A Comparison of PA to Resident Productivity in an Acute Setting

Joseph Sutherland
Pacific University

Follow this and additional works at: http://commons.pacificu.edu/pa
Part of the Medicine and Health Sciences Commons

Recommended Citation
A Comparison of PA to Resident Productivity in an Acute Setting

Abstract

Background: There is a popular conception that PAs are able to spend more time with patients than physicians, and this is often quoted by PA school applicants as a reason for them choosing to pursue a career as a PA vs. becoming a physician. With the passage of the Affordable Care Act in 2010, there has been an increase of ten million more patients with access to insurance. This has led to an influx of new patients into the healthcare system; putting a strain on available resources. This review evaluates if the perception that PAs spend more time with patients than physicians who are in residency training is true, and whether PAs are efficient clinicians in the utilization of limited time.

Methods: An exhaustive search of available medical literature was conducted using MEDLINE-OVID, CINAHL, Web of Science, and EBMR Multifile. The keywords used for each search were: physician assistant, resident, emergency department, and productivity. Additional inclusion and exclusion criteria were used to focus the search. Relevant articles were assessed for quality using GRADE. Forty-Eight articles were reviewed for relevancy. Three retrospective studies met inclusion criteria and were included in this systematic review.

Results: The first study was conducted at a tertiary ED as an evaluation of PA productivity and found that PAs saw an equivalent number of patients per hour compared to ED residents in both the main ED and the fast track. The second study was conducted at a single high volume ED that sees 45,000 patients a year and evaluated PAs vs residents in the main ED; the study shows that the PAs saw more patients per hours than residents, whether they were in their first, second, or third year of residency training. The third study looked at PA vs resident productivity as well as patient satisfaction at a community hospital's fast track. They found that PAs saw significantly more patients than residents, regardless of their year of training, and that there was no difference in patient satisfaction between the groups of clinicians.

Conclusion: In one of the studies PAs saw an equivalent number of patients per hour as the residents, and saw more patients per hour than residents in the other two: showing that in an acute setting PAs actually spend less time with patients than physicians in training. Further research needs to be done to see if this carries over into a primary care setting and if it remains true or at least equivalent to the productivity of physicians once they become attendings.

Keywords: Physician assistant, resident, emergency department, and productivity

Degree Type
Capstone Project

Degree Name
Master of Science in Physician Assistant Studies

First Advisor
Mark Pedemonte, MD

Second Advisor
Annjanette Sommers, MS, PA-C

This capstone project is available at CommonKnowledge: http://commons.pacificu.edu/pa/576
Copyright and terms of use

If you have downloaded this document directly from the web or from CommonKnowledge, see the “Rights” section on the previous page for the terms of use.

If you have received this document through an interlibrary loan/document delivery service, the following terms of use apply:

Copyright in this work is held by the author(s). You may download or print any portion of this document for personal use only, or for any use that is allowed by fair use (Title 17, §107 U.S.C.). Except for personal or fair use, you or your borrowing library may not reproduce, remix, republish, post, transmit, or distribute this document, or any portion thereof, without the permission of the copyright owner. [Note: If this document is licensed under a Creative Commons license (see “Rights” on the previous page) which allows broader usage rights, your use is governed by the terms of that license.]

Inquiries regarding further use of these materials should be addressed to: CommonKnowledge Rights, Pacific University Library, 2043 College Way, Forest Grove, OR 97116, (503) 352-7209. Email inquiries may be directed to: copyright@pacificu.edu

This capstone project is available at CommonKnowledge: http://commons.pacificu.edu/pa/576
NOTICE TO READERS

This work is not a peer-reviewed publication. The Master’s Candidate author of this work has made every effort to provide accurate information and to rely on authoritative sources in the completion of this work. However, neither the author nor the faculty advisor(s) warrants the completeness, accuracy or usefulness of the information provided in this work. This work should not be considered authoritative or comprehensive in and of itself and the author and advisor(s) disclaim all responsibility for the results obtained from use of the information contained in this work. Knowledge and practice change constantly, and readers are advised to confirm the information found in this work with other more current and/or comprehensive sources.

