SECTION 3. PATIENT SAFETY ARTICLES

23. ASSESSING THE RISKS BEFORE SURGERY AND IDENTIFYING HIGH-RISK PATIENTS FOR TAILORED POSTOPERATIVE CARE: IMPROVING PATIENT SAFETY

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Abstract: The mortality rate of post-surgical complications in low- and middle-income countries is alarmingly high, particularly in Africa. Each year, over 600,000 individuals lose their lives after surgery, primarily from treatable causes. Despite this situation, a significant amount of government priorities and development aid is directed towards infectious diseases, while the quality of care for surgical patients receives minimal attention.

Methods: A set of reliable and evidence-based interventions that includes five sequential care steps was designed to reduce post-surgical mortality rates. The 5Rs framework includes Risk Assessment, Recognize, Respond, Reassess, and Reflect elements. The team utilized this framework to guide their decision-making process and improve patient care in the perioperative setting. The implementation of individual R involved the utilization of the Model for Improvement framework, which requires team establishment, problem analysis, aim setting, change generation, defining progress tracking indicators, and change testing.

Interventions: The facility team implemented a set of reliable and evidence-based interventions known as the "5Rs for Rescue. The 5Rs framework includes Risk Assessment, Recognize, Respond, Reassess, and Reflect. This improvement project focuses on the first R, which is Risk stratification. All adult surgical patients above 18 years of age, with a length of stay (LOS) ranging from at least 24 hours to less than 30 days, were included. The following interventions were implemented: risk identification using ASOS, relay high-risk status, maintain high-risk awareness, and conduct weekly compliance audits and reflection meetings.

Results: Improvement team meeting weekly and reviewing improvement activities progress was established and functional. After the improvement project introduced significant strides in St. Peter and Debre Berhan Hakim Gizaw Hospital, adherence to risk calculations has reached an impressive 90% in both facilities, highlighting its importance as a critical component of the diagnostic process.

Conclusion: Since few intensive care units in low-income countries like ours, designing and introducing innovative approaches that pick preventable post-operative complications and deterioration like 5Rs play a critical role in planning and improving postoperative care.

Introduction

The mortality rate of post-surgical complications in low- and middle-income countries is alarmingly high, particularly in Africa. Each year, over 600,000 individuals lose their lives after surgery, primarily

from treatable causes. Surprisingly, the number of deaths resulting from post-surgical complications in Africa surpasses the combined mortality rates of tuberculosis, HIV, and malaria. Despite this situation, a significant amount of development aid is directed towards infectious diseases, while the quality of care for surgical patients receives minimal attention.

Before a surgical procedure, assessing the potential risks and complications that may arise during or after the surgery is crucial. This assessment helps understand the specific challenges that may be faced and allows for appropriate preparations to mitigate these risks. By identifying high-risk patients, care providers can take additional precautions and provide customized care for the best possible outcome. In low-resource settings, it is essential to prioritize care and allocate resources effectively to minimize risks and complications. This may involve careful planning, coordination, and collaboration among healthcare providers to ensure that all patients receive the necessary care despite limited resources. Regular monitoring and follow-up after surgery are essential to address post-operative complications and provide ongoing support for optimal recovery.

In this project, we aim to implement strategies that address the failure to rescue deteriorating patients in the postoperative period in public governmental hospitals in Ethiopia. Due to limited resources and healthcare infrastructure, Ethiopia faces challenges in the timely detection and response to postoperative complications. By implementing these strategies, we aim to strengthen the capacity of selected healthcare facilities to rescue deteriorating patients and ultimately improve surgical patient outcomes effectively.

Aim

This project aims to implement strategies to improve the failure to rescue patients who experience deterioration during the perioperative period by introducing a perioperative surgical risk assessment tool and Early Warning Score charts in the surgical departments of St. Peter Hospital and Hakim Gizaw Hospital from March to June 2023. Specifically, the aim is to increase compliance to the perioperative surgical risk assessment tool (ASOS-2) among eligible surgical patients in the surgical ward from zero to 95% from March to June 2023.

Methods

In February 2023, a collaboration between the African Partnership for Perioperative and Critical Care Research (APPRISE) and the Institute for Healthcare Improvement (IHI) brought together a team of anesthetists, surgeons, nurses, and improvement advisors from two hospitals in Ethiopia. Their collective effort was to launch a quality improvement (QI) demonstration project focused on rescuing postoperatively deteriorating patients in surgical wards.

The first step involved assembling a quality improvement team comprising members from the quality unit, Anesthesia, and surgical ward. Their objective was to establish a clear improvement project plan, including identifying critical processes and outcome measures for follow-up. To gain support and buy-in from hospital administrators and key stakeholders, the QI project was presented, ensuring leadership endorsement. Before the launch of the QI project, minor adjustments were made based on feedback, with the surgical ward chosen as the testing unit for the first cycle of the first Plan-Do-Study-Act (PDSA).

