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# Positive outcomes of a surgical progressive care unit for patients following head and neck cancer surgery

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# Positive outcomes of a surgical progressive care unit for patients following head and neck cancer surgery

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Caring for the postoperative head and neck cancer (HNC) patient requires a nurse with a specific skill set to ensure optimal outcomes. Identifying airway issues in a timely manner is essential to patient safety. Tracheostomy is a strong determinant of costs and hospital length of stay (LOS) and a predictor of major complications following head and neck surgery, correlating with postoperative lower respiratory tract infections, decreased or delayed oral intake, scarring of the airway, tube obstruction, and respiratory arrest.[1] Nurses' comfort with the care of postoperative tracheostomy patients is highly varied and inadequate knowledge can lead to serious patient complications, including death.

Care of HNC patients is complex due to the surgical procedure itself and the multiple medical comorbidities that are common within this patient

population. The most common complications experienced within the HNC population include infection, wound dehiscence, flap compromise, hematoma, fistula, major vessel rupture, delayed wound healing, dysphagia, dystonia, and body image issues.[2] Nurses must be skilled in various areas, such as free flap monitoring, airway management, wound care, parenteral feeding, management of tracheostomies and laryngectomy sites and devices, and providing support for a patient's emotional needs.

Due to the complex needs of the HNC population, patients are often admitted for an extensive stay to the ICU following surgery. The average ICU stays for postoperative HNC patients vary extensively, from 0 days (for centers with a specialty unit) to up to 11 days (for centers without specialty units).[1] Because of the resource-intensive environment, care costs for a patient admitted to the ICU postoperatively are notably higher when compared with patients admitted to a non-ICU setting.[3]

Disadvantages of ICU admissions include predisposition of patients to hospital-acquired infections, increased costs, and longer LOS.[1] ICU admissions can also result in increased use of sedation, delirium, prolonged mechanical ventilation, and late ambulation.[4] Patients admitted to the ICU are often managed by an intensivist physician team rather than the primary surgical team.[1] Decreased involvement by the primary surgical team can result in difficulty ensuring adequate wound care, flap management, and appropriate tracheostomy care.[1]

Creating or designating a unit with specially trained staff to care for this complex patient population has been a solution increasingly studied. Developing a specialty unit with adequate staffing support (1:1 to 1:3 nurse-to-patient ratio) can provide care similar to that received in an ICU setting and improves overall cost-effectiveness without any negative impact to patient care.[1,3-6] Staffing levels based on patient needs result in better outcomes for patients in addition to positively impacting financial performance.[7]

According to Yu and colleagues, 88.9% of microvascular free flaps performed in the US rely on immediate postoperative transfer to the ICU.[6] Recent studies have found no meaningful differences in morbidity, mortality, or flap failure between patients admitted postoperatively to an ICU versus those admitted to a specialized intermediate-level care unit following a microvascular free flap procedure.[1,4] Routine transfer to an intermediate-level care unit with nurses specialized in care of otolaryngology patients is effective and rarely results in subsequent ICU transfer.[6]

The success of an intermediate-level care unit in place of ICU admission postoperatively is dependent on appropriate education of nursing staff.[6] Close support from physician staff, dedicated medical and nursing staff, and patient exposure at levels necessary to ensure clinical staff members are trained and experienced are other factors important to the success of specialized HNC units.[1]

Utilizing a specialty unit for care of HNC patients has demonstrated improvement in care quality and outcomes. This article describes the implementation of a surgical progressive care unit (SPCU) for care of HNC patients at a quaternary care hospital in Detroit, Mich.

### Project overview

A quality improvement initiative to create an eight-bed SPCU and maintain a 32-bed general practice unit (GPU) was implemented on a medical-surgical unit within an urban, 877-bed quaternary care hospital. The unit has 40 GPU beds and is home to 10 specialized surgical services. The SPCU would provide specially trained nursing staff to care for patients who would otherwise receive care in the ICU setting. The primary patient population for the SPCU would include thoracic and HNC surgery patients. Other surgical patients with a need for the specialized services the unit offered would also be considered for admission. The use of the SPCU would allow for more advanced care and monitoring of surgical patients outside the ICU, thus allowing for more efficient use of resources.