The student author attests that this work is completely his/her original authorship and that no material in this work has been plagiarized, fabricated or incorrectly attributed.
A Comparison of PA to Resident Productivity in an Acute Setting

Joseph D. Sutherland

A Clinical Graduate Project Submitted to the Faculty of the
School of Physician Assistant Studies
Pacific University
Hillsboro, OR
For the Masters of Science Degree, August 13 2016

Faculty Advisor: Mark Pedemonte, MD
Clinical Graduate Project Coordinator: Annjanette Sommers, MS, PA-C
BIOGRAPHY

[Redacted for privacy]
ABSTRACT

Background: There is a popular conception that PAs are able to spend more time with patients than physicians, and this is often quoted by PA school applicants as a reason for them choosing to pursue a career as a PA vs. becoming a physician. With the passage of the Affordable Care Act in 2010, there has been an increase of ten million more patients with access to insurance. This has led to an influx of new patients into the healthcare system; putting a strain on available resources. This review evaluates if the perception that PAs spend more time with patients than physicians who are in residency training is true, and whether PAs are efficient clinicians in the utilization of limited time.

Methods: An exhaustive search of available medical literature was conducted using MEDLINE-OVID, CINAHL, Web of Science, and EBMR Multifile. The keywords used for each search were: physician assistant, resident, emergency department, and productivity. Additional inclusion and exclusion criteria were used to focus the search. Relevant articles were assessed for quality using GRADE. Forty-Eight articles were reviewed for relevancy. Three retrospective studies met inclusion criteria and were included in this systematic review.

Results: The first study was conducted at a tertiary ED as an evaluation of PA productivity and found that PAs saw an equivalent number of patients per hour compared to ED residents in both the main ED and the fast track. The second study was conducted at a single high volume ED that sees 45,000 patients a year and evaluated PAs vs residents in the main ED; the study shows that the PAs saw more patients per hour than residents, whether they were in their first, second, or third year of residency training. The third study looked at PA vs resident productivity as well as patient satisfaction at a community hospital’s fast track. They found that PAs saw significantly more patients than residents, regardless of their year of training, and that there was no difference in patient satisfaction between the groups of clinicians.

Conclusion: In one of the studies PAs saw an equivalent number of patients per hour as the residents, and saw more patients per hour than residents in the other two: showing that in an acute setting PAs actually spend less time with patients than physicians in training. Further research needs to be done to see if this carries over into a primary care setting and if it remains true or at least equivalent to the productivity of physicians once they become attendings.

Keywords: Physician assistant, resident, emergency department, and productivity
ACKNOWLEDGEMENTS

[Redacted for privacy]
Table of Contents
A Comparison of PA to Resident Productivity in an Acute Setting ........................................... 1
Joseph D. Sutherland .................................................................................................................... 1
Biography ...................................................................................................................................... 2
Abstract ................................................................................................................................. Error! Bookmark not defined.
Acknowledgements .................................................................................................................. 4
Table of Contents .................................................................................................................. 5
List of Tables .......................................................................................................................... 6
Abbreviations ........................................................................................................................ 6
BACKGROUND ....................................................................................................................... 7
METHODS ............................................................................................................................. 9
RESULTS ................................................................................................................................. 10
DISCUSSION .......................................................................................................................... 18
References ............................................................................................................................... 22
Table I: Quality Assessment of Reviewed Articles ................................................................. 24
Table II: Brook et al ................................................................................................................. 24
Table III: Hamden et al ........................................................................................................... 24
Table IV: Jeanmonod et al ...................................................................................................... 24
List of Tables

Table I: Characteristics of Reviewed Studies
Table II: Summary of Finding Brook et al
Table III: Summary of Finding Hamden et al
Table IV: Summary of Finding Jeanmonod et al

Abbreviations
Pt/h..............................Patient per hour
RVU.........................Relative Value Unit
RVU/Pt.....................RVU per patient
RVU/h.......................RVU per hour
CPT.............................Current Procedural Terminology
ESI.............................Emergency severity index
ACA............................Affordable Care Act
GRADE.........................Grading of Recommendations, Assessment, Development, and Evaluation
A Comparison of PA to Resident Productivity in an Acute Setting

BACKGROUND

Physician Assistants (PAs) were introduced into the United States clinical setting in the late 1960’s by training former Navy Corpsman in the fast track medical school curriculum with which the Army used to commission doctors during WWII. As these returning Vietnam veterans had garnered significant medical experience that did not easily translate into a civilian occupation, this career took advantage of their already extensive training and added to it, creating clinicians that could fill the gap in medical care to underserved populations. Their role in medicine and scope of practice has grown tremendously from that early beginning.\textsuperscript{1-4} There are more than 100 000 graduates of PA programs in the United States today, and they practice in a wide variety of settings including primary care, critical care, surgery, specialty practice, psychiatry, and emergency medicine.\textsuperscript{5} The expanding scope and use of PAs has been supported by research that shows there is no compromise in patient care by their utilization. Multiple studies across the continuum of care have shown that utilizing PAs does not result in increased morbidity, mortality, or adversely affect visit times and cost, regardless of the setting or lack of physician involvement in a case.\textsuperscript{6-9}

