Title

Medical Scribes in Emergency Medicine produce financially significant productivity gains for some, but not all emergency physicians

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KW, MBM, MS and DP conceived the study and designed the trial. KW and MBM obtained research funding. KW recruited the physicians. KW was responsible for the scribe management, collected shift data and provided quality control. DP provided data from administrative databases. MS provided statistical advice on study design and analyzed the data and provided quality control. KW drafted the manuscript, and all authors contributed substantially to its revision. KW takes responsibility for the manuscript as a whole.

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Abstract

Objective

This study aims to determine if a scribe in an Australian Emergency Department (ED) can assist emergency physicians (EP)s to work with increased productivity and to investigate when and where to allocate a scribe and to whom.

Methods

This was a prospective observational single-center study conducted at a private ED in Melbourne. It evaluated one American scribe and 5 doctors over 6 months. A scribe is a trained assistant who performs non-clinical tasks usually performed by the doctor. The primary outcomes were patients/hour/doctor and billings/patient. Additional analyses included individual doctor productivity, productivity by ED region, shift time, day of the week and physician learning curves. Door-to-doc time, time spent on ambulance bypass and door-to-discharge time were examined, also complaints or issues with the scribe.

Results

There was an overall increase in doctor consultations of 0.11 (95% CI 0.07, 0.15) primary consultations per hour (13%). There was variation seen between individual doctors (lowest increase 0.06 (6%) to highest increase 0.12 (15%)). Billings per patients, door-to-doc, door-to-discharge and ambulance bypass times remained the same. There was no advantage to allocating a scribe to a specific time of day, day of week or region of the ED. There was no learning period found.

Conclusion

In this study, scribe usage was associated with overall improvements in primary consultations per hour of 13% per scribed hour and this varied depending on the

physician. There is an economic argument for allocating scribes to some emergency physicians on days evenings and weekends, not to trainees.

Key words

Medical scribe, scribe, emergency medicine, productivity, doctor's assistant

Author Manuscript

Introduction

Background

Emergency physicians (EPs) undertake a 6-year training program after their medical degree to be deemed safe to see patients independently. There has been much research on emergency doctor substitution or replacement(1-7) by other health care professionals who don't undertake the same degree of training to enable greater numbers of Emergency patients to be seen. There has been little research on how to enable the trained doctors to be more productive in a cost-effective way.

Productivity of emergency physicians is variable and an increasingly relevant issue in a healthcare environment that is seeing increases in presentations per year. Salaried individual physician productivity is rarely analyzed within the complex ED environment. It is imperative that healthcare services look at systems and processes that optimize the use of their most expensive resources – their EPs. The electronic medical record is increasing the burden of data entry(8), rather than decreasing it.

EPs undertake many tasks for each patient seen in the ED. The current productivity rate at Cabrini ED, Australia is around 0.9 patients per hour. A significant number of tasks undertaken are not directly clinical and task substitution opportunities exist(9, 10). Scribes were investigated in a pilot study at the study hospital (11) and this was associated with an overall increase of 0.32 (19%) patients per hour (95%CI 0.17,0.47) however this varied between physicians from an increase of 0.16-0.65 patients per hour (14-41%). Due to the

variability in productivity improvement with the scribe, further investigation was merited before introducing a scribe program, to explore who should be allocated a scribe and when and where in the ED they should be used.

Scribe services are being employed in increasing numbers of EDs (12-15) and offices (16-18) across the USA. Independent measures of their productivity gains in the ED are limited(11, 13, 15). There is no data on individual physician productivity with scribes in any setting other than a pilot study(11). The same study is the only Australian data available. Understanding the economic impact of the scribe is helpful in informing decisions regarding implementation in the Australian ED context.

Goals of this investigation

The primary outcome was to determine if an emergency department scribe increased the productivity of emergency physicians at Cabrini ED compared to emergency physicians working alone.

The secondary outcomes were to investigate if there was a time of day or week when scribe allocation increased productivity more, if there were some physicians that increased their productivity more compared to others and whether there was a productivity learning curve for the physician who was allocated a scribe. Additional analyses included door-to doctor time, length of stay, time spent on ambulance bypass, complaints/issues identified.

Methods

Study design and setting

This was a prospective observational study comparing three ED physician groups. The study was conducted between July 27 2014 and December 19 2014.