The reason for this project was multifold. One area needing to be addressed was decreasing ICU utilization. Often, HNC patients had extended admissions in the surgical ICU due to needing more frequent interventions/monitoring than available on a GPU. However, these patients didn't often require any other technical services that the ICU provides. Increased LOS in the ICU is synonymous with longer hospital LOS. There are several reasons for this trend, including decreased mobility in the ICU, which contributes to further patient deconditioning;

reduced emphasis on patient transitions out of the hospital setting; and less focus on the extensive education patients require before discharge.

Most of the discharge preparedness and education of the patient and/or significant other is completed in the GPU setting. Self-care of the patient's tracheostomy/laryngectomy is promoted after teaching. This allows nurses to monitor the patient and/or significant other's comfort level and competency in caring for the tracheostomy/laryngectomy before discharge. Based on feedback from the GPU nursing team, the care requirements and educational needs of the HNC patient in a GPU assignment resulted in difficulty effectively caring for other patients in their assignment. Inappropriate staffing levels for patient care requirements led to nurse dissatisfaction and turnover.

The business plan for the creation of the SPCU highlighted several key opportunities, including decreased HNC patient LOS in the ICU, reduced costs associated with ICU care, shorter overall LOS, and less GPU RN turnover. An additional advantage regarding the creation of the SPCU included the ability to offload another surgical population (thoracic surgery) due to space constraints on the current unit. This need helped create a sense of urgency for the project.

### Intervention

Eight surgical beds were identified for the SPCU. Services available on the SPCU would include telemetry monitoring, use of specified cardiac I.V. medications, and continuous pulse oximetry ($SpO_2$) monitoring, with the ability to complete interventions every 2 hours (or hourly interventions for defined time-limited periods). The need for any of the offered services would qualify a patient for admission to the SPCU; however, not all interventions available were required for admission. One intervention could be ordered without the others to ensure appropriate use of resources such as telemetry because every patient admitted wouldn't need cardiac monitoring.

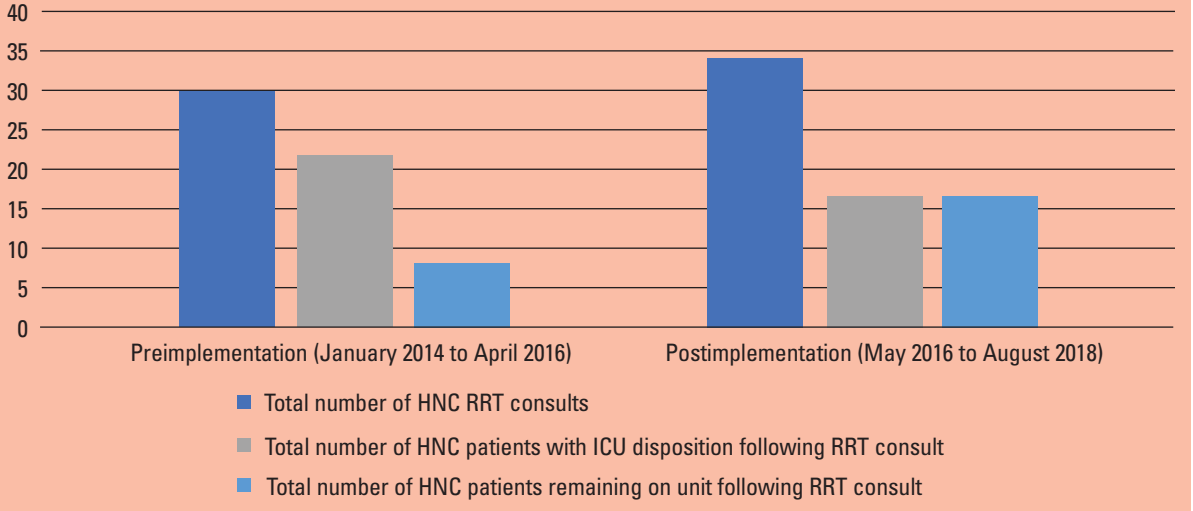
The unit would be staffed by the current GPU nursing staff and ancillary care staff. To facilitate staffing for a patient population requiring increased monitoring, nurse-to-patient ratios were evaluated. A literature review related to patient acuity and assignments for similar units was completed, leading to a determination of a nurse-to-patient ratio of 1:3.