One distinct difference between PAs and physicians is that depending on state law and/or administrative policy, there are large difference in the PA scope of practice.\textsuperscript{10} There is a perception that PAs should be tasked with managing lower acuity patients; however, there is currently minimal research that justifies this practice. Currently 10% of new PA graduates enter into emergency medicine as their primary occupation, and another 20% report spending some of their time each year working in the field.\textsuperscript{11}
Additionally, PAs that work fulltime in emergency medicine report having a higher than national average salary than PAs working in other settings, and there are now multiple academic institutions offering postgraduate specialty training to PAs in emergency medicine such as Yale, John Hopkins, and the Mayo Clinic.

Emergency department (ED) overcrowding and waiting times are of growing concern as the number of patient visits has continued to rise since the passing of the Affordable Care Act. The National Hospital Ambulatory Medical Care Survey estimates that ED visits in the USA have grown from 123.8 million in 2008 to 136.2 million in 2011. Hospital ED visits during which a patient was seen by a PA or nurse practitioner increased from 7% in 2000 to 17% in 2010, and ED visits during which a patient was seen by a PA or nurse practitioner and did not see a physician increased from 3% in 2000 to 7% in 2010. Nationally, 53% of patients in the ED are seen with an emergency severity index (ESI) of 4 or 5, the lowest level of acuity. There is no contemporaneous physician involvement documented in 45% of these cases. Among EDs that utilize PAs, nonurban EDs had PAs without direct physician involvement see a median 27% of all ED visits, compared to 7.5% for urban EDs.

In an effort to improve patient safety and satisfaction, many EDs have turned to PAs, to augment the emergency physician workforce. Utilizing PAs has allowed EDs to better manage increasing patient volumes and helps to offset the need for more emergency physicians. It is expected, therefore, that PA use in EDs will continue to increase. While there are over 100 000 PAs practicing in the US, and an additional 1000 graduating PAs entering emergency medicine every year, little is known about their overall productivity and how they contribute to departmental workflow. While research
has shown similar medication prescribing patterns between physicians and PAs in EDs, and similar cost and length of stay in an urgent care setting between PAs working alone and attending physicians, there is an overall paucity of literature.

This review examined three studies that compare the productivity of PAs and emergency medicine residents in years 1, 2, 3, and 4 of their post graduate training staffing an Emergency department according to three measures: the number of patients seen per hour (Pt/h), the number of relative value units (RVUs) generated per hour (RVU/h), and the number of RVUs generated per patient (RVU/Pt). RVUs are derived from a formula that provides a gauge to measure clinician productivity and reimbursement through Medicare. An RVU is generated for each Current Procedural Terminology (CPT) code by taking into account a geographic adjustment factor, the cognitive and technical work provided by the clinician, the expense to provide the service on the part of the institution, and the cost of malpractice insurance for coverage of the service provided. The total RVU is then used to determine the Medicare payment. As the normal fee for service model transitions into some heretofore unknown combination of value based care and service fee remuneration, looking at all three measurements of productivity, Pt/h, RVU/h, and RVU/Pt, allows for a broader perspective on which to base the most accurate reflection of true productivity under future reimbursement models.

**METHODS**

An exhaustive search of available medical literature was conducted using MEDLINE-OVID, CINAHL, Web of Science, and EBMR Multifile. The keywords used for each search were: physician assistant, resident, emergency department, and productivity. These sources were then narrowed to only include studies published after
the implementation of the ACA in 2010, which evaluated PAs practicing in the United States. The bibliographies of these articles were further evaluated for relevant sources, and studies that evaluated PAs to residents in an emergency department setting were included. Applicable articles were assessed for quality using the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE).17

RESULTS

The initial search yielded 48 articles for review. After screening the articles for relevant data, three articles met inclusion criteria. All three articles were retrospective chart reviews18-20 and results of the GRADE assessment are seen in Table I. A summary of the outcome results from the three studies can be seen in Tables II, III, and IV.

