

Interprofessional teams' contribution to patient outcomes in emergency general surgery

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ABSTRACT

Hospitals increased residency programs and added advanced practice providers in response to duty hour limitations. We intended to ascertain whether the type of clinical support was related to the outcomes of emergency general surgery. We questioned acute care hospitals on their participation in emergency general surgery services as part of our study of those facilities. Data from participating hospitals were combined with patient data (17 State Inpatient) from patients older than years old admitted with an

emergency general surgery diagnosis. Based on the types of providers aiding emergency general surgery surgeons, analyses examined emergency general surgery patient and hospital characteristics. (none, only advanced practice providers, only residents, or both). Using a multivariable analysis, it was assessed whether the number of residents or advanced practice doctors was related to the kind of management, mortality, or complications.

Key Words: *Surgical care; Cardiovascular disease; Colorectal surgery; Vascular surgery*

INTRODUCTION

Healthcare facilities are using physician extenders more and more as the surgical workforce grows overworked as a result of national shortages and geographic worker maldistribution. Residents have traditionally given practicing surgeons a lot of clinical help at teaching hospitals. More teaching hospitals are using Advanced Practice Providers (APPs) to complete responsibilities including bedside procedures, inpatient consultations, outpatient follow-ups, and initial evaluations because of duty hour constraints, despite the rise of residency training posts. Residents and APPs can assist surgeons clinically in addition to easing some of the needless administrative strain associated with providing care. In critical care, orthopedics surgery, or obstetrics and gynecology, studies evaluating outcomes depending on the presence of residents or APPs on care teams have not discovered any appreciable differences in measures like duration of stay or mortality. But it's unclear how residents and APPs affect the treatment of patients who need Emergency General Surgery (EGS). We intended to ascertain if the treatment style provided to EGS patients or lower incidence of complications or mortality were related to resident and APPs working independently or in teams. After

adjusting for patient and facility level factors, our hypothesis was that additional clinical assistance for surgeons would enhance patient outcomes. The survey's conception and execution have already been discussed. The study (Appendix 1) on workforce composition includes information on the clinical support given to EGS surgeons. In particular, the presence and frequency of APPs (nurse practitioners and/or physician assistants), sometimes known as resident clinicians, were determined. Hospitals that did not respond to survey questions about the presence of residents or APPs were eliminated from this retrospective study of our survey, as were hospitals whose response indicating the presence of residents or APPs was inconsistent with their reported frequency of that support. For instance, a hospital would be disqualified if it said that residents were not a member of its EGS team but afterwards claimed that residents always provided daytime clinical support. The next step was to try and correlate survey results to information about the hospital and the patients. State Inpatient Databases were used to collect patient-level data. (SID). For the Healthcare Cost and Utilization Project, the Agency for Healthcare Quality developed the SID. SID are produced by community hospitals (i.e., open to

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the general public, not affiliated with a jail, not federal) using billing information for all payers, and they offer admission-level details like as diagnoses, treatments, and patient demographics. SID currently includes representation for hospital discharges. For information at the hospital level, which includes information on factors like the number of beds, ownership, rurality, association with particular medical schools, teaching status, and trauma certification. Our ability to link hospital survey results and discharge level data anonymously was made possible by the survey's exclusive American Hospital Association identifier. We subsequently established a group of EGS patients who were being treated at these hospitals. Age, years, and an admission for an emergency or urgent situation were inclusion criteria. The International Classification of Diseases Ninth or Tenth Revision diagnosis code indicating EGS disease was required for inclusion; however, an operation was not necessary because the type of management was what was important (for a full list of included diagnoses, see the Appendix). This list, which includes the illnesses most frequently treated urgently by acute care surgeons or surgeons offering EGS coverage, was created based on the American Association for the Surgery of Trauma panel's definition of EGS disorders as well as findings from our preliminary pilot study and literature analysis. Patients who were admitted for EGS care were counted to evaluate hospital-level transfer patterns, but they were later omitted from patient-level analysis since we couldn't estimate the contribution of the care providers prior to admission. To determine whether EGS patients were managed surgically or nonsurgical, we identified patients who had undergone an EGS operation using the procedure codes listed in the Appendix. In addition to inpatient mortality, outcome factors included surgical problems (such as anastomotic leak, hemorrhage, or reoperation) and systemic complications (such as pneumonia, acute myocardial infarction, and shock). These criteria were applied, and we then found certain EGS admissions. Depending on the type of clinical support provided, patients and hospitals were divided into cohorts: no clinical support (only independently practising surgeons), residents only, APPs solely, or APPs and residents together. The type of clinical support offered for EGS management was the relevant predictor variable in all analyses comparing outcomes among these cohorts. We compared tests of association, Fisher exact test, Student's t test, and Wilcoxon rank-sum test, where necessary, along with outcomes variables, hospital characteristics, and hospital characteristics by type of clinical support. Then, using each group as the reference, we created multivariable logistic regression models to examine if the type of clinical support had an effect on the probabilities of operative management, systemic complication, operative complication, or mortality. Hospitals without residents or APPs had the shortest median number of surgeons, whereas those with both APPs and residents on staff had the biggest median number of surgeons. Hospitals without residents and APPs had a higher percentage of hospitals that were rural, had fewer beds, lacked trauma certification, were nonteaching, and were not connected to a medical school than hospitals with both types of clinical support. While hospitals with only residents and hospitals with only APPs had a similar percentage of rural hospitals, hospitals with only APPs were more likely to be nonteaching, not affiliated with a medical school, and

