

Physician assistants reduce resident workload and improve care in an academic surgical setting

Natalie Dies, MSc, BHSc; Saira Rashid, BHSc; Maureen Shandling, MD; Carol Swallow, MD, PhD; Alexandra M. Easson, MD, PhD; Erin Kennedy, MD, PhD

ABSTRACT

Objectives: Educational demands coupled with restricted hours reduce residents' availability to provide care at academic hospitals. Physician assistants (PAs) may address this issue. This study assessed the effect of PAs on patient discharges, resident workload, and resident perceptions of PAs on a surgical team.

Methods: Two PAs were employed on teams caring for complex surgical patients. Measures included time of discharge order entry, hours residents spent on the electronic medical record (EMR), and resident opinions of PA effectiveness.

Results: The teams with PAs had a 0.5% late discharge and 16% early discharge rate. Junior residents with a PA on the team spent fewer hours on the EMR. Residents reported PAs significantly improved their rotation and quality care.

Conclusions: PAs reduce resident workload and improve care on surgical teams in a tertiary hospital.

Keywords: physician assistants, resident education, resident surgical teams, improved patient outcomes, Canada, workforce

Improving physician in training well-being and reducing fatigue are an increasing priority in Canada, prompting regulatory changes limiting resident duty hours. In Ontario, the Professional Association of Interns and Residents of Ontario-Council of Academic Hospitals of Ontario (PAIRO-CAHO) has terms of employment that limit in-

At Mount Sinai Hospital in Toronto, Ontario, Canada, **Natalie Dies** and **Saira Rashid** practice in the Department of General Surgery; **Maureen Shandling** is the senior vice president of medical affairs and a practicing neurologist; **Carol Swallow** is the chair of the Division of General Surgery at University of Toronto, professor in the Department of Surgery, and a practicing surgical oncologist; **Alexandra M. Easson** is an assistant professor in the Department of Surgery and Institute of Health Policy, Management, and Evaluation and a practicing surgical oncologist; and **Erin Kennedy** is an associate professor in the Department of Surgery and Institute of Health Policy, Management, and Evaluation and a practicing colorectal surgeon. The authors have disclosed no potential conflicts of interest, financial or otherwise.

Acknowledgement: The authors would like to thank **Daphne Horn** for her assistance with this manuscript.

DOI: 10.1097/O1.JAA.0000476214.34937.50

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hospital overnight calls to a maximum of one in four nights and a maximum of 24 hours consecutive work.¹ A crossover period for adequate patient care handover also is required.¹

Many other factors affect the resident hospital workforce. For example, the resident workforce has not increased, and fewer housestaff are available in hospital to provide continuity in patient care, particularly when a resident is postcall. Furthermore, increasing formal education obligations for residents have further taken residents away from the hospital. Lastly, although computerized physician order entry has been shown to decrease medical error and may improve organizational efficiency, computerized orders take more provider time at point of entry, thus residents need more time to enter computerized patient orders than handwritten ones.^{2,3} Restricted resident work hours have already caused significant workforce issues in Canada, and coupled with an aging population and increasing prevalence of chronic disease suggests that PAs and NPs will be increasingly necessary to maintain quality care and patient safety. These challenges have led many academic hospitals to consider using physician assistants (PAs). PAs are less well-known in Canada than in the United States, although the NP is well-known in Canada. PA practice in the United States is guided by the national professional society, the American Academy of Physician Assistants (AAPA), but governed and regulated in each state. The AAPA recommends that state PA practice laws include:

- *Licensure* as the regulatory term
- Full prescriptive authority
- Scope of practice determined at the practice level
- Adaptable collaboration requirements
- Chart cosignature requirements determined at the practice
- Number of PAs a physician may supervise determined at the practice level.⁴

PAs were introduced into the Ontario healthcare system in 2007. They are not a regulated healthcare profession, and have a more restrictive scope of practice until regulation can be achieved.⁵ Meantime, medical directives are implemented, specifying the medical procedures and treatments that may be performed by the PA on a defined patient population under the supervising physician(s); these directives are specific to each institution.⁶ In Ontario, the typical PA model is one PA under the direct supervision of one

staff physician in primary care internal or emergency medicine within a community setting. Little data exist as to the effect of PAs in this model of care.