Brook et al

This was a retrospective chart review18 that was conducted of all the patients seen in the ED at a 70,000 volume tertiary care center in the months of June and July of 2007. Productivity data was collected by review of the computerized timeline available for all patients seen in the ED, which created a record of patient registration and caregiver assignment to the patient. A PA was considered the primary provider if they initiated patient care and provided documentation on the patient. If more than 1 PA or resident signed up for the patient, the computerized medical record was accessed to determine which provider dictated the chart.18

Eight PAs participated in the study. Productivity was defined as patients seen during a given shift divided by the total hours that a PA saw patients that shift. Relative value unit data were collected from a separate database, and a total was calculated for all of the PA shifts worked. Total RVUs were compared against the total hours worked by
PAs during those months, giving a mean RVU per hour for each of the PAs (to use as a reference standard). Productivity by shift length was compared using an analysis of variance (ANOVA) statistical test. Productivity by day of the week was also calculated and compared using ANOVA. Hourly productivity for each shift was calculated so that patterns of patient care could be compared between different shifts lengths.\(^{18}\)

ED volume was calculated to determine if there was a correlation between PA productivity and the volume of patients seen in the ED. Daily volume was calculated as the number of patients registered between 0700 and 2359 each day; 0700 was chosen because that is the hour that ED residents working the day shift start their shifts, and it was hypothesized that their work load might affect PA productivity. Volume was not analyzed for the early morning hours because all PA shifts at the institution end by midnight, and none of the other providers working before 0700 overlapped with PAs. Microsoft Excel was used for statistical calculations. No financial or other incentives were in place to encourage PA productivity or efficiency during the study period.

During the study period of June to July 2007, there were 160 PA shifts, with shift lengths ranging from 4 to 13 hours. The mean productivity of all shifts was 1.16 patients per hour (95% confidence interval [CI] 1.12–1.20). By ANOVA calculation, there was no statistical difference between productivity of different shift lengths (P 0.73). ANOVA yielded no statistical difference between hourly productivity on different shift lengths (eg. productivity in the third hour of any shift length was not statistically different), except the 11-hour shift, which had significantly lower productivity in the 11th hour than productivity in the 11th hour of the 12- and 13-hour shifts (P 0.0001), and the 5-hour shift, which had significantly lower productivity in its last hour than other shifts in their
fifth hour (P 0.01). Productivity in terms of mean RVUs per hour during the study period was calculated as 2.35 RVUs per hour (95% CI 1.98–2.72). The daily number of patients registered in the ED (0700–2359), ranged from 133 patients to 198 patients. Linear regression analysis examining shift productivity related to daily volume showed an $R^2$ (statistical term for the coefficient of determination) of 0.01. Linear regression analysis of productivity per hour plotted against volume per hour yielded an $R^2$ of 0.02.  

The PA productivity of 1.16 patients per hour compared well with the productivity (as patients per hour) of emergency medicine residents during the later years of their training, which ranges from 1.19 to 1.41 in different studies.  

At the study institution, data showed that senior-level residents see 1.25 patients per hour, while second-year residents see 1.13.  

In regards to RVUs the PAs billed 2.35 RVUs per hour during the study period, this was less than the Brennan et al study showing emergency medicine resident productivity in RVUs ranging from 2.51 as first-year residents to 3.61 as third-year residents.  

**Hamden et al**  

This was a retrospective chart review of emergency medicine residents and a group of advanced practice clinicians (APCs) comprised of 5 PAs and 1 NP. The study was performed at a single-center 45 000 volume community ED from July 2009 to September 2010. The ED had a low-acuity area staffed with single coverage by the PAs, and about 20% of the ED census was seen in this area. In addition, the same group of PAs worked 2 high-acuity day shifts each week, on Monday and Thursday; Mondays to account for the higher census that occurs on Mondays and Thursdays because it is a resident conference day. The PAs had all been in practice in the study ED for at least 2
years and were well versed in the electronic medical record and operations of the
department. 19

The emergency medicine residency training program is a 4-year program, and all
four classes rotate through the community site. Residents were eligible to work any shift
at the community site except for Thursday day shifts, as this was their mandatory
education time. The computer tracking system and electronic medical record at the
community site are identical with the systems used at the main teaching hospital. Because
PAs did not work evenings or nights in the high-acuity area, only day shifts on Mondays
and Thursdays were used (08:00–18:00) for PAs shift data, while day shifts for
emergency medicine residents (07:00–17:00 or 08:00–18:00) included all days
throughout the week. Patients with Emergency Severity Index (ESI) scores of 1, 2, and 3
were seen in the high-acuity area of the ED. PA shifts in low-acuity areas were excluded.
Off service resident rotators and attending physicians were also excluded. Microsoft
Excel was used for statistical calculations. 19