The project's scope included all adult surgical patients above 18 years of age who were discharged after surgeries with a length of stay (LOS) ranging from at least 24 hours to less than 30 days, whether

the surgery was elective or emergency. However, cardiac and pediatric surgeries (for patients below 18 years) were excluded. The QI team also decided that preoperative risk assessments would be conducted by ward general practitioners (GPs), along with their admission notes at the surgical ward.

Intervention Setting

The selection of facilities for this project was purposeful, considering their involvement in APPRISE projects and their willingness to actively participate in moving the project forward. Two facilities were chosen: Debre Berhan University Hakim Gizaw Teaching Hospital and St. Peter Hospital. Hakim Gizaw Hospital, established in 2022, is in Debre Berhan, Ethiopia. It is a renowned medical institution known for its expertise and contributions in various medical fields. The hospital serves a catchment population of over 3,500,000 and has 30 surgical beds. Its commitment to research and development makes it a valuable partner in APPRISE projects, ensuring the advancement of healthcare in the region.

On the other hand, St. Peter's Hospital is situated in Addis Ababa, the capital of Ethiopia. The hospital is well-equipped with seven operational operating room (OR) tables. It offers various surgical procedures, including general surgery, OBGYN, pediatrics, orthopedics, urology, plastic surgery, ophthalmology, and cardiothoracic surgery. From October 2022 to March 2023, 422 surgeries were performed each month. St. Peter's Hospital has 303 functional beds, with 54 dedicated to surgical patients and 34 to gynecology patients. Throughout the year, there were 53 reported deaths among the surgical cases, resulting in a perioperative (Peri-OP) mortality rate of 1.2%. As no interventions were in place to identify high-risk post-operative patients before the improvement project, the baseline for post-operative risk level was considered to be zero.

Interventions

The facility team implemented a set of ***reliable and evidence-based interventions*** known as the "5Rs for Rescue." These five sequential care steps were designed to reduce post-surgical mortality rates. The 5Rs framework includes Risk Assessment, Recognize, Respond, Reassess, and Reflect. The team utilized this framework to guide their decision-making process and improve patient care in the perioperative setting. The implementation of individual R involved the utilization of the Model for Improvement framework. This framework includes team establishment, problem analysis, aim setting, change generation, defining progress tracking indicators, and testing. Risk Assessment involves evaluating the potential risks and vulnerabilities of each patient. The team can proactively address and minimize complications by identifying and understanding these risks. Recognize focuses on identifying signs or symptoms that may indicate a risk or problem. This step allows for early detection and prompt intervention.

Respond involves taking appropriate action to address the identified risk or problem. The team utilizes their knowledge and expertise to provide timely and effective interventions. Reassess involves periodically evaluating the chosen treatment plan's effectiveness and making necessary adjustments. This step ensures that the patient's condition is monitored and managed appropriately.

Reflect emphasizes learning from past experiences and continuously improving the quality of care provided. By reflecting on outcomes and feedback, the team can identify areas for improvement and implement changes to enhance patient safety and outcomes. These practices can also be applied to other aspects of healthcare, including facility management, policy development, and professional training. For this improvement project, the focus was on the first R, Risk stratification. The team aimed to accurately assess and stratify patients' risks to inform their decision-making and optimize patient care.
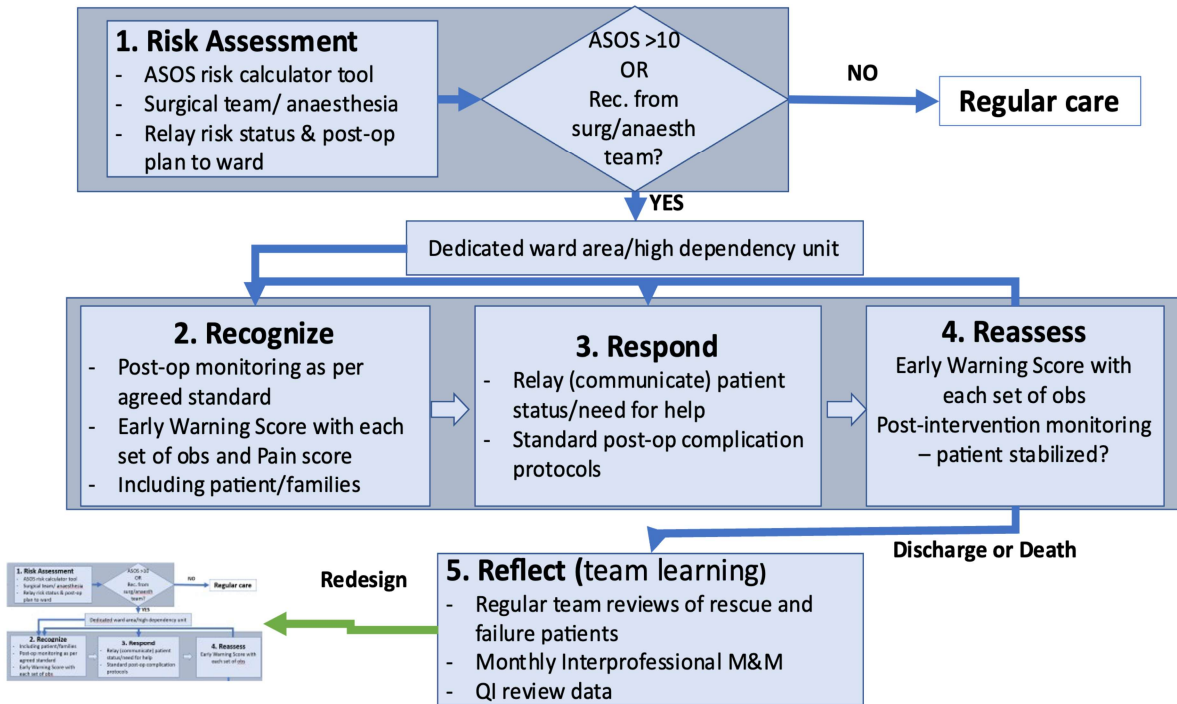
Figure 6:Process map "5Rs to Rescue