not certified in trauma care. Based on the type of clinical support, patient demographic, clinical, and outcome characteristics are considered. While all patients were white and older, a larger percentage of EGS patients were older and non-Hispanic white in hospitals without residents (surgeons alone or surgeons with APPs only) compared to hospitals with residents exclusively or residents and APPs. Compared to hospitals with other types of coverage, those with APPs only had a higher likelihood of having patients with or more comorbidities. Both Medicare (46%) and self-pay had the largest proportions in hospitals without clinical support. Additionally, patients in surgeon-only facilities were more likely to get surgery than those with other types of insurance. The majority of patients at all sites didn't experience problems. Once patient and facility characteristics were taken into consideration, all hospitals with clinical support had lower odds of surgical management than hospitals without residents or APPs, including hospitals with solely residents, only APPs, and both residents and APPs. The findings of the regression analysis using each form of clinical support as a reference group for the outcome indicators are displayed. Hospitals with residents solely had reduced adjusted chances of operating complications compared to the other groups, while hospitals with residents and APPs had lower odds compared to hospitals with APPs alone. Compared to hospitals without residents or APPs, hospitals with residents (alone or with APPs) had decreased adjusted risk of serious systemic complications. After correcting for patient and facility level factors, there were no discernible changes in mortality. When patient and hospital characteristics were taken into account, our study of the function of clinical assistance in the care of EGS patients at hospitals in states showed no variations in mortality, but there were substantial disparities in management and complication rates based on team composition. Surgical management for EGS disorders was most frequently used in hospitals without clinical support; nevertheless, surgical problems were least common in facilities where surgeons treat EGS patients only with help from residents. Hospitals where surgeons care for EGS patients without clinical help from residents experienced greater rates of systemic complications. These findings draw attention to the beneficial effects that residents may have on the prognosis of EGS patients and may have ramifications for how EGS care is organised. Even after adjusting for other patient and hospital level characteristics, EGS patients were more likely to be managed operatively in hospitals without residents or APPs. This can indicate that more team members are present to observe patients and do serial exams. Surgeons may be able to use serial tests to ensure clinical deterioration is quickly identified while allowing a period of cautious waiting and avoiding surgical intervention. The likelihood of an operational complication was lowest for patients treated in hospitals where EGS surgeons were assisted only by residents. There have been conflicting findings in prior studies assessing resident participation in operating room problems. According to a study on emergency surgery conducted in Australia, resident involvement reduced the incidence of surgical complications. Furthermore, it has been discovered that thyroid surgeries had decreased risks of perioperative bleeding problems. However, greater rates of anastomotic leak and surgical site infections have also been reported following bariatric surgeries for ventral hernias. This may be because bleeding is an acute postoperative consequence, and having the resident's extra set of eyes may really be

beneficial. On the other hand, minute inadequacies in intraoperative technique, which can happen despite the attending surgeon's close supervision (for instance, the anastomosis is only created once and the likelihood of failure cannot be visualised at that time), lead to complications like wound infection and anastomotic leak that manifest days after surgery. This suggests a different dynamic that might be at play. According to earlier studies, APPs might give residents additional time in the operation room. Therefore, compared to residents at hospitals with both residents and APPs, residents at hospitals without APPs probably spend more time on the floor and less time in the operation room. In contrast to hospitals having both APPs and residents, lower complications may be explained by this conceivably reduced engagement. It seems that simply releasing residents from floor work to spend more time in the operating room is of questionable benefit (or harm), at least in the short term, to patients. This highlights the need for additional research into methods to create the highest yield and safest intraoperative training opportunities. Systemic problems in our study comprised disease processes like pneumonia, pulmonary embolism, and bloodstream infection related to central lines. These are illnesses that can be mainly avoided by following standard bedside procedures and monitoring. This observation may help to explain why hospitals with residents (alone or in collaboration with APPs) have lower rates of systemic complications than hospitals without either. Residents may spend more time at the hospital and at the bedside than surgeons who have completed training. They might be useful if they ensure proper pulmonary toileting, central venous catheter removal, and appropriate venous thromboembolism prophylaxis on daily rounds. Numerous of these procedures are supported by data and are frequently included in bedside care regimens. We were surprised to learn that adding APPs specifically did not reduce the risk of systemic complications because adding acute care nurse practitioners to a surgical intensive care unit has been found to increase adherence to recommendations like deep vein thrombosis prevention, and adding nurse practitioners to a trauma service has been found to reduce rates of pneumonia and deep vein thrombosis. In terms of team composition, we discovered that most EGS patients and many EGS hospitals have both residents and APPs working together; nonetheless, results were not better with these teams. Our results need to be understood in light of a variety of restrictions. The first is the scalability of administrative data sources like SIDs. The SIDs are reliable and validated publicly available data, although they are only able to index hospitalisation outcomes and lack clinical details. Due to the low overall response rate to the clinical support questions and the social desirability bias, where respondents provided answers they thought would be acceptable to the researcher, our survey responses may have also been vulnerable to selection bias. In contrast, given that we requested up-to-the-minute details on how EGS care was being delivered at the time the survey was completed, the risk of recall bias was probably low.