The research associates collected census and productivity data through query of
the Verinet coding system (LightSpeed Technology Group, copyright 2004–2005). The
Verinet system records individual provider shift data regarding the total number of
patients seen, the total number of RVUs generated, and the mean RVUs generated per
patient (RVU/Pt). In the event of patients being signed over from shift to shift, the
transfer of care to the next provider was recorded on the electronic medical record, but
the system credits the original provider with care of the patient. Shift hours were recorded
from the resident and PA work schedules and cross-referenced with the Verinet system
on a day-by-day basis to ensure accuracy of the schedule. RVU/h and Pt/h were
calculated using the data from the Verinet system and the monthly schedule. Census data was also recorded to ensure that there were no differences in overall daily ED census.  

A power calculation found that at least 21 shifts per group were required to determine an absolute difference of 0.25 Pt/h between PAs and emergency medicine residents working high-acuity shifts with an $\alpha$ of 0.05. This calculation used prior data on the same PAs’ productivity extrapolated from low-acuity shifts at another site. Data was analyzed using the two-tailed t-test to compare Pt/h, RVU/h, RVU/Pt and daily census between the two groups. Comparison was made between PAs and all residents, as well as subgroups of residents with different levels of training. Simple linear correlation was used to determine the correlation of Pt/h with RVU/h.  

Fifty-five PAs and 98 emergency medicine resident shifts were included in this study. Resident shifts were distributed among resident level of training as follows: 29 shifts by residents in their first year of postgraduate training (PGY1s), 27 shifts by residents in their second year of training (PGY2s), 21 residents in their third year of training (PGY3s), and 21 shifts by residents in their fourth year of training (PGY4s). All shifts were 10 h in length (either 07:00–17:00 or 08:00 to 18:00). The mean daily ED census was 130 patients on days when PAs worked high-acuity shifts as well as when residents worked high-acuity shifts (p=NS). The mean RVU/Pt for the study institution was 2.79, which was calculated from all patients seen at the institution regardless of ESI levels. There was a strong correlation between Pt/h and RVU/h for emergency medicine residents as well as PAs, with $r=0.81$ and 0.86, respectively.  

Results showed that PGY1s working in the high-acuity area treated a mean of 1.11 Pt/h (CI±0.094), PGY2s treated a mean of 1.25 Pt/h (CI±0.15), PGY3s treated a
mean of 1.33 Pt/h (CI±0.14), and PGY4s treated a mean of 1.27 Pt/h (CI±0.12). PAs saw more patients than any residency class, with a mean of 1.56 Pt/h (CI±0.14, p<0.02 for all classes). PGY1s generated a mean of 3.03 RVU/h (CI±0.32), PGY2s generated a mean of 3.27 RVU/h (CI±0.37), PGY3s generated a mean of 3.58 RVU/h (CI±0.32), and PGY4s generated a mean of 3.56 RVU/h (CI±0.38). PAs performed similarly to residents, with a mean of 3.19 RVU/h (CI±0.29, p value range 0.07–0.75). PGY1s generated 2.71 RVU/Pt (CI±0.13), PGY2s generated 2.65 RVU/Pt (CI±0.19), PGY3s generated 2.75 RVU/Pt (CI ±0.21), and PGY4s generated 2.82 RVU/Pt (CI±0.19). PAs generated fewer RVU/Pt than any resident class, with a mean of 2.05/Pt (CI±0.09, p<0.0001).

Jeanmonod et al

This was a retrospective cohort study of resident and PA productivity combined with a prospective study of patient satisfaction in an ED low acuity fast track area. The study site, a low acuity fast track area at a tertiary care community ED, had an annual census of 70 000: 19% of the census is seen in the fast track area. The study population included Advanced Practice Clinicians (APCs) comprised of 5 PAs and 1 NP, and EM residents (allopathic and osteopathic residents of all levels) assigned to the fast track. EM residents assigned to the remainder of the ED were excluded. Off service resident rotators and attending physicians were also excluded.