The unit was equipped to allow for wireless monitoring. A main monitor was installed at the nurses' station for ease of monitoring multiple patients at once. Due to the primary patient populations on the SPCU being identified as thoracic or HNC surgery patients, an investment in wireless telemetry monitoring packs, including $SpO_2$ monitoring, was made for ease of patient observation. The telemetry packs also allowed for visualization of the patient's rhythm and $SpO_2$ from the individual telemetry pack rather than having to rely on the nurse returning to the nurses' station for visualization.

Alarm settings were reviewed through a workgroup inclusive of nursing leadership and clinical nurses, with representation from all hospital telemetry units. Abnormal cardiac rhythms and $SpO_2$ ranges were set to alarm to the assigned nurse's telephone. With this process, the nurse would be immediately aware of any significant patient rhythm or $SpO_2$ changes even if busy with another patient. This would lead to quicker intervention by the nurse when the patient may be in acute airway distress due to obstruction, such as a patient experiencing a mucus plug, which is vitally important to patient safety. Due to this technology, patients were no longer monitored by technicians at a central station. Patients were monitored electronically, and the nurses were alerted to rhythm abnormalities that would be addressed as they occurred by the assigned nurse.

A significant part of this project included training nursing staff to ensure competency in cardiac and $SpO_2$ monitoring and interventions. The unit governance council, which comprises unit leadership, clinical nurses, and assistive personnel, determined staff training needs and protocol development for the SPCU. All nurses attended a portion of the hospital critical care course dealing with rhythm monitoring, interventions, and cardiac I.V. medications. Nursing staff members were also allotted time to train with telemetry technicians to identify irregular rhythms. Staff members were trained on the new telemetry system that included $SpO_2$ monitoring. All staff members were required to obtain advanced cardiovascular life support certification within 12 months of attending telemetry training. Nursing staff members were already familiar with the

**Figure 1: RRT consults and disposition of patients following consult**




HNC population and care of patients with a tracheostomy or laryngectomy. Review of patient flap monitoring, including Doppler monitoring, was completed with all nursing staff because the improved nurse-to-patient ratio would allow for more frequent flap monitoring.

Twenty-four-hour coverage was provided by unit leadership to lend support during the initial 2 weeks following the opening of the unit in May 2016. The rapid response team (RRT) was available when staff needed assistance with increased acute patient needs. As staff members adjusted to caring for patients with higher acuity, the expertise of the RRT was essential.

## Results

Several areas were evaluated to determine the effectiveness of the SPCU. Data markers monitored included the number of RRT consults and disposition of patients following consult, LOS, and nurse retention rates.

### RRT consults and disposition of patients following consult

Data were reviewed for 28 months both preimplementation (January 2014 through April 2016) and postimplementation (May 2016 through August 2018). There was a spike in the number of RRT consults made immediately following the opening of the SPCU, which extended several months. This fleeting increase was due to the nurses utilizing RRT consults more frequently as they gained more confidence in the care of patients with higher acuity. These increased consults decreased over the next 10 months. Also noted in this data review was a substantial decrease in the number of HNC patients transferred to the ICU following RRT consults at 28 months postimplementation of the SPCU. (See *Figure 1.*) There was a greater than 23% decrease in the number of HNC patients transferred to the ICU following RRT consult. The number of RRT consults also included code blues during both the pre- and postimplementation periods.

### LOS

A second data marker included identifying trends related to LOS. Data were again reviewed from 28 months pre- and postimplementation, demonstrating a noteworthy improvement regarding decreased LOS. The preimplementation average LOS for HNC patients was 20.25 days. The postimplementation LOS decreased to 17.14 days. (See *Figure 2.*) This was an overall decrease in LOS of 3.11 days (15.4%).