Recently, the Division of General Surgery at Mount Sinai Hospital in Toronto employed two PAs as members of the academic general surgical inpatient care team. The team consists of surgeons, clinical fellows, residents, and medical students. Because this was both a new PA model and unique PA position, we wanted to describe the effect of the PA in the team setting. The objectives of this study were to:

- determine if PAs reduced the number of late hospital discharges (defined as occurring after 10 a.m.)
- determine if PAs decreased the number of hours residents spent on the electronic medical record (EMR)
- elicit residents' perceptions of the PA as a member of the surgical team.

METHODS

Two PAs were employed in the Division of General Surgery at Mount Sinai Hospital starting in November 2012. They were assigned to one of three general surgery teams; each team consists of two to three staff surgeons, one clinical fellow, one senior resident, and one junior resident. Each team provides care for about 20 acute surgical patients undergoing breast, colorectal, or multivisceral resections. The PA's work hours were 6:30 a.m. to 2:30 p.m. Monday through Friday. The PAs attended morning care rounds with the residents; gave patient report to nurses; attended interdisciplinary rounds; planned for patient discharge; assisted in clinic with patient interviews and physical examinations; assisted in the OR with retraction, closure of incisions, and patient transfer to postoperative recovery; and assessed on the unit and in the ED by triaging patients and alerting the surgical team about urgent issues.

Discharge data Over a 13-month period (December 2012 to December 2013), the PAs prospectively collected discharge data onto data abstraction sheets developed by the PAs and their supervising physicians. The data collected included timely completion of home care referrals, time of discharge orders entered into the EMR, prescriptions, and any reasons for delay of discharge. Data were documented in a binary fashion ("yes" or "no") to state whether the PAs and resident teams were able to complete the home care referral the day before discharge, enter the discharge order before 10 a.m., and have the prescription written (if patient required one) by a resident for the 10 a.m. discharge. Reasons for delay of discharge were documented in free text by the PAs as either delay due to late discharge order, medical reassessment, resolution of outstanding medical issue, or awaiting staff approval of the patient discharge plan. Data from the abstraction sheets were combined and analyzed in a spreadsheet program. A *planned discharge* was defined as any discharge that met the following criteria:

- anticipated hospital discharge was communicated to the nursing team 12 to 24 hours in advance

- the home care referral was completed the day before discharge
- prescriptions were ready by 10 a.m. on the discharge day
- a discharge order was entered into the EMR by 10 a.m. on the discharge day.

A *planned late discharge* did not meet these four requirements; for example, if the prescription was not written before 10 a.m. During the early data collection phase of the study, *unplanned early discharge* emerged as an unexpected but important outcome measure that was included in the study. Unplanned early discharges were defined as patients deemed not ready for discharge during morning rounds but who were subsequently discharged later the same day after reassessment by the surgical team. Surgical reassessment often involved follow-up of adequate oral intake, blood work, imaging results, or liaison with a consulting service.

These data collected by the PAs were compared with data previously collected over 2 months by nursing unit administrators on the surgical units, who examined the reasons for delayed patient discharges. These data identified that late physician order entry contributed to delayed patient discharges and represented an area for improvement in patient care.

Resident computer time All orders for patients admitted to the surgical unit at Mount Sinai Hospital must be entered into the EMR. Test results, interdisciplinary notes, and active medications also are documented in the EMR. The hospital informatics department provided the number of hours that each junior resident logged onto the EMR system each week to provide direct patient care. We used these hours as a surrogate measure of resident workload. Users are automatically logged out of the system after being idle for 20 minutes. The junior resident is typically the team member who does the electronic order entry for inpatients because after morning rounds, senior residents immediately report to the OR for patient preparation and staff surgeon report. Junior residents also are the first to be called for unit and on-call issues. Because of this, we excluded senior residents from the analysis and only compared junior resident hours logged on the EMR for teams with and without a PA.

