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Title	Routine chest X-rays for low-risk patients undergoing a periodic health examination: a retrospective cohort study
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Reviewer 1	Dr. Terrence McDonald
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General comments (author response in bold)	1) No mention of cost to the system - (i.e. how much does an Xray cost) this might be useful to establish further context of the value to the system, given the changes to OHIP billing regulations. Several US studies are highlighted, the lack of evidence or information in the Canadian context needs to be further highlighted, not simply mentioning Choosing Wisely or the (list) from the Canadian College of Family Physicians. If little data on DI is lacking in Canada, it is noteworthy to add a comment as to why? This information is typically difficult to obtain in other provincial jurisdictions - and for a reason. **We specifically avoided speaking of costs for this study, as the CWC campaign is really focused on quality of care as opposed to cost, and the goal of the study was to understand the frequency of low value CXRs, and the impact of the campaign and policy changes on this frequency.** **Nonetheless, the cost of an X-ray on the OHIP Schedule of Benefits depends on the number of views taken and whether or not billing is for the performance (technical fee) or supervision and interpretation (professional fee) of the chest radiograph. A single-view chest X-ray costs a total of $21.30 CAD to perform and interpret, while a two-view chest X-ray costs $32.65, and a three or more view chest X-ray costs $40.60. The reviewer is correct that Canadian Data in this instance is lacking, likely due to a lack of readily available administrative data. In the discussion as follows:** **"Conversely, our study involved a large cohort of patients from multiple regions and practices across Ontario and suggests routine CXRs are uncommon in Canada, where prior data has been lacking"** 2) No mention is also made of the Periodic Health Examination and the lack of evidence or recommendation for it by the CCFP; it is slightly more expensive than a Chest Xray (in some jurisdictions - see AMA fee navigator in Alberta for example) - it is an obvious note to make of the money spent on PHEs such a large number completed for this time period. Did the number of PHE decline --- after the College made a statement against their routine periodic health exam? This is an important point and is lost by not highlighting, as it fits very well with the theme of your work and message otherwise **Thank you for this comment. We initially analyzed the PHE billing volume over the study period but had excluded it from the submission as we did not initially set out to investigate the impact of the PHE revisions on PHE frequency. Instead, we adjusted for PHE volume as an offset term.** **However, as per your suggestion, we have opted to add this. First, we added the PHE billing volume on a secondary axis in Figure 3. In-text, we qualitatively assessed the trend in PHE use (by billing volume) using Figure 3. Lastly, we provided a simple negative binomial regression (PHE volume = time) to assess the average quarter-to-quarter trend in PHE billing volume over the study period, which is summarized in the following statements:** **"During this same period, total PHE volume decreased, on average, by 2.2% per quarter (P<.001). Total PHE volume was appreciably lower post- versus pre-2012."** **Furthermore, given that assessing the impact of the 2013 guidelines on PHE or routine CXR billing was not an objective of our paper and given its current length, we recommended that any future investigation with this objective would benefit from a more robust analysis. For example, a segmented negative binomial regression would allow a researcher to assess the immediate impact (i.e. a change in level/intercept immediately following the changes) and gradual impact (i.e. a change in slope from the baseline trend) of the 2013 revised guidelines on PHE billing volume (or CXR billing volume).** 3) Why were providers years in practice divided in the manner noted? **It might be much more meaningful to explore this variable in terms of first, second, third and greater than three decades of practice experience; as clinical experience and the use of testing will vary greatly among those early in practice, mid-career and late career; important nuances in the trend found might be lost simply by limiting the analysis to two groups. As a minimum, I recommend a comment on why this was chosen as an approach and supported with what others have done/found in the literature - on early, mid and late career GPs practice patterns. This might also support the work to target further QI (as you mention) on specific practices etc.** **We defined years in practice by three distinct levels/values according to our prior study of low-value ECG use. We mirrored that definition to facilitate possible comparison of the impact of years since graduation (for e.g. > 30 v <=20) on low-value CXR use versus low-value ECG use (See Bhatia, JAMA Internal Medicine 2017).** 4) It appears great effort was taken to explore patients characteristics, but very limited is written about theme (such as SES) thereafter in the discussion. This needs to be expanded or at least explained, was the thought to explore practice variation specifically with SES in mind as part of a general comment on regional/geographic variation? There also needs to be further rationale used in the introduction on the about the choice of variables, age, sex and SES that needs then to be tied in better in the interpretation and conclusion. **We thank the reviewer for the comment. We certainly would have liked to expand more fully on patient characteristics in the discussion but were limited by space constraints. We decided to leave out a more fulsome discussion as the objective of the current study was really focused on establishing baseline frequencies of low value CXRs and an understanding of the degree of physicians ordering variation. Further research is required to understand the impact of patient variables on ordering.** 5) Was data available to explore the effect of 'panel size" given that it is mentioned clearly that the high % of rostered patients in Ontario? This is a useful variable as it might shed light on whether the practitioner being examined is 'high-volume' or not - and might speak to an issue of access or specific practice pattern. Primary care reform is not commented to a great extent, despite some positive findings noted on p. 18 in Appendix 1, which is surprising - it might be valuable to comment at least brief on whether the reforms in place for their data set had any impact at on the use of CXR and place it in the context of Ontario primary in its current form. **Unfortunately we did not have available data in this study to evaluate roster size and the ordering of low value care. We did not have enough data to appropriately comment on the impact of primary care reform in Ontario on low value ordering, but we did note that primary care payment model was not as powerful a predictor of low value CXR ordering that the Median Odd Ratio (MOR), suggesting a physician ordering variability was a more important variable than payment model.** 6) I do not believe the 'costs and waits to the system' comment - is a completely valid point, given the low-use and low payment

	for a Chest Xray - relative to other expense tests such as an MRI (knee, hip, low back) or PFTs (instead of spirometry) - there are minimal wait times for a Chest Xrays; publicly funded MRI by contrast can be up to 8-12 months or longer depending on your location and type-requested. With this in mind, it might be beneficial, as a means to 'highlight' the point being made about low - value testing by mentioning their costs (system and patient: monetary, lost work time and wages, etc.) as noted in my other comment above. Wait times for Chest X-rays may require some additional explanation or simply re-wording. **We have clarified this comment, and specified in particular the potential for downstream testing, such as CT scans, lung biopsies/ bronchoscopies, which may lead to increase costs and harm.** **"Due to its trivial diagnostic yield and high false positive rate, routine CXR for asymptomatic, low-risk outpatients often confers no clinical benefit, while leading to additional unnecessary services (e.g. advanced imaging, procedures and consultations) that can pose additional patient harms and system costs5-10."** 7) The substantial variation discussed in the interpretation p. 11, lines 18-38 might benefit from more specific commentary on the findings. It appears to be given little credence, but in fact is likely a highlight (finding) to be explored especially in the Ontario context. **We have highlighted this comment by changing the last sentence of the conclusion to highlight the variation event further:** **"Further research exploring the causes of variation in physician ordering practices, particularly among high ordering physicians, is warranted."**