### Nurse retention

The third data marker investigated was the impact that the addition of the SPCU had on nurse turnover. Overall, the nurse retention rate improved dramatically by 43.3%. (See *Figure 3.*) Informal feedback from the nursing staff included appreciation of having the HNC patients in a care environment more conducive to their acuity needs. The 1:3 nurse-

to-patient ratio allowed the nurses to have adequate time to care for and teach their patients. Also, nurses had the opportunity to develop their skills on their own unit, which improved overall retention. Additional informal feedback from the nursing staff included appreciation of being able to switch between the different sides of the unit (working both on the SPCU and GPU) as each side offered a "break" from the other.

**Sustainability and spread**

The unit continues to see positive trends with the use of the SPCU. Patients admitted to the SPCU are closely monitored by unit leadership for appropriateness. Although the unit was initially directed toward thoracic and HNC surgery patients, there are other surgical patients who've benefited from admission to this unit rather than the ICU. As patients progress and no longer need SPCU services, they're transferred to the GPU.

HNC patients continue to transfer to the SPCU from the ICU sooner (1 to 2 days following surgery). The SPCU also has seen more acute patients who were previously admitted to the ICU setting, such as those with new tracheostomies and laryngectomies, directly admitted to the SPCU from surgery. The unit continues to work with the HNC surgeons to ensure that the nurs-

**Figure 2: Average LOS**

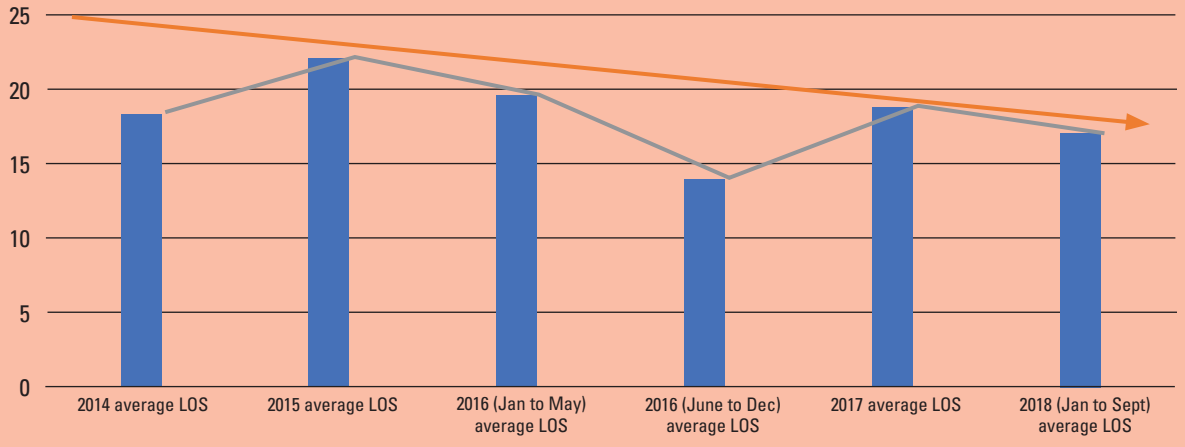
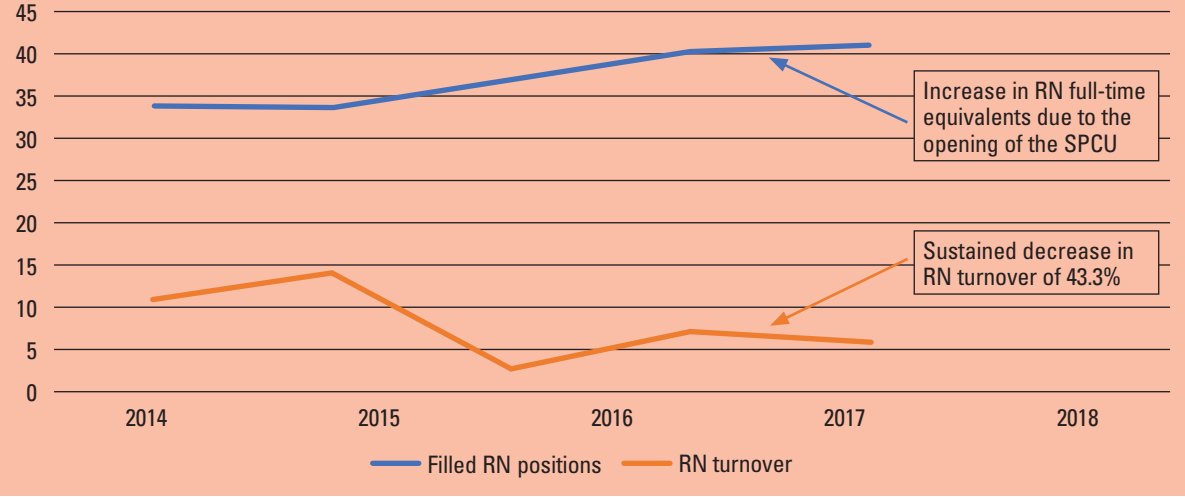



