Article details: 2018-0031	
Title	Effects of medical scribes on physician productivity in a Canadian emergency department: a four-month pilot study
Authors	Peter S. Graves MD, Stephen R. Graves BSc, Tanvir Minhas BSc, Rebecca E. Lewinson BSc Isabelle A. Vallerand PhD, Ryan T. Lewinson MD PhD
Reviewer 1	Eddy Lang MDCM
Institution	University of Calgary, Emergency, Calgary, Alta.
General comments (author response in bold)	Comments to the Author Thank you for the opportunity to review this work. The study describes a pilot QI trial designed to determine if the assignment of scribes to ED physicians improves productivity as defined by patients seen per hour. This is a contemporaneous comparison to physicians who do not work with scribes. The results demonstrated a statistically significant improvement of approximately 0.4 ore patients seen per hour. While I think it is important to study the benefits and potential drawbacks of scribes I am concerned that this paper has a number of limitations which threaten the conclusions. Firstly, the unique focus on a productivity outcome does not provide more than a narrow view on the impact of an intervention. There would need to be more information provided on the other impacts of scribe be it either from a provider satisfaction perspective or for patients but ideally for both. **Thank you very much for your review and constructive feedback on our paper. We fully agree with you that an important aspect of scribes is from a provider or patient satisfaction perspective and ultimately these are aspects that we think should be expanded in future research. There are a few reasons why we did not include these outcomes in the current study, however. Firstly, the primary purpose of a scribe is to enhance clinical workflow – without evidence to support a performance benefit, this was the target of our preliminary pilot project. Only objective measures of this performance were sought, such as PPH given our relatively small sample size and single-centre design. Secondly, since the pilot was conducted in one of the author's centre with their colleagues, a smaller tight-knit community hospital, subjective experience data was not sought from physicians as there could have been a tendency of physician bias in favor of scribes simply out of courtesy to their colleague. In terms of patient subjective experience, this was not sought largely related to hospital ethics board requirements – for this initial study, we were granted permission to implement scribes to assess their effects on workflow, but we were not granted permission initially to extract specific patient information from their health records or to interview patients about their experience. In our experience and in discussion with other physicians involved in the pilot, scribes seemed to be well received and it was exceedingly rare that a patient declined to have a scribe present. Following the success of this pilot, we have since been able to focus more on the patient factors such as clinical presentations, and patient experience but these were not possible at the time of our original pilot. Recognizing that ideally each of these factors would have been collected concurrently during our initial pilot, the primary goal was first to establish proof-of-concept of a performance benefit, and that is the focus of our present paper.** The allocation of scribes to physicians is not clearly described or more specifically steps taken to ensure that they were not assigned with consideration of other factors would be important considerations. For example did all MDs want or enjoy working with scribes? Did this influence assignment? Is there a Hawthorn effect that might have influenced productivity independent of the presence of the scribe. **We have now added to our methods section that while 24 physicians were eligible to participate, 2 declined to participate citing their preference to working alone. Of the 22 that did agree to participate, while we did not collect specific data on this as described above, not all of them enjoyed working with scribes as evidenced by the fact that not all of them continued to use scribes after the study. However, this preference had no bearing on whether they were assigned a scribe or not. Moreover, physicians had no control over which scribes they worked with. In our methods, we have added details to specify that the scribe HR manager assigned scribes based on scribe availability – not on physician preferences – and effort was made to rotate scribes amongst physicians. The idea of a Hawthorn effect is interesting, and can be broken down to whether the Hawthorn effect is acting on scribed shifts or non-scribed shifts. We do not think this was the case for non-scribed shifts. Specifically, we conducted a sensitivity analysis comparing physician PPH metrics from 2015 without a scribe to 2014 without a scribe (i.e. even before they were aware of the study) and we found no difference in their baseline PPH. It is possible that a Hawthorn effect occurred on scribed shifts, where physicians knew they had a scribe and their behavior changed accordingly – this really gets at "why" does a scribe increase PPH. Certainly some of it could be because the physician knows they have an assistant and feel they should be faster as a consequence. Some of it could be due to enhanced and streamlined documentation. Our present data shows that scribes do seem to have an impact on PPH by one mechanism or another, but unfortunately additional larger studies with more outcome measures will be needed to understand "why" they increased PPH. These aspects have now been added to our discussion section.** The reader is provided precious little information on the patients who were evaluated by the scribe assisted and control physicians.