One scribe was allocated to 5 physicians' shifts during this period and was expected to attend all consultations with the physician. Scribed shifts for the period were compared to un-scribed shifts with the same study physicians and non-study control physicians in the same ED during the same time period.

The study was undertaken at Cabrini ED. It is a tertiary, not-for-profit, Catholic private hospital in the southeast of Melbourne, Australia. The network has 832 beds; the ED has 24,000 visits per annum (adult and pediatric). The average patient age is 56; the admission rate is 50%.

The doctor is allocated to a region in the ED and is responsible for patients in that region. They perform all medical and documentation tasks required for each patient they attend including ordering investigations, writing medication charts, finding consultants for specialist opinions and booking beds. They also complete an electronic medical record (EMR) chart and bill each patient. There is minimal flow or supervision required of the physician. They are an individual provider without physician's assistants or nurse practitioners to assist in data gathering.

The doctors are employees of the hospital on an hourly wage. They bill the patient based on doctor qualifications, complexity, procedures and consumables used.

We employed an experienced scribe from the USA with 2 years' experience, employed via a scribe labour company (eScribe - www.md-scribes.com). He was asked to undertake all tasks as per USA scribes, using a computer-on-wheels with Wi-Fi connection. (Document history, physical exam, plans and assessments; facilitate investigations; locate consultants; record consultations with families and consultants; book beds; deliver charts/requests to nurses; request health records from other facilities; document re-evaluations, patient progress, procedures; print charts/referrals/illness certificates; write bill). The scribe received Australian ED orientation.

The study doctors received training on the use of a scribe prior to the study from eScribe and a billing tutorial. They also had access to an on-site, physician coach from eScribe for two weeks during initial scribe period.

Selection of Participants

The Cabrini ED group consists of 15 EPs (Fellows of the Australasian College for Emergency Medicine (FACEMs) and 7 non-FACEM physicians and 6 registrars. Physicians were chosen to provide broad representation of the Cabrini ED group with respect to ages, physician qualifications, experience and typing abilities. They were individually invited to participate. Those doctors not allocated a scribe formed a control group. Physician administrators, authors and temporary employees were not eligible to participate in either group.

The scribe was chosen by eScribe to represent a qualified, experienced scribe of above average capabilities who was thought to be likely to cope with

international placement. A physician shift roster was released and the scribe was allocated to the physicians according to physician availability and chosen to spread across all shifts, days of week and regions of the ED. Night shifts were excluded from the study.

A patient encounter was defined as the allocation of a patient to a physician on the EMR for the shift; either as a primary or handover doctor.

Interventions

When allocated the scribe worked with the physician for their whole shift. The physicians and scribe were aware of the study aims.

Methods and Measurements

Data was collected from five sources.

1. An administrative database derived from the EMR
2. A roster database for physicians
3. A scribe roster
4. Informal conversations with ED staff members regarding acceptability of the scribe to the ED and patients.
5. Informal conversations with the scribe and the study physicians.

The bill amount used in the analyses was the Medicare Australia rate for each encounter or procedure. The facility fee and consumables were excluded.

Doctors, nurses and clerks enter data at point of care.

Outcomes

The primary outcome was overall physician productivity: patients/doctor/hour, billings/patient and billings/hour. Aggregate scribed physician shifts were compared to aggregate un-scribed study physician shifts and to the control group shifts.

The secondary outcomes were:

Comparing within the aggregate scribed shift group – patients per doctor per hour on morning, middle of day and evening shifts; patients per hour on busier (Friday, Saturday, Sunday, Monday) compared to quieter (Tuesday, Wednesday, Thursday) days; patients doctor per hour on shifts allocated to regions of the ED (resuscitation, cubicles, ambulant and floating (seeing longest wait patient in all regions))

Comparing the individual study group physicians to each other, scribed to un-scribed shifts productivity: patients per doctor per hour, billing per patient, billing per hour.

Comparing individual and aggregate study physician group productivity by numbers of shifts completed with a scribe to assess for a productivity learning/attenuation curve.

Additional analyses comparing each aggregate physician group included door-to-doc time, length of stay and process measures of time spent on ambulance bypass, complaints or issues identified with the scribe.