Resident perceptions of PAs on the team We developed a resident satisfaction survey to elicit resident perceptions of the effect PAs had on patient care and resident workload. The unvalidated survey consisted of 24 items rated on a 5-point Likert scale. The survey was e-mailed to all fellows and residents on the two teams with a PA at the end of their rotation and was reviewed anonymously. One e-mail reminder including the survey link was sent to all nonresponders 2 weeks after the initial e-mail.

Data analysis Descriptive statistics were used to present means and standard deviations for continuous variables and proportions for dichotomous variables. Differences were tested using the student's *t*-test for continuous data. Resident survey data and any commentary were examined but not analyzed on software.

RESULTS

Discharge data Over the 13-month study period, the two surgical teams with PAs had 848 planned discharges (Table 1). Of these, 0.5% (4 of 848) did not have discharge orders by 10 a.m. and were considered late discharges using the study criteria for late discharges. Discharge data gathered before PAs joined the teams showed a late discharge rate of 20% (25 of 126) over 2 months, with the most common reason for delay being home care forms that were not completed on time.

Teams with PAs had 132 unplanned early discharges, primarily because the PAs ensured that patients were reassessed before 2:30 p.m. to determine if they were ready for discharge. Similarly, the PAs could resolve any outstanding medical issues that were preventing discharge in an ongoing fashion throughout the day until 2:30 p.m. Surgical teams that did not have a PA often were unable to perform reassessments until the end of the day when the residents returned to the units after finishing their clinical duties in the OR or clinic. By this time in the evening, discharge was difficult to coordinate. For example, allied health staff and home care coordinators were no longer in hospital and the patient had to wait until the following day for safe discharge.

Resident workload Over the study period, 41 junior residents completed a general surgery rotation at Mount Sinai Hospital. Junior residents on the team without a PA spent about 10 hours more per week on the EMR compared with junior residents on teams with PAs (31.3 hours compared with 21 hours, $P < 0.05$). No significant difference was found in the number of hours the junior residents logged on the EMR between the two teams in which a PA was assigned (19.7 hours versus 21.6 hours, $P > 0.05$).

Resident perceptions of PAs on the team The survey to elicit resident perceptions effect of PAs on resident workload was sent to all 72 residents who completed a general surgery rotation at Mount Sinai Hospital during the study period. Of these, 45 returned the completed survey, for a response rate of 63%.

In terms of resident workload, residents' perceptions were that having a PA on the team significantly decreased the time residents spent completing home care forms (91%) and discharge summaries (91%), decreased the number of pages that they received (77%), and made it significantly easier to get to the OR (78%) and educational sessions (79%), and leave postcall by noon (71%) (Table 2). Optional comments by the residents on the survey suggested that one of the biggest gains was letting them get to the OR in the morning on time and letting junior residents get to the OR more often. Other positive statements received were: "Before the PA arrived I was struggling to keep up with basic patient care... I think most importantly it improved patient safety," and "As constant team members they eased orientation into the surgical system ... enhanced patient flow and communication with the nurses." Importantly, 90% (38 of 42) agreed that the PAs significantly

TABLE 1. Late physician discharge orders without and with PAs

Data were collected over 2 months before PAs were introduced to the teams.		
	Without PAs	With PAs
Total discharges	126	848
Late MD discharge order (%)	25 (20%)	4 (0.5%)

improved the overall quality of their surgical rotation when compared with other surgical rotations without a PA.