**Figure 3: RN turnover**



ing team is up-to-date on the newest advances and is working toward directly admitting non-ventilated free flap patients to the SPCU unit in the future.

### Keys to success and lessons learned

A key to the success of this project was the willingness and readiness of the nursing staff to take on a new challenge. The support of nursing and hospital administration was also crucial to success. The implementation of the SPCU was a challenging endeavor because extensive staff training and protocol development were needed. Initially, an additional complicating factor for the unit was that the training had to occur without the benefit of an existing unit for orientation purposes because this was a unique unit new to the hospital. The use of the RRT team as a resource for staff members when they had questions about abnormal cardiac rhythms, patient assessment, or administration of new or unfamiliar medications was paramount.

Another strategic decision instrumental to success was ensuring that the appropriate tools were used. Investment in better technology, such as adding $SpO_2$ monitoring to the telemetry system, allowed for efficient notification of the assigned nurse and other nurses in the area. It also allowed for ease of patient mobility. The patient was easily able to get up and walk with staff in the halls with continuous monitoring of $SpO_2$ to detect any abnormalities.

Following the opening of the SPCU, the unit was able to further refine the unit orientation process. A lesson learned over time was that new graduate nurses needed more focused training on the HNC population when they were oriented to the SPCU. New graduate nurses and other new staff to the unit were allotted time to train and work on the GPU (about 6 to 9 months) before SPCU training. After completion of the required portion of the critical care course, nurses were given several weeks' orientation time with a preceptor on the SPCU. Preceptors were determined by the leadership team based on their SPCU expertise. A separate orientation checklist and manual were developed by unit leadership to ensure a consistent orientation experience.

Overall, the implementation of the SPCU led to increased patient, nurse, and physician satisfaction and a higher quality of care delivered to this vulnerable patient population. Nurse satisfaction improved due to the ability to provide more individualized and timely care because of the improved nurse-to-patient ratio. Continuous $SpO_2$ monitoring was another benefit because nurses were able to intercede earlier for patients with imminent respiratory compromise. Physicians were pleased with the specialty care delivered to their patients, allowing for earlier ambulation and decreased complications. Surgical teams also enjoyed having more control regarding the patient care plan outside the ICU setting. Informal feedback from patients indicated an increase in satisfaction, with improved attention to their care needs and more comprehensive discharge teaching.

Creation of the SPCU was a collaborative initiative based on best practices and evidence-based research. Costs associated with this project included investments in technology and infrastructure, human capital to accommodate the changed nurse-to-patient ratio, and staff training. A return on investment was noted in decreased hospital LOS and ICU days/transfers, owing to the ability to monitor and care for patients in a setting focused on early recovery and discharge. Also noted was a decrease in orientation costs due to a 43% reduction in nurse turnover.

A limitation in the development of the SPCU was a lack of formal patient-centered input. Next steps to further refine care delivery on the SPCU include a formal

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process for collection of data to evaluate patients' perception of care delivery.

### Complex needs

The SPCU demonstrated multiple improvements in patient care and nursing satisfaction. Patient safety was enhanced by remote monitoring of patients' respiratory and cardiac status for a quicker nursing response to variations in vital signs, demonstrated by a decrease in ICU transfers following RRT consult. The reduced nurse-to-patient ratio also supported an improvement in patient safety by allowing more time for nurses to spend assessing patients, implementing interventions to improve outcomes, and monitoring the results of interventions. Finally, the improved nurse-to-patient ratio gave the nurses needed time to provide education to patients/significant other(s) to meet the complex needs of this patient population. NM

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