Cabrini Human Resources estimated the potential wage of the scribe in Australia by comparing USA scribe role descriptions (eg 19) to those already existing in Australian awards to determine the closest match, taking into account the learning opportunities the role provides for the scribe. The economic viability of

maintaining a scribe program was then examined for individual physicians and individual scribes using the following calculations:

Usual productivity of physician (patients per hour) = X

Cost of physician per hour (hourly wage + on-costs) = Y

Cost of scribe per hour (hourly wage + on-costs) = A

Percentage productivity change with individual scribe = B

(Training/equipment costs for the scribe were excluded from this calculation)

$(X \times Y \times B) - A = \text{net gain/loss per hour}$

Statistical Analysis and Sample size

The characteristics of patients seen on scribed and un-scribed shifts were compared using the Kruskal-Wallis equality-of-populations rank test for age and χ^2 tests for other variables. Differences between scribed and un-scribed shifts in patient age; wait time and duration of stay were assessed using linear regression (scribe predictor).

For primary outcomes, the total consultations/doctor /hour were calculated as the sum of primary and secondary (handover) patient encounters for each doctor divided by hours worked for the shift. Summing the consultation and procedure costs billed by a doctor for a shift and dividing by the number of consultations by that doctor during the shift calculated Billings/consultation.

The effect of the scribe was assessed using linear regression with scribe status as a predictor. All analyses were performed using Strata 13. (Strata Corp College Station TX)

The sample size for the primary outcome required a productivity increase of 20% (an increase in EP efficiency from 1.0 to 1.2 consultations/doctor/hour). Using a two-sided 5% significance level and assuming a common standard deviation of 0.3, we needed a total of 74 shifts (37 scribed and 37 un-scribed shifts) to achieve 80% power to detect this difference. We employed the scribe for 6-months to gain 100 scribed shifts for analysis, allowing us to address secondary outcomes with at least 65% power.

(Ethics approval: Cabrini Institute HREC; prospective trial registration ACTRN12614000360617).

Results

Characteristics of Study subjects

3 EPs, one non-FACEM physician and one registrar were invited to participate, none declined and all completed the study. All others consented to be the control group. The study physician's ages ranged from 42 to 65, they were all male, their Emergency experience ranged from trainee to 40 years.

All shifts completed by the scribe were included, except for 3 shifts where protocol was breached (physicians shared the scribe mid-shift). All patient visit data were available and analyzed. There were 6344 patient visits, 108 scribed shifts (939 patients), 211 un-scribed study group shifts (1615 patients), 480 control shifts (3790 patients).

The demographics of these patients are shown in Table 1, there were no clinically significant differences between the groups enrolled.

Outcomes

The scribe was associated with a modest overall physician productivity increase for primary consultations of 13% (0.11 (95%CI 0.05, 0.17)) patients per hour.

There was no change seen in billings per patient with the scribed shifts versus un-scribed shifts (\$1.44 95%CI -\$28, \$31). This figure doesn't include the cost of the scribe.

Insert Table 2 here

There were no differences found in the productivity impact of having a scribe between quiet and busy days of the week, shift start times or regions of the ED in which the physicians worked. The scribe was not associated with an increase in periods the ED spent on ambulance bypass. Patient door-to-discharge showed no change. Door-to-doctor times were statistically slightly longer (4 minutes) for the un-scribed group compared to the scribed group but not clinically significantly longer.

Insert Table 3 here

The scribe had varying impacts on the productivity of individual physicians in terms of patients per hour. There was no change in billing.

Insert Table 4 here

There was no evidence of a learning curve for the scribe group. There were no issues identified regarding scribe acceptability to ED staff or patients. Several of the study physicians were initially apprehensive about a change in practice but settled in within a few shifts. All physicians were satisfied with the initial History/Physical exam capture into the chart and all would like a scribe permanently. We had feedback that this scribe was good at the history capture but struggled to complete other tasks. No patients asked the scribe to leave or complained about the scribe's presence. No staff members identified issues regarding the scribe's presence in the ED.

Our matched award for the scribe in Australia was a basic clerk, \$18.45/hour basic wage in 2015.

Insert Table 5 here

Discussion

Overall the use of this scribe was associated with a modest increase in productivity for primary consultations and no change in income per scribed hour. For these physicians, this would create a variable economic argument for introduction of a scribe program at Cabrini ED. An experienced FACEM on an evening or weekend shift would require from 10-18% gains for a scribe to be worth allocating, a registrar will require 37% gains on the same weekend. It is more cost-effective to allocate to faster doctors. More productive doctors require a 10% gain to breakeven, less productive doctors 18%.