For the retrospective portion of this study, research associates collected census and productivity data through query of the Verinet coding system. The Verinet system records individual provider shift data regarding total number of patients seen, total number of RVUs generated and mean RVUs generated per patient. In the event of patients being signed over from shift to shift, the transfer of care to the next provider is
recorded on the electronic medical record but the system credits the original provider with care of the patient. Shift hours were recorded from the resident and PA work schedules. Resident shifts were almost entirely 10 h shifts from 10:00 to 20:00, although on conference days they occasionally worked 13:00 to 21:00 or 16:00 to midnight. PA shifts were predominantly 8:00-18:00 or 13:00-23:00; Pt/h and RVU/h were calculated. 20

For the prospective portion of this study, a convenience sample of patients seen in the fast track was surveyed. After their visit, patients verbally consented to complete an anonymous 4 item satisfaction survey. The items were as follows: “The healthcare provider cared about me as a person,” “The healthcare provider explained my problem and follow-up to me,” “The healthcare provider kept me aware of tests and studies” and “I am very satisfied with my experience here today.” Survey items were based on Press-Ganey surveys to best represent parameters by which healthcare providers are evaluated. Each question was rated on a 10 point scale, with a score of 10 corresponding to ‘strongly agree’ and a score of 1 corresponding to ‘strongly disagree’. 20

A power calculation determined that 10 subjects per group were required for a power of 0.8 to determine a 25% difference in productivity among residents of varying levels of training and PAs. Data for productivity measures, including Pt/h, RVU/h, and RVU/Pt were analyzed using descriptive statistics, two tailed t-test, and ANOVA. Comparison was made between PAs and all residents as well as with subgroups of residents at different years of training. Regression analysis was used to determine whether ED census contributed to differences in productivity. Data for satisfaction were analyzed with descriptive statistics. Non-parametric tests (ManneWhitney and KruskaleWallis) were used to compare patient satisfaction scores for residents of various
levels of training and PAs, as well as satisfaction scores based on shift time of day, as this data were not normally distributed.20

Ninety resident (15 PGY1, 33 PGY2 and 42 PGY3) and 208 PA fast track shifts were included for productivity analysis. From June to October, 2009, PAs saw 2.21 Pt/h (95% CI±0.09) while residents saw 1.53 Pt/h (95% CI±0.08; p<0.001). There were no differences in productivity based on resident level of training. PGY1s saw 1.5 Pt/h (95% CI±0.17) versus PGY2s, who saw 1.49 Pt/h (95% CI±0.12), versus PGY3s, who saw 1.58 Pt/h (95% CI±0.14). PAs generated 4.01 RVU/h (95% CI±0.18) while residents generated 3.14 RVU/h (95% CI±0.18; p<0.001). There were no differences in RVU/h based on resident level of training. Residents, however, generated 2.07 RVU/Pt (95% CI±0.08) while PAs generated 1.82 RVU/Pt (95% CI±0.03; p<0.001). There were no differences in RVU/Pt based on resident level of training. The mean ED census during the study period was 195 visits/day (SD=20). Regression analysis to determine the relationship of census to residents’ productivity yielded R2 values of 0.024 Pt/h and 0.059 RVU/h; R2 values for PAs were 0.275 Pt/h and 0.272 RVU/h.20

A total of 201 patients completed the satisfaction surveys; 126 patients were seen by PAs and 75 were seen by residents (22 by PGY1s, 17 by PGY2s and 36 by PGY3s). The majority of patients were highly satisfied with their ED visits. For the first survey item (“The healthcare provider cared about me as a person”), median/mean values were 10/7.0 for PAs and 10/7.4 for residents (p=0.4, ManneWhitney). For the second item (“The healthcare provider explained my problem and follow-up to me”), median/mean values were 10/7.1 for PAs and 10/7.4 for residents (p=0.70, ManneWhitney). For the third item (“The healthcare provider kept me aware of tests and studies”), median/mean
values were 10/7 for PAs and 10/7.3 for residents (p=0.42, ManneWhitney). For the fourth item (“I am very satisfied with my experience here today”), median/mean values were 10/7.1 for PAs and 10/7.1 for residents (p=0.95, ManneWhitney). There were no differences in any survey responses based on resident level of training (p=0.52 for item 1, p=0.54 for item 2, p=0.60 for item 3 and p=0.61 for item 4, KruskaleWallis). There were also no differences found in patient satisfaction based on shift time of day.20

DISCUSSION

Across all studies, PAs saw as many or more Pt/h than emergency medicine residents, regardless of their level of training or the acuity of the patient. This productivity did not seem to vary with departmental census in any appreciable way across the studies. One reason for this may be that PAs are already working as hard as they can with no bandwidth for additional work load. Another reason may be due to institutional inefficiencies, such as when patients are in fact waiting to be seen but cannot find a physical space within the department due to inpatient holds or other patients undergoing extensive workups. These patients remain in waiting to be seen, perhaps until the PAs shift is over, as they are typically lower-acuity cases and can afford to wait, or they potentially choose to leave without being seen. Research has demonstrated essentially no relationship between departmental volume and resident productivity on a day-to-day basis with R2 values ranging between 0.08 and 0.20, depending on level of training.21 Given a system with a finite number of beds, PAs, attendings, and residents, one would assume that if the PAs and residents cannot adjust their productivity with increasing patient volume, then it falls to attendings to be able to adjust their productivity. Further research would need to be done to assess the viability of such an option, but if attendings
are maxed in their productivity as well, then removal of institutional barriers to efficient
delivery of care and to training of more clinicians must be explored.