Residents also agreed that the PAs significantly improved patient care and communication. Residents indicated that the PAs significantly increased the efficiency of the discharge process (93%) and morning rounds (98%); improved consistency and quality of morning report (79%); improved quality of communication between the surgical team, nursing, and other healthcare professionals (93%); decreased wait time for patients to be assessed on the unit (79%); and significantly improved the overall quality of care provided to patients (93%).

DISCUSSION

Our study suggests that PAs can be successfully integrated on a surgical resident team in a tertiary academic setting in Canada. Overall, the introduction of PAs onto our surgical teams

- decreased late planned discharges after 10 a.m.
- increased unplanned early discharges with earlier reassessment and/or coordination of care
- decreased resident workload
- improved resident satisfaction with their rotation.

Implementation of PAs on our general surgery service led to a significant decrease in late discharges from 20% to 0.5% and increase in unplanned early discharges from 0% to 16%. This resulted in improved bed flow and possibly translated into a 1-day decrease in length of stay on our service, according to the quarterly hospital audit. Length of stay was not measured in this study; however, the audit data were brought forth to the Division of General Surgery and coincided with implementation of the PAs. These results are in keeping with other studies that have reported a decrease in length of stay by 0.7 to 3 days with the use of PAs and NPs.⁷⁻¹⁰ The PAs on our service were able to effect this change primarily by ensuring that home care referrals were completed before the day of discharge and that prescriptions were written in advance for signature by the physician.

Another significant advantage of having PAs was that they were available during the day, when staff and residents were in the OR, to coordinate discharge planning with the nursing team and other healthcare professionals. PAs acted as a liaison with these services and addressed all patient issues, allowing for coordinated discharge planning. These observations are supported by Moote and colleagues, who

surveyed organizational leaders at major academic medical centers across the United States for their opinions on the effects of integrating PAs or NPs on resident teams.⁷ Respondents ranked accessibility of the PAs and NPs to other members of the interprofessional team as the most valuable contribution of the PA to the team and organization.

This study showed that PAs significantly reduced the electronic order entry workload for junior residents. Junior

residents with a PA on the team were logged onto the EMR 10 hours less on average per week than residents without a PA. This was despite the fact that PAs during this study time period were not able to enter medical orders themselves. Most likely, the time saved was due to the PAs reviewing blood work and imaging and summarizing pertinent results for the residents, entering orders for quicker resident cosignature, and completing home care referrals. Although these

TABLE 2. Resident perceptions of PAs on surgical teams (number of responses)

	Strongly disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly agree (5)	Median
Resident workload						
Significantly decreased the time I spent on EHR	0	5	12	17	9	4
Significantly decreased the amount of time I spent completing home care forms	0	1	3	11	30	5
Significantly decreased the amount of time I spent completing discharge summaries	0	1	3	10	30	5
Significantly increased the efficiency and quality of the discharge process for patients on our team	0	0	3	15	27	5
Significantly decreased the number of pages for unit issues and minimized interruptions to my workflow	0	3	7	14	20	4
Significantly improved the consistency and quality of morning report to the nursing staff	1	0	8	14	19	4
Significantly improved the level and quality of communication with nursing staff and allied health	1	0	2	18	23	5
Made it significantly easier for me to go to clinic	0	0	15	8	19	4
Made it significantly easier for me to go to the OR	0	0	9	9	23	5
Made it significantly easier for me to attend my weekly off-site teaching sessions	0	0	8	16	14	4
Made it significantly easier for me to leave postcall by noon	3	0	7	13	12	4
Significantly helped improve the overall efficiency of the team	0	1	2	13	29	5
Significantly helped improve the overall quality of care provided to patients	0	0	3	16	25	5
Significantly improved the overall quality of my surgical rotation	0	0	4	13	25	5
Patient care and safety						
Could safely enter blood work orders on EHR	0	1	0	17	26	5
Could safely enter imaging orders on EHR	0	2	2	18	22	4.5
Could safely enter a discharge order for a patient	0	1	3	13	27	5
Could safely assess stable patients in the ED	0	0	10	13	16	4
Could safely enter fluid orders for the patients on our team	0	1	9	16	17	4
Knows their limitations and appropriately requests back-up	0	1	4	1	23	5
Significantly improved the surgical team's efficiency on morning rounds	0	0	1	17	26	5
Significantly improved the wait time for patients to be assessed on the surgical unit and in the ED	0	1	9	16	16	4
Significantly improved overall patient care and patient flow on our service	0	0	1	19	24	5