Interestingly, productivity gains compared to the six-week pilot were significantly lower. Proposed explanations of this are:

1. The chief investigator was a study subject in the pilot introducing bias
2. Individual variances between scribe capabilities, which were informally reported by the physician group
3. Physicians not yet accessing the full potential of the scribe.

The breakdown into the productivity of individual doctors was similar to the pilot(11) in that different doctors responded to the scribe in different ways. This variability has not been previously reported. The scribes' variable ability to improve physician productivity has also not been previously reported.

The gains seen in the pilot and other settings(11-13, 15) with respect to time performance indicators were not seen in this study. This was different to the pilot(11). The study suggested no associated advantage to allocating a scribe to a particular shift or day of the week, or to a region of the ED.

Limitations

This was a single center observational study in Australia with exposure to a small group of physicians and one scribe only over 6 months. It was un-blinded and a sample of convenience. There were no documentation quality measures in the study. Bias was potentially introduced by informal conversations with study participants.

Further work should occur to determine if local scribes can deliver economic benefits and if scribes should be used in alternate settings such as public EDs to improve productivity in a cost effective way. It should consider more scribes and physicians in the study to determine the characteristics of a productive scribe and of the physician who is able to benefit from a scribe. Work should also be conducted on the quality of the scribe chart and the patient experience of having a scribe in the room.

Further work should also more broadly be considered in the area of clinical documentation and processes required of physicians and in emergency physician performance measures.

Conclusions

In summary the scribe was well tolerated and productivity gains were seen. The economic gains were not significant for trainees or non-specialist doctors. Some emergency physicians (FACEMs) may benefit from having a scribe; it may not be cost-effective for all.

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References

1. Steiner IP, Nichols DN, Blitz S, Tapper L, Stagg AP, Sharma L, et al. Impact of a nurse practitioner on patient care in a Canadian emergency department. Cjem. 2009;11(3):207-14.

2. Nestler DM, Fratzke AR, Church CJ, Scanlan-Hanson L, Sadosty AT, Halasy MP, et al. Effect of a physician assistant as triage liaison provider on patient throughput in an academic emergency department. *Academic emergency medicine : official journal of the Society for Academic Emergency Medicine*. 2012;19(11):1235-41.
3. McDonnell WM, Carpenter P, Jacobsen K, Kadish HA. Relative productivity of nurse practitioner and resident physician care models in the pediatric emergency department. *Pediatric emergency care*. 2015;31(2):101-6.
4. McDevitt J, Melby V. An evaluation of the quality of Emergency Nurse Practitioner services for patients presenting with minor injuries to one rural urgent care centre in the UK: a descriptive study. *Journal of clinical nursing*. 2015;24(3-4):523-35.
5. Goldfrank L, Corso T, Squillacote D. The emergency services physician assistant: results of two years' experience. *Annals of emergency medicine*. 1980;9(2):96-9.
6. Doan Q, Sabhaney V, Kissoon N, Sheps S, Singer J. A systematic review: The role and impact of the physician assistant in the emergency department. *Emergency medicine Australasia : EMA*. 2011;23(1):7-15.
7. Bethel J. The role of the physiotherapist practitioner in emergency departments: a critical appraisal. *Emergency nurse : the journal of the RCN Accident and Emergency Nursing Association*. 2005;13(2):26-31.
8. Hill RG, Jr., Sears LM, Melanson SW. 4000 clicks: a productivity analysis of electronic medical records in a community hospital ED. *The American journal of emergency medicine*. 2013;31(11):1591-4.

9. Hollingsworth JC, Chisholm CD, Giles BK, Cordell WH, Nelson DR. How do physicians and nurses spend their time in the emergency department? *Annals of emergency medicine*. 1998;31(1):87-91.
10. Fuchtbauer LM, Norgaard B, Mogensen CB. Emergency department physicians spend only 25% of their working time on direct patient care. *Danish medical journal*. 2013;60(1):A4558.
11. Walker K, Ben-Meir M, O'Mullane P, Phillips D, Staples M. Scribes in an Australian private emergency department: A description of physician productivity. *Emergency medicine Australasia : EMA*. 2014;26(6):543-8.
12. Allred RJ, Ewer S. Improved emergency department patient flow: five years of experience with a scribe system. *Annals of emergency medicine*. 1983;12(3):162-3.
13. Arya R, Salovich DM, Ohman-Strickland P, Merlin MA. Impact of scribes on performance indicators in the emergency department. *Academic emergency medicine : official journal of the Society for Academic Emergency Medicine*. 2010;17(5):490-4.
14. Brady K, Shariff A. Virtual medical scribes: making electronic medical records work for you. *The Journal of medical practice management : MPM*. 2013;29(2):133-6.
15. Bastani A, Shaqiri B, Palomba K, Bananno D, Anderson W. An ED scribe program is able to improve throughput time and patient satisfaction. *The American journal of emergency medicine*. 2014;32(5):399-402.
16. Koshy S, Feustel PJ, Hong M, Kogan BA. Scribes in an ambulatory urology practice: patient and physician satisfaction. *The Journal of urology*. 2010;184(1):258-62.