Although the number of Pt/h seen by PAs is on average greater than that of
residents, it is important to recognize that their roles in the ED have some differences that
may offer limited mitigating factors. For one, residents do not have the level of autonomy
that PAs function with. Medicare, third party insurance reimbursement requirements, and
hospital policy require residents to work under the direct supervision of an attending
physician. Residents must present each patient to an attending physician, after which a
discussion involving patient management typically occurs. These discussions may be
lengthy depending on the particular resident’s fund of knowledge and the attending
physician’s comfort with the resident’s skills. Often, additional discussions regarding the
patient’s response to treatment occur before the patient’s final disposition. Residents may
also receive intermittent didactics on pertinent educational topics as they arise throughout
the course of the shift. In their study of direct observation of resident/attending
interactions, Chisholm et al\textsuperscript{25} demonstrated that approximately 18% of resident time
spent working in non-critical areas of the ED was spent interacting with the attending
staff. PAs typically initiate work-ups on their own and provide attending physicians with
a brief synopsis if they plan to admit a patient to an inpatient setting or prior to discharge
if there is a concern. Although it is difficult to quantify, it is likely that these interactions
are briefer than those between residents and attending physicians. PAs are also likely to
receive less bedside teaching than residents. Together, these factors may contribute to
making PAs more efficient in seeing a higher numbers of patients than residents.
All studies showed PAs billing fewer RVUs/Pt regardless of the acuity of the patient, or the level of training of the resident. It is unclear if this discrepancy in RVU data is based on the lower acuity of the patients seen by PAs or if it is an issue with incomplete documentation. RVU is highly dependent on completeness of documentation, and PAs may not document as well as residents for several reasons. Third-party payers require a more detailed level of documentation in order to bill a higher level of care. For example, when seeing a patient who presents with a complaint that would be billed at the lowest possible rate (E/M code 99281), a review of systems is not required to be documented; only a problem-specific physical examination is necessary. On the other end of the spectrum, in order to bill for a critically ill patient (E/M code 99285), the physician or PA must include a full physical examination covering eight or more organ systems, as well as a full review of systems covering at least 10 systems, and moderately complex medical decision making. Failure to document appropriately precludes the hospital from billing at the higher rate even if the patient’s complaint results in a critical diagnosis.

Residents work closely with attending physicians, who have financial incentives to capture the maximum number of RVUs available on a given presentation. PAs normally do not share that same incentive structure. PAs have very little training in regards to specialty billing in the ED. Specialized ED training for PAs, such as a fellowship in emergency medicine, has been shown to be a predictor of improved RVU generation.\textsuperscript{26} Alternately, studies\textsuperscript{27-29} examining the effectiveness of education directed specifically at increasing RVU generation have been successful when applied to emergency medicine residents in an academic setting, although this has not been studied in PAs. In regards to patient satisfaction, comparing care rendered from a PA versus a
resident, Jeanmonod et al\textsuperscript{20} showed there were no differences in patient satisfaction on four different recorded measures. Although not studied in the ED setting, Hooker et al\textsuperscript{30} found similar results, showing that patient satisfaction in the Kaiser Permanente system did not differ based on care by physician, physician assistant or nurse practitioner. A review of previous research\textsuperscript{31-34} demonstrates that a patient’s overall satisfaction with their ED visits decreases with decreasing level of acuity, making the low acuity environment a challenging place to practice. It is a reasonable extrapolation to make that there is no significant adverse effect on patient satisfaction if their care is rendered by a PA instead of a physician.

