The growing demand for critical care services combined with a shortage of board-certified critical care physicians and increasing limitations on resident training hours have culminated in the need for nonphysician advanced practice providers (APPs), such as nurse practitioners (NPs) and physician assistants (PAs) in US intensive care units (ICUs). Recent survey data suggest that NPs and PAs provide care in >50% and ~25%, respectively, of adult ICUs in academic medical centers in the United States.

APPs are typically utilized in 2 distinct paradigms in the ICU setting. In the first, APPs are recruited in small numbers to supplement existing residents or to assist the ICU attendings. In the second, APPs are hired in large numbers to function as semi-autonomous workforces in conjunction with ICU attendings. In 2007, Memorial Sloan-Kettering Cancer Center (MSKCC), a 470-bed, tertiary care cancer center in New York City, initiated a critical care medicine (CCM) NP program for their closed, mixed medical-surgical adult ICU and opted for the second model. The program has since incorporated PAs to become an APP service. Herein, we describe the development, function, and staffing of our CCM APP program and review the challenges associated with initiating and maintaining this type of workforce.

Creation, Design, and Implementation of the CCM APP Program

For decades, patients in our ICU were cared for by anesthesiology and internal medicine residents, CCM fellows, and full-time CCM attendings. With the expansion of the ICU from 12 to 20 beds, supplementary staff was needed. Because the hiring of additional residents was not a viable long-term solution, we chose to develop a CCM APP team and to complement the existing ICU residents and fellows to provide in-house, full-time, comprehensive patient care, with roles and responsibilities comparable to advanced level residents (Table 1). Recruitment and training efforts for the CCM APP team began in the fall of 2006 in preparation for the opening of a new and larger ICU in April 2007. Although our preference was to hire board-certified acute care nurse practitioners (ACNPs) with ICU experience as either a registered nurse (RN) or NP, we also hired adult and family certified NPs. The key personality traits we looked for included flexibility, adaptability, self-direction, engaging communication skills, confidence, composure, assertiveness when appropriate, and ambition with a desire to grow professionally in a novel role. As the program matured, we continued these recruitment practices and developed ongoing affiliations with local NP and PA schools.

Since inception, with the generous support of hospital leadership, our APP program has grown steadily from 11 NPs in 2007 to a full staff of 25 in 2013 (22 NPs, 2 PAs, and a CCM APP coordinator). The coordinator administers the APP team and
reports directly to the Department of Nursing NP director and the CCM service chief. The coordinator also serves as a liaison between CCM, Nursing Administration, the ICU nurse leader (manager), the director of Respiratory Therapy, and the CCM APP team.

**Staffing and Clinical Workload**

In our ICU, the APPs participate in 2 teams: an APP-based team composed of APPs, CCM fellows, and attendings; and members of a housestaff team that includes residents, APPs, CCM fellows, and attendings. The 2 teams share similar clinical responsibilities. Each team cares for 10 patients, with an average of 2 to 4 patients per resident or APP. Outside the ICU, the APPs serve as the rapid response team (RRT) (approximately 3 calls/day) and as active participants of the CCM consultation service (APPs, CCM fellows and attendings).

**Training and Educational Activities**

APPs receive competency-based training within a custom designed, comprehensive, 3-month CCM APP preparation course. This program, led by CCM attendings and senior NPs, teaches the requisite critical care didactics and procedural skills (Table 2). On daily rounds, the CCM attendings further develop the APPs’ case presentation skills and organizational and prioritization proficiencies. Once the basic instruction and procedural training is complete, and the necessary clinical experience is attained, the APPs’ education continues outside of the ICU learning how to provide rapid response and consultative services (Table 2).

The APPs participate in ongoing professional development activities including CCM conferences, journal clubs, CCM and Nursing grand rounds, and hospital-wide quality assurance initiatives and committees. Several of our NPs have presented original research at national CCM conferences and have contributed to our annual CCM symposiums for APPs. Membership in professional organizations, such as the Society of Critical Care Medicine (SCCM), is strongly recommended and funded by the APP program.

Although our CCM APP program has been very successful, we have experienced several challenges in role transition, intra- and interdisciplinary relations, and workforce retention (Table 3).

**Challenge 1: Role Transition**

The shift from bedside RN to CCM NP is difficult. Although this process is discussed in depth at recruitment interviews, the magnitude of the role change only becomes evident to the NPs as training begins. The steep learning curve in transitioning from being a facilitator of care to becoming a director of care can be daunting due to knowledge deficits, high expectations, and most importantly, the pressures of being responsible for time-sensitive, high impact decisions. We provide significant mentorship and support; however, only APPs who can successfully complete the orientation program and handle the rigor of the role are permitted to remain. As of September 2012, 23% of new hires did not pass our CCM orientation.