results show a significant reduction in the number of hours that junior residents were logged onto the EMR each week, these data indicate that even with PAs, junior residents were spending 3 to 4 hours per day on the EMR. Since this study was completed, medical directives have been developed to let PAs enter orders without physician cosignature for blood work, blood cultures, ECGs, and nasogastric tube insertion after demonstration of appropriate training. This could further reduce the number of hours per day that junior residents enter electronic orders.

The survey also found that 80% of residents reported that PAs significantly decreased the time spent completing home care forms and discharge summaries compared with experiences on other surgical teams without PAs, decreased the number of pages that they received, and made it significantly easier to get to the OR and educational sessions and leave postcall by noon. Residents also felt that integration of the PAs onto the service significantly improved patient care primarily by facilitating more effective communication between the surgical team, nursing, and other healthcare professionals.

These findings are similar to other studies on the integration of PAs or NPs that have been conducted in the United States, where the PA role is well-established. These studies also found that resident workload is decreased, based on a variety of measures including number of pages received, hours slept on-call, hours spent in hospital, hours spent in the OR, amount of resident time saved, and improved resident written test scores.^{6,11-16}

Other studies also have shown high resident satisfaction with PAs.¹⁷⁻¹⁹ One Canadian group collected qualitative surveys from residents to explore their opinions about PAs on an orthopedic surgery service.²⁰ Of the six residents interviewed, five reported that PAs reduced their workload by decreasing their clinical responsibilities and three reported that their training was improved by the staff surgeon providing closer supervision during surgery when the PAs acted as second assistants.

One of the main concerns of program directors and department chiefs across Canada about integrating PAs onto resident teams is whether the PA may interfere with resident learning and preparedness.¹ Although initially our group shared these concerns, we found the opposite to be true. We found that because the residents needed to supervise the PAs, they needed to know how to manage the units themselves and learned by reviewing the PAs' work and troubleshooting problems when they occurred. The opportunity for residents to work with PAs also prepares them for future practice that will likely include team-based medicine.²¹ Residents had to be able to communicate and delegate specific tasks to the PAs. In this way, our group felt that the residents not only learned how to do these tasks but also incorporated other CanMEDS competencies beyond medical scholar, including communicator and manager. (CanMEDS, a framework of different roles outlined by the

Royal College of Physicians and Surgeons of Canada, sets the standards for expected competencies of resident physicians and is the basis of their formal evaluations.²²)

LIMITATIONS

This study had several limitations. Our discharge data did not include weekend discharges. This may have biased the results to higher late discharge and lower unplanned early discharge rates because the data exclude 2 of the 7 potential discharge days per week. However, we do not feel that this would have significantly altered the overall results.

We were unable to control for the amount of call or vacation for the junior residents but feel that this was unlikely to change the overall study results. The amount of call and vacation was likely to have evened out for all residents over the 13-month data collection period. The response rate to the resident survey was 63%, in keeping with other physician surveys. Although this may introduce an element of response bias, perceptions of the nonresponders are unlikely to have significantly affected our survey results because most respondents felt strongly that PAs reduced resident workload and improved patient care.

Finally, our data also are limited by different time frames and different methods that were used to collect the data before and after the implementation of the PAs at our institution.

CONCLUSION

Our results suggest that PAs can be successfully integrated onto surgical resident teams and lead to positive outcomes for patients while reducing resident workload in Canada. The PA-resident team model described in this study also may be applicable across all fields of medicine. **JAAPA**

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