Interventions Tested and Operational Definitions

1. **Risk identification:** this involves printing ASOS format, orienting staff on ASOS use, calculating ASOS risk score for all adult patients having surgery preoperative, and documenting the score in the patient chart. Patients with an ASOS score of >10 are considered at higher risk for complications post-operative. The ASOS surgical risk calculator is a simple preoperative risk stratification tool that provides good discrimination and calibration for predicting in-hospital mortality and severe postoperative complications. The risk calculator requires no special investigations and can be applied to every adult surgical patient. Finally, the score can be calculated and presented simply on a card and, therefore, does not require a computer or internet access to implement, making it ideal to be used in low-resource settings where there are biochemical and radiological tests. Even stable internet access limits the utility of some technologies for risk prediction. The tool development is based on the African Surgical Outcome findings and data, including all eligible participants meeting the predefined criteria and making 8799. The risk prediction tool is available on the website and in the Play Store; the elements are shown below.

ASOS Surgical Risk Calculator

Age *		ASA *	
Select value	▾	Select value	▾

Surgery timing *		Surgery severity *	
Select value	▾	Select value	▾

Indication for surgery *		Surgery type *	
Select value	▾	Select value	▾

Figure 7: ASOS Calculator variables

2. **Relay High-risk Status:** If score >10 (OR clinician assesses patient as high risk), clearly communicate high-risk status to ward staff and post-operative monitoring instructions to ward team.

3. **Maintain high-risk awareness**: hang a bedside sign that shows the patient is at high risk and requires higher follow-up post-operatively.

4. **Conduct weekly compliance audits and reflection meetings.**

Measurements

The following measurements were set to monitor the improvement work.

- Outcome measure: % of eligible surgical pts got ASOS2 risk assessment.
- Process measures:
  - ASOS tool availed: Yes/ No
  - Number of QI team meetings per week

Results

Since March 2023, the piloting improvement project has significantly improved in St. Peter and Debre Berhan Asrat Hakim Gizaw Hospital. Adherence to risk calculations has reached an impressive 90% in both facilities, highlighting its importance as a critical component of the diagnostic process.

As part of this initiative, the risk assessment tool meticulously documented the ASOS risk score for adult patients undergoing surgery. To ensure accessibility and easy reference, the total score and corresponding risk level were attached to the front side of the patient's folders.

To streamline the process further, a dedicated daily registration form is now in place for patients undergoing ASOS risk assessment. The diligent members of the Quality Improvement Team (QIT) report the results of risk assessments for each eligible patient, which are then shared on the QI team's dedicated telegram page. Continuously monitoring compliance data through a user-friendly dashboard and plotting it on a run chart aids in visualizing progress. Any challenges or issues encountered during implementation are thoroughly documented and discussed during weekly team meetings.

Furthermore, starting from March 30, 2023, the data capturing process has been incorporated into the daily hospital QSMT (Quality and Safety Management Team) report, ensuring comprehensive and up-to-date data collection.

After introducing the QI project in the system, we observed inconsistent adherence to the ASOS tool from March to the third week of April 2023. Different challenges explain this, including inconsistent use, shortage of printed ASOS tools, and role clarity during the early phase. To settle these challenges, the QI team conducted weekly discussions and presented progress to the hospital leadership.