17. Norris B, Harris T, Stringer S. Effective use of physician extenders in an outpatient otolaryngology setting. *The Laryngoscope*. 2011;121(11):2317-21.
18. Bank AJ, Obetz C, Konrardy A, Khan A, Pillai KM, McKinley BJ, et al. Impact of scribes on patient interaction, productivity, and revenue in a cardiology clinic: a prospective study. *ClinicoEconomics and outcomes research : CEOR*. 2013;5:399-406.
19. Emergency Physicians Professional Association. Job Description, scribe, EPPA, November 2011, accessed July 6th 2015
<http://www.eppanet.com/siteadmin/ckeditor/ckfinder/userfiles/files/Scribe%20Job%20Description.pdf>

Tables and figures

Table 1. Patient Demographic Comparisons

Patient Demographics	Scribe	No-scribe	Control
Patients	921	1595	3808
Mean Age	54 (95%CI 46, 60)	53 (95%CI 43, 59)	57 (95%CI 51, 59)
Sex (female)%	54	53	56
Triage Cat 1%	0.4	0.1	0.2
Triage Cat 2%	12	10	12
Triage Cat 3%	45	45	46
Triage Cat 4%	39	41	40
Triage Cat 5%	4	4	3
Admission%	50	50	51

Mean age has a p-value of <0.001 for differences between groups

Table 2. Aggregate physician productivity data

Aggregate productivity data (95% CI)	Scribe	No-scribe	Controls
Consults per hour	1.13 (1.04, 1.21)	1.02 (0.94, 1.10)	1.05 (0.97, 1.13)
Billings per consultation (AUD)	\$150 (\$87-\$213)	\$149 (\$77-\$220)	\$127 (\$95-\$158)
Primary consultations per hour	0.94 (0.83, 1.06)	0.83 (0.73, 0.94)	0.85 (0.77, 0.92)
Secondary consultations per hour	0.19	0.19	0.20

There were more total and primary consultations per hour in the scribed shifts compared to un-scribed shifts (p=0.017).

Table 3. Time indicators

time indicators (95%CI)	Scribe	No-scribe	Controls
Ambulance bypass			
hours/shift	1.65 (1.23, 2.06)	1.45 (1.15, 1.75)	1.29 (1.17, 1.42)
Door-to-doc time/minutes	39 (33, 44)	42 (36, 48)	41 (38, 44)
Door-to-discharge/minutes	319 (292, 347)	317 (395, 340)	299 (285, 313)

Table 4. Impact of scribe on individual physician productivity – primary consultations

Doctor	No Scribe patients/hour	Increased patients per hour with scribe	% Increase
A	0.76 (0.68, 0.83)	0.12 (-0.03, 0.27)	15
B	0.89 (0.78, 1.00)	0.11 (0.02, 0.24)	12
C	0.96 (0.77, 0.82)	0.12 (0, 0.17)	12
D	0.77 (0.66, 0.88)	0.08 (-0.05, 0.23)	11
E	0.88 (0.75, 1.00)	0.06 (0.02, 0.33)	9

Table 5. Doctor-scribe economic calculations to determine breakeven productivity increase required for trained scribe employment (Basic clerical award 2015, 22% on-costs for doctor and scribe)

Doctor Type	Wage estimate (excluding on-costs)	Shift worked	Usual productivity of doctor/hour	productivity gain required on clerk wage
FACEM	\$225	Weekend	1.3	10%
FACEM	\$225	Weekend	1	13%
FACEM	\$225	Weekend	0.7	18%
FACEM	\$195	Evening	1	10%
FACEM	\$150	Day	1	13%
non-FACEM	\$150	Weekend	1	19%
non-FACEM	\$100	Day	1	13%
Registrar	\$75	Weekend	1	37%
Registrar	\$50	Day	1	38%

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