	As mentioned earlier, we did not seek to document patient factors in this initial pilot and we did not have ethical approval to document this information at the time. However, patients were seen in the same geographic location of the ED, same evening shifts, and same time of year – in our methods we describe the typical presentations that would be seen in this area of the ED. This allowed us to control for as many factors as possible. As over 60 shifts without a scribe and nearly 100 shifts with a scribe were documented, it would be highly unlikely that patient clinical presentations differed dramatically between groups. **We also do not have information on the environmental conditions in the ED at the time that these measures were being taken. All of these elements could have biased the comparison and accounted for at least part of the differences observed.** **In our methods, we describe the hospital as a small to mid-sized community hospital in Ottawa, Canada seeing about 70K patients per year, and further describe that patients were only seen in our "cubicles" area of the ED, where patients are usually ambulatory and there is rapid turnover (e.g. fractures, GI concerns, lacerations etc).. We also highlighted that only evening shifts were considered in this study, which are usually very high volume and busy. During these evening shifts, physicians are only responsible for the cubicles area, and there is no moving or transferring to other observational or intensive care areas. Outside of these hospital characteristics, shift characteristics, and the physician responsibilities while on shift, we are unsure what the reviewer is referring to regarding environmental conditions.** Scribes are an important topic area and the area deserves more scrutiny. The assumption that their benefit is proven in the US is not one that I would agree with seeing the evidence base and incomplete and mixed. None the less more rigorous and unbiased research is required. **The reviewers point is well taken that data from the US can be mixed; however, this is usually a mixture of studies suggesting a benefit and studies showing no effect. In our article, we have now modified the language in our sections on US data to indicate possible benefits of scribes rather than concrete benefits. Furthermore, we have ensured that our discussion and conclusions focus only on the data generated in our study and that is that here, scribes did appear to have a performance benefit to physicians but that certainly additional multi-centered studies with more outcome measures are critical to confirm these findings.**
Reviewer 2	Timothy Cowan
Institution	Ballarat Health Services, Ballarat, Victoria, Australia
General comments (author response in bold)	Comments to the Author Thank you for the article. I believe it has achieved the aim of proof-of-concept for the use of scribes in Canada and will be of interest. There are a few minor revisions that could be made to improve this message which I have listed below: **Thank you very much for your review of our manuscript and for your helpful suggestions. We agree with all of the feedback you have provided and have made changes to the manuscript accordingly, as described further below. Overall, we think these modifications will provide a better overview of our approach to readers and highlight some key aspects that should be considered.** Line 87: Consider describing the role of the scribe in the first part of this section and then continue on to demographics and the training timeframe. **This section has now been rearranged to describe the role of the scribe, then the demographics and training, as suggested.** Line 115: Please clarify whether all included emergency physicians have completed specialist training in emergency medicine or if senior trainees were also included. **Senior trainees were not included - only emergency physicians with CCFP(EM) or FRCPC certification. This important detail has now been added to our methods.** Line 135: Please include the number of scribed and non-scribed shifts that were excluded. It would be more informative to include low-volume shifts in the analysis as this is a greater reflection of the the real-world environment where, due to contracted hours and the unpredictability of low patient volume shifts, employed scribes would likely still have to work on low patient volume shifts. You could consider including these shifts and doing a sub-analysis to show the differential effect on busy shifts. This could be used to justify using scribes only when its busy. I would also suggest finding literature to validate your definition of a low-volume shift if possible. **The total number of shifts has now been added to our results section. Regarding low volume shifts, there was just one low volume shift in the "no scribe" shifts, largely because we specifically targeted the high volume evening shifts for data collection. We analyzed the data in considering this single low volume shift and not, and it was ultimately**

	inconsequential to the final result (did not affect group mean or SD, p value still <0.01). We have now mentioned this in the paper. Indeed it could be useful to assess low volume shifts in the future, but as you mentioned, in a real world scenario following our study, physicians will often simply send a scribe home when the shift is low volume. Line 120: Regarding the matching of scribed shifts to non-scribed shifts, please clarify if analyzed non-scribed shifts were also only in the evenings. **Yes, they were only in the evenings. This has been clarified in the methods section.** Line 149: Briefly explain why 4/22 physicians were not included in the sensitivity analysis. Were they not working at QCH during that timeframe? Were these the 4/22 that did not produce a greater PPH with use of a scribe (Line 159)? **Of the 22 physicians, 4 were new hires, so we didn't have data for the year before. This has been added to our methods. They were not the 4 who didn't produce a greater PPH.** Line 154: How many emergency physicians were eligible to take part in the study? An additional limitation may be that the remaining eligible physicians may not want to work with a scribe and they may have less productivity gains as a result. **We had 24 physicians who were initially eligible, though 2 declined to participate out of preference for working alone rather than in partnership with a scribe. This information has now been added to our methods as well.** Line 157: Please also list the number of shifts that these hours correlate to and the average number of scribed shifts per physician. **This has now been added to our results.** Line 189: Given the descriptive pilot design, small sample size, and multiple factors involved in determining financial feasibility, I would suggest refraining from making financial calculations and present this point as a hypothetical financial gain based on the productivity increase. **Thank you for this suggestion. We agree with this, and have moved this section to our results as a hypothetical cost assessment, emphasizing the need for more detailed study on this.** Line 207: What is the actual number of physicians who have paid for scribes after the study? Listing this as X/22 as well may as a percentage may be clearer. **We have now identified the specific number of physicians using scribe services after the study, as well as where scribes are being used today. This section has been moved to our results.**