Afterward, signals of improvement for our outcome measure were evidenced by the **Shift Rule** from the fourth week of May 2023 to the last week of June 2023. During this period, compliance with the ASOS tool remains above the median. This implies that the performance of our intervention has improved our outcome indicators.
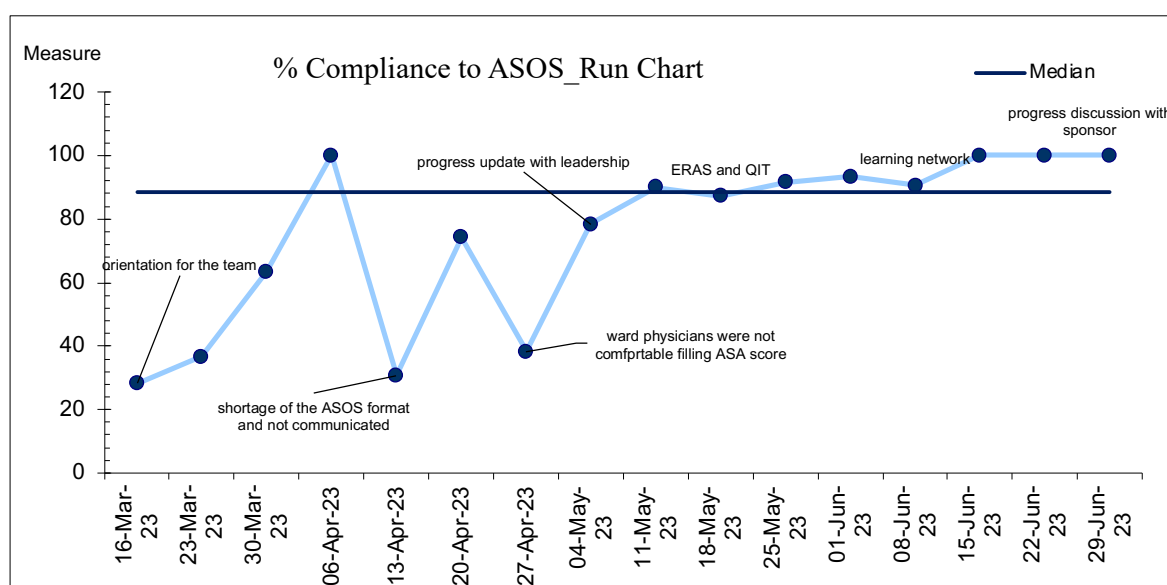
Fig.3. % Compliance with ASOS among eligible surgical patients.

In addition, for the second "R" (Recognize), the team has engaged in open discussions to identify a tool that can effectively recognize deteriorating patients in the postoperative period. After careful consideration, both hospitals have adopted the national early warning score (NEWS) developed by the United Kingdom's Royal College of Physicians. The template adapted for St. Peter Hospital, currently in use, can be found in Appendix 1 for reference.

Conclusion

In conclusion, implementing the Failure to Rescue project has shown promising results. The clinical team has effectively and well-received the Risk assessment and recognition strategies. The use of the ASOS risk calculator has aided in identifying high-risk patients and grading their risk. Additionally, the national early warning score has contributed to recognizing deteriorating patients during the postoperative period, allowing for timely interventions, and reducing adverse events. Overall, the project positively impacts patient safety and care quality at St. Peter Hospital and Hakim Gizaw Hospital, which also needs to be supported by further research. The remaining components of Respond, Reassess, and Reflect are currently being implemented and are expected to further contribute to the project's success. These components focus on promptly responding to patient needs, continuously assessing their condition, and reflecting on intervention effectiveness. By incorporating these steps into their daily practice, healthcare providers can ensure timely and appropriate patient care, improving surgical outcomes and reducing morbidity and mortality rates.

Future Plan and Recommendations

To strengthen the implementation of the NEWS system and improve patient outcomes, our plan involves continuing to enhance the first and second Rs while also implementing the remaining Rs. This will require significant resources and teamwork, as evidence-based patient care management guidelines must be developed and tailored to specific contexts. As we move forward to the next R, responding to deteriorating patients, we aim to collaborate with other hospitals to share our experiences and improve patient care on a larger scale. By fostering collaboration, hospitals can learn from each other, make informed decisions, and contribute to developing a standardized approach for responding to deteriorating patients. Additionally, we call for the participation of different hospitals and surgical teams in implementing the NEWS system and emphasize the need for more research outputs to validate its effectiveness and enhance patient care management guidelines. Plus, it is also crucial for stakeholders to collaborate on generating robust evidence and continuously improve patient care. Overall, these efforts will contribute to advancing surgical patient care and saving lives in Ethiopia, supporting the national initiative.