPI with frontline team members were identified to have had the most effect.

Policy and SOP Development, Review, and Compliance Monitoring

Periodic policy review in cognizance of advances in technology in needlestick safety and prevention and other clinical evidence is imperative. Because of the increased reported incidence of needlestick injuries in 2018, policies and standard procedures were developed for central line insertion, maintenance, and removal as well as for recapping and disposing of needles and sharps. These were benchmarked with the Joint Commission International measurable elements and standards. A culture of safety and safe practice in needle use and disposal was also benchmarked with best practices of the International Financial Corporation healthcare indicators. We also cross-mapped our policy reviews to meet legislative or regulatory directives to enhance and sustain the prevention of needlestick injuries at NMC. This is because although the primary prevention measure has reduced needlestick injuries, it is not enough to guarantee a concerted program and policies to protect staff, particularly frontline HCWs, as needed.

Policy compliance monitoring

We engaged in regular policy and SOP compliance monitoring to ensure the reinforcement of best practices to prevent occupational exposure and more specifically needlestick injury. Also, daily waste segregation audits were conducted by the IPC nurse and quality team during rounds.

Developing and Reporting on KPIs on Needlestick Injuries

The monthly reporting of needlestick injuries highlighted the scale of the problem. By the end of quarter one in 2019, decisions were to prioritize the reduction of needlestick injuries. Further metrics were measured and tracked including safer staffing and training (participation rate). These were reported monthly to the chief executive officer; quarterly to the Clinical Governance Committee; and monthly, quarterly, and annually to the board of directors as a KPI. With these measures, we recorded a significant drop in needlestick injuries in 2021 (Fig. 3).

Staff Training, Knowledge and Awareness Creation, and Ensuring Supportive Environment to Model Behaviors

Following assessments of the learning and training needs of staff, we designed simulation training for staff to address the lack of knowledge and to create awareness of preventive behavior and risks associated with needlestick injuries. The simulation training was routinized for both existing and newly recruited staff covering topics such as safe injection practices, safe recapping and disposal of needles and sharps, proper handling of the sharps container, policy and SOP adherence, incident reporting, and documentation. The training was intended to create knowledge and awareness that every percutaneous needlestick injury carries a risk of infection from bloodborne pathogens. In addition, there was a simulation that covered modeling the behavior of competent and experienced nurses (mentorship), reflective practice, adherence to SOPs, and using designated areas for safe needle handling procedures. Studies suggest that interventions such as following SOPs, reflections, and mentorship affect needlestick injury rates.

We designed and introduced a mentorship and coaching model for all new staff with the aim of driving the right behaviors expected of nurses. The outcome of the designed model demonstrated significant competence in the new joiners underpinned by, for example, understanding of the handling of sharps and awareness of the standards. The interventions played a significant role in improving staff competence, especially that of the clinical staff, leading to acceptable behaviors that promoted safe practice in needle use and disposal.

Building a Safety Culture

With the considerable number of injuries recorded in 2018 (11 needlestick injuries), redefining our culture of safety and implementing intervention to reduce the incidence of needlestick injuries became a necessity. In the first quarter of 2020, we started a rigorous patient and staff safety campaign to build a culture of safety in NMC. The focuses were on ensuring that staff understood the importance of safety and exhibited positive safety behaviors such as wearing PPE without being

asked, and ensuring a no-blame system for reporting all incidents, including needlestick injuries. Based on the hierarchy of effectiveness of interventions,[13] a so-called "force function" initiative was instituted at the end of each IPC and culture of safety training, which mandated all new joiners to score not less than an 80% pass mark after the training to demonstrate adequate knowledge and understating of IPC measures and culture of safety.

Additionally, mandatory reporting was instituted to ensure that all incidents and near misses of needlestick injuries were reviewed systematically to reveal useful insights for corrective actions and shared learning without compromising the anonymity of the involved staff. To achieve this, it was critical to promote a "just culture" at NMC. We created an atmosphere of trust, whereby staff were encouraged (even rewarded) for reporting safety-related incidents, even the incidents that never reach the staff and patients (near misses).

No Needle Recapping Campaign

Additional work practice controls were initiated, which included no recapping. In addition, we have institutionalized a no recap campaign in our overarching functional orientation program led by experienced senior nurses, doctors, and the IPC team lead.

Safe Staffing

To address the staffing gap phenomenon, we undertook a review of the staffing policy, which demonstrated the need to establish safe staffing levels. This resulted in policy amendment and a new SOP (best practice) for safer staffing, thereby allocating an adequate number of staff, particularly clinical staff, per shift. Likewise, skill mix teams were established to ensure that for every shift schedule there was a mix of competent and novice staff to deliver safe care. The skill mix team also ensured that experienced staff were on shift to provide adequate supervision and mentorship. The practice was extended to other departments across the organization, whereby heads of departments were reporting on staff-to-patient ratios and skill mix teams. This resulted in developing metrics to measure KPIs (i.e., balanced scorecards) and reporting them as part of the monthly performance review report.

Use of Proximal Sharp Containers

The lack of access to sharp containers was addressed by procuring adequate sharp containers that were puncture-free and leak-proof to enable staff to always have a sharp container available when they perform a procedure. This ensured that there were enough containers placed in proximity to the patient's bedside, procedure room, and all other patient care areas. Additional controls included placing sharps containers at eye level and at arm's reach, checking sharps containers during shifts, and disposing of sharps devices on procedure trays before beginning a new procedure.

Limitations

This study was a facility-based study limited to NMC. One limitation of the study was that we did not have a process to document and track needlestick injuries that might have occurred but were not reported. This makes it difficult to conclude that the challenge with under-reporting of needlestick injuries was solved even as the data show (Fig. 3) an improvement in the number of recorded needlestick injuries over the course of the years (2018–2021) under review.

CONCLUSION

Using RCA to investigate the possible causes of needlestick injury and using the run chart to monitor the improvement strategies (interventions) helped reduce the incidence of needlestick injuries among staff and thereby improve staff safety. The introduction of the incident reporting management systems saw an increase in the culture of incident reporting in general. Other incidents, such as medical errors and patient falls, were being reported using the incident reporting system. The inclusion of IPC training as part of NMC's onboarding for new employees helped in the knowledge and awareness creation on needlestick injuries and safety measures to preventing injury from needles and sharps.

Last, we noticed that what worked effectively well for us was the proximal use of sharp boxes at all patient care areas, which provided easy access to sharp boxes for safe disposal of needles and sharps, and the culture of safety training during the IPC onboarding session for all new joiners. A "force function" initiative was instituted at the end of each IPC and culture of safety training, which mandated all new joiners to score not less than an 80% pass mark after the training to demonstrate adequate knowledge and understating of IPC measures and culture of safety. Employees who scored less than 80% were made to work under supervision and mentorship while given another opportunity to rewrite the IPC and culture of safety test. Policy changes and audit with feedback sharing KPI with frontline team members were identified to have had the most effect.

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