**Challenge 2: The RN-NP Dynamic**

Whereas the career advancement from RN to NP is natural progression, the coalescence of NPs and...
The registered nurse-nurse practitioner dynamic must be continuously monitored and honed to foster both synergistic relationships and a strong team.

Table 2
Educational curriculum for nurse practitioners and physician assistants in the intensive care unit

<table>
<thead>
<tr>
<th>Didactic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission and discharge process</td>
</tr>
<tr>
<td>Documentation (progress, consult, RRT, procedure notes)</td>
</tr>
<tr>
<td>Chest radiograph and CT scan interpretation</td>
</tr>
<tr>
<td>Electrocardiogram interpretation</td>
</tr>
<tr>
<td>Critical care topics</td>
</tr>
<tr>
<td>Common surgical oncologic procedures</td>
</tr>
<tr>
<td>Biweekly ventilator workshops</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Procedural training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simulation followed by supervision</td>
</tr>
<tr>
<td>Central venous catheterization</td>
</tr>
<tr>
<td>Arterial catheterization</td>
</tr>
<tr>
<td>Hemodialysis catheter placement</td>
</tr>
<tr>
<td>Ultrasound guided vascular access</td>
</tr>
<tr>
<td>Endotracheal intubation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Advanced training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fundamentals of critical care support course</td>
</tr>
<tr>
<td>Operating room rotation for airway management</td>
</tr>
<tr>
<td>Emergency management simulator course</td>
</tr>
<tr>
<td>Communication skills workshop (discussing adverse events, prognosis, advanced directives, withdrawal of care)</td>
</tr>
</tbody>
</table>

Abbreviations: RRT, rapid response team; CT, computed tomography

and RNs into one team is delicate. In a survey of ICU RNs conducted by our ICU Nurse Leader Patricia Spellman, RN, MSN (personal communication), NPs in general were considered valuable resources, and were viewed as easily accessible, quality care providers. However, more than 50% of RNs perceived that the CCM NPs “forgot where they came from” and did not appreciate or remember the knowledge level, capabilities, and challenges faced by the bedside nurse. Other investigators corroborate these findings and additionally reported that RNs felt they received limited respect from NPs.11

We ascribe the periodic tensions between the nurses and NPs to several factors. In certain situations, seasoned RNs may view the NPs as a threat to their autonomy and independence. RNs may also have difficulty accepting direction from individuals they perceive as “novice” NPs. Conversely, the NPs may feel that the RNs do not appreciate the higher levels of difficulty and responsibility associated with the NPs’ new role. Lastly, the NPs sometimes clash with bedside nurses in regard to the delivery of bedside care as the NPs may have difficulty in “letting go” of the bedside.

The RN-NP dynamic must be continuously monitored and honed to foster both synergistic relationships and a strong team. Commitment to the development of a culture that emphasizes intraprofessional collaboration and a unified philosophy toward patient care not only facilitates mutual trust and respect but creates value within the multidisciplinary ICU team.12

Challenge 3: The APP-CCM Fellow Dynamic

A recent survey presented at the SCCM Congress in January 2013 demonstrated the positive impact and successful utilization of APPs in a large number of US academic medical centers with CCM fellowship training programs.13 Other studies,1 as well as our own experiences, have substantiated the efficiencies that APPs offer during rounds and while evaluating new patients. APPs also improve continuity of care and are more likely than the residents to interact with both the multidisciplinary health care team and family members of ICU patients.13

Similar to the APP-RN dynamic, the relationship between the CCM APPs and fellows can be many-sided. The APPs are valuable resources for incoming CCM fellows, teaching them the “ins and outs” of the hospital, assisting with their procedural training, and helping manage their patient case loads. At times, the APPs and fellows have competing interests especially in the realm of ICU procedures where both groups must attain and maintain procedural proficiencies. Throughout the year, the APP coordinator and fellowship program director work out an equitable procedural distribution between both groups. Overall, we believe that the exposure of CCM fellows to APPs helps the fellows gain invaluable insights into the future ICU workplace.14
Challenge 4: Merging NPs and PAs in a Multidisciplinary CCM Team

In the program’s fourth year, PAs were added to the all-NP CCM team after we determined that NP recruitment and retention could not continue to solely support the expanding program. However, it quickly became evident that finding experienced PAs was going to be challenging, thus we hired novice PAs with minimal CCM exposure. At that time we did not fully appreciate the unique set of training and workplace challenges beginner PAs would pose due to the significant educational and experiential disparities when compared to the CCM NPs. To bridge these gaps, we adjusted our orientation process for PAs, placed them at the ICU bedside directly under the tutelage of experienced ICU nurses, and extended the length of their mentorship period. Surprisingly, we were also forced to focus on NP-PA interactions as the NPs were initially hesitant to integrate PAs into their exclusively NP group. As time passed and relationships were fostered, our NPs have become more receptive and proactive in the assimilation of PAs within the APP group. This interprofessional hurdle may be averted, if both NPs and PAs are recruited together at the inception of a CCM APP team.