**CONCLUSION**

In studied community Emergency Departments that were part of a teaching hospital, regardless of acuity, PAs treated more patients per hour and generated equivalent RVU/hr as EM resident physicians. Resident physicians, however, generated more RVU/Pt. It is uncertain whether this is related to documentation deficiencies and/or differences in PA/resident training regarding billing. Further study is needed to evaluate whether documentation training would improve the RVU/Pt production of PAs in a high-acuity setting. The ED patient census had little impact on productivity of either group. If specific days of the week or times of the day are known statistically to have higher volume, those times should be staffed with a larger number of PAs to absorb the extra patients. Further research needs to be done to see if productivity disparity carries over into a primary care setting, and if the disparity remains greater than or at least equivalent to the productivity of physicians once they become attendings.
REFERENCES

<table>
<thead>
<tr>
<th>Outcome</th>
<th># of studies</th>
<th>Study Designs</th>
<th>Limitations</th>
<th>Indirectness</th>
<th>Inconsistency</th>
<th>Imprecision</th>
<th>Publication Bias</th>
<th>Quality</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pt/h</td>
<td>3</td>
<td>Retrospective Chart Review</td>
<td>Not Serious</td>
<td>Not Serious</td>
<td>Not Serious</td>
<td>Not Serious</td>
<td>Unlikely</td>
<td>Moderate</td>
<td>Critical</td>
</tr>
<tr>
<td>RVU/Pt</td>
<td>3</td>
<td>Retrospective Chart Review</td>
<td>Not Serious</td>
<td>Not Serious</td>
<td>Not Serious</td>
<td>Not Serious</td>
<td>Unlikely</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>RVU/h</td>
<td>3</td>
<td>Retrospective Chart Review</td>
<td>Not Serious</td>
<td>Not Serious</td>
<td>Not Serious</td>
<td>Not Serious</td>
<td>Unlikely</td>
<td>Moderate</td>
<td>High</td>
</tr>
</tbody>
</table>

Table II: Brook et al

<table>
<thead>
<tr>
<th>Outcome</th>
<th>PA</th>
<th>2nd Year</th>
<th>4th Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pt/h</td>
<td>1.16 +/- .04</td>
<td>1.13</td>
<td>1.25</td>
</tr>
<tr>
<td>RVU/h</td>
<td>2.35</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

P Values of <0.05 were considered significantly different

Table III: Hamden et al

<table>
<thead>
<tr>
<th>Outcome</th>
<th>PA</th>
<th>1st Year</th>
<th>2nd Year</th>
<th>3rd Year</th>
<th>4th Year</th>
<th>P Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pt/h</td>
<td>1.56 Pt/h (CI±0.14)</td>
<td>1.11 Pt/h (CI±0.094) b</td>
<td>1.25 Pt/h (CI±0.15) b</td>
<td>1.33 Pt/h (CI±0.14) b</td>
<td>1.27 Pt/h (CI±0.12) b</td>
<td>^ p&lt;0.02 for all classes</td>
</tr>
<tr>
<td>RVU/h</td>
<td>3.19 RVU/h (CI±0.29) c</td>
<td>3.03 RVU/h (CI±0.32)</td>
<td>3.27 RVU/h (CI±0.37)</td>
<td>3.58 RVU/h (CI±0.32)</td>
<td>3.56 RVU/h (CI±0.38)</td>
<td>^ p value range 0.07-0.75</td>
</tr>
<tr>
<td>RVU/Pt</td>
<td>2.05/pt (CI±0.09) d</td>
<td>2.71 RVU/Pt (CI±0.13)</td>
<td>2.65 RVU/Pt (CI±0.19)</td>
<td>2.75 RVU/Pt (CI±0.21)</td>
<td>2.82 RVU/Pt (CI±0.19)</td>
<td>^ p&lt;0.0001</td>
</tr>
</tbody>
</table>

P Values of <0.05 were considered significantly different

Table IV: Jeanmonod et al

<table>
<thead>
<tr>
<th>Outcome</th>
<th>PA</th>
<th>1st Year</th>
<th>2nd Year</th>
<th>3rd Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pt/h</td>
<td>2.21 Pt/h (95% CI±0.09)</td>
<td>1.5 Pt/h (95% CI±0.17)</td>
<td>1.49 Pt/h (95% CI±0.12)</td>
<td>1.58 Pt/h (95% CI±0.14)</td>
</tr>
<tr>
<td>RVU/h</td>
<td>4.01 RVU/h (95% CI±0.18)</td>
<td>3.14 RVU/h (95% CI±0.18)</td>
<td>There were no differences in RVU/h based on resident level of training</td>
<td></td>
</tr>
<tr>
<td>RVU/Pt</td>
<td>1.82 RVU/Pt (95% CI±0.03; p&lt;0.001)</td>
<td>2.07 RVU/Pt (95%±CI 0.08)</td>
<td>There were no differences in RVU/Pt based on resident level of training</td>
<td></td>
</tr>
</tbody>
</table>

P Values of <0.05 were considered significantly different