Challenge 5: Being Under Direction of Both Nursing and CCM

APPs are commonly assigned into existing hospital administrative infrastructures—Departments of Nursing, Medicine, or Surgery. In our institution, NPs are organizationally situated within the Department of Nursing and typically report directly to nurse leaders and not their collaborative physicians. PAs are commonly appointed within either the medical or nursing departments and the reporting structure is variable. In order to create a more physician-oriented model for our new CCM APP team, we crafted an APP oversight model with dual governance. The Department of Anesthesiology and CCM oversees the education, clinical supervision, recruitment and scheduling; the Department of Nursing handles the financing, credentialing, and administration. The APP coordinator facilitates collaboration between the 2 groups.

Our arrangement works well, however it is sometimes challenging for the APPs to be working under the direction of 2 departments without a clear professional identity. Furthermore, due to differences in credentialing, billing, and training between NPs and PAs, integrating PAs into the nursing infrastructure adds another layer of complexity. One possible solution for hospitals with large numbers of APPs (NPs, PAs, and Certified Registered Nurse Anesthetists [CRNAs]) is to establish a distinct Department of Advanced Clinical Practice. This solution will streamline APP administration and clinical oversight and provide APP-based leadership for this workforce.

Challenge 6: Workforce Retention

We have found 3 main obstacles to providing stable 24/7 CCM APP coverage. The first is the maintenance of a consistent night shift workforce and filling the inevitable night vacancies. Both experienced APPs and new APPs who have worked the day shift for several years usually do not want to return to the night shift. Newer APPs who start on the night shift yearn for the coveted transition to days and will seek other opportunities if day-shift positions are not eventually available. Second, dependable team coverage is limited through the frequent use of the Family Medical Leave Act (FMLA) by the APPs. This situation is unavoidable with a team predominantly composed of women of child rearing ages. Lastly, APPs occasionally face burnout as an oncologic ICU is a complex, demanding, and stressful work environment with a high emotional burden. Despite our attempts to offer flexible scheduling to help adjust for the usual life exigencies and to provide emotional support to prevent clinician burnout, we do periodically lose our experienced staff. Thus recruitment and training is a continuous process in maintaining the APP team.

Conclusions

Acute care trained APPs are being increasingly used in many US ICUs. Our collaborative physician-APP model at MSKCC has allowed us to develop a well-trained, highly functional and semi-autonomous CCM APP team. Along with the program’s successes, we have experienced challenges in role transition, intra- and interdisciplinary relations, and workforce retention. Similar experiences are likely to be encoun-
tered by other institutions intent on developing a program of this magnitude. Understanding and overcoming these obstacles will ensure that APPs will not only thrive in the intensive care setting, but more importantly, will be able to deliver timely, safe, and cost-effective care for all critically ill patients.

FINANCIAL DISCLOSURES

None Reported.

REFERENCES

13. Joffe A, Pastores SM, Maerz L, Mathur P, Lisco S. Utilization and impact on fellowship training of non-physician advanced practice providers in intensive care units of academic medical centers: a survey of critical care program directors. The results of this study were presented at the Society of Critical Care Medicine Congress; January 21, 2013; San Juan, Puerto Rico.
Critical Care Medicine Advanced Practice Provider Model at a Comprehensive Cancer Center: Successes and Challenges
Alichia Paton, Deborah E. Stein, Rhonda D'Agostino, Stephen M. Pastores and Neil A. Halpern

Am J Crit Care 2013;22 439-443 10.4037/ajcc2013821
©2013 American Association of Critical-Care Nurses
Published online http://ajcc.aacnjournals.org/

Personal use only. For copyright permission information:
http://ajcc.aacnjournals.org/cgi/external_ref?link_type=PERMISSIONDIRECT

Subscription Information
http://ajcc.aacnjournals.org/subscriptions/

Information for authors
http://ajcc.aacnjournals.org/misc/ifora.xhtml

Submit a manuscript
http://www.editorialmanager.com/ajcc

Email alerts
http://ajcc.aacnjournals.org/subscriptions/etoc.xhtml