

An Audit of unnecessary pre-operative Chest X-Rays in a tertiary centre in Singapore

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care
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Background

This poster concurrently discusses an audit of pre-operative Chest X-Rays (CXRs) which were taken for patients undergoing elective surgeries in Singapore General Hospital (SGH), a single tertiary centre in Singapore, and a pre-implementation survey conducted amongst clinicians in Singapore on their perspectives on unnecessary investigations that do not contribute to improved patient outcomes. The combined qualitative and quantitative data aims to establish the extent of healthcare overuse and elucidate the barriers and enablers specific to the ordering of unnecessary pre-operative CXRs, with the purpose of creating a robust implementation plan uniquely tailored to the local context.

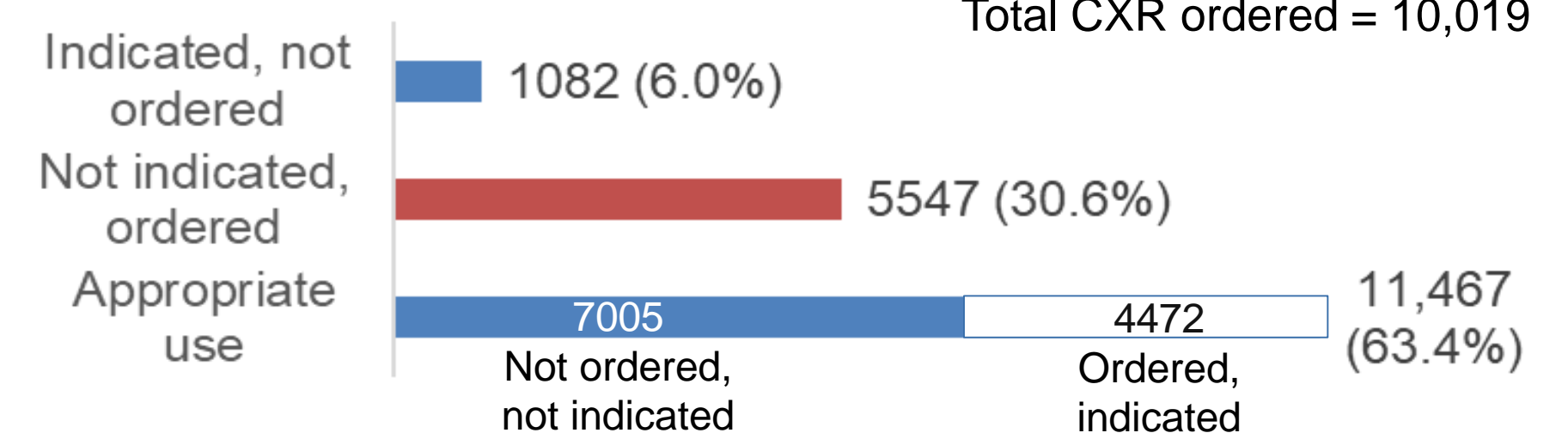
Audit: Methods

A retrospective audit was conducted on pre-operative CXRs ordered for all patients planned for elective surgery who visited SGH's pre-surgery anaesthesia evaluation clinic (PEC) from January 2022 to January 2023. The criteria used for audit is based on existing hospital guidelines¹, which were adapted from international and local guidelines^{2,3}.

Audit: Results

During this period, 18,096 patients attended PEC, of which 5547 (30.6%) received CXR although it was not indicated. There were a total of 10,019 CXRs ordered during this period; thus overutilization of CXRs represents 55.4% of all CXRs ordered during this period. Based on our hospital's per-unit cost of CXRs (S\$69), and 12 minutes taken to shoot and read a CXR, this represents S\$382,743 direct costs and 1109.4 man-hours attributed to unnecessary CXRs done specific to the elective pre-operative setting.

Table 1: Patients attending PEC & CXR Order From Jan 2022 – Jan 2023
Total patients = 18,096
Total CXR ordered = 10,019



Pre-implementation survey: Methods

Simultaneously, an online pre-implementation survey was conducted from April 2023 to May 2023 on junior and senior clinicians in public institutions in Singapore to explore perceptions surrounding overutilization of care.

Pre-implementation survey: Results

280 doctors responded, of which 75 (26.8%) were senior doctors (Associate Consultant and above). 61 (21.8%) were from anaesthesia, 67 (23.9%) were from surgical specialties and 152 (54.3%) were from medical specialties.

Of the 147 (52.5%) doctors who order pre-operative CXRs at least monthly, 108 (73.5%) agree that some orders are unnecessary. This proportion similar amongst junior doctors (85 of 114, 74.6%) and senior doctors (23 of 33, 69.7%).

However, there were significant differences between junior and senior doctors in the factors influencing their decision to order pre-operative CXRs (Chart 1). Junior doctors felt that instructions from senior physicians and/or the department were more influential factors than guidelines, whilst senior doctors predominantly looked at local guidelines or instructions from the department in their decision making.

Chart 2 reveals a similar difference between junior and senior doctors in the prevalent reasons for ordering more investigations than necessary. Although the top 3 reasons cited were similar in both groups (instructions from department or senior physicians, medicolegal concerns and ordering as a precaution to be clinically safe), the first reason was a particularly strong factor amongst junior doctors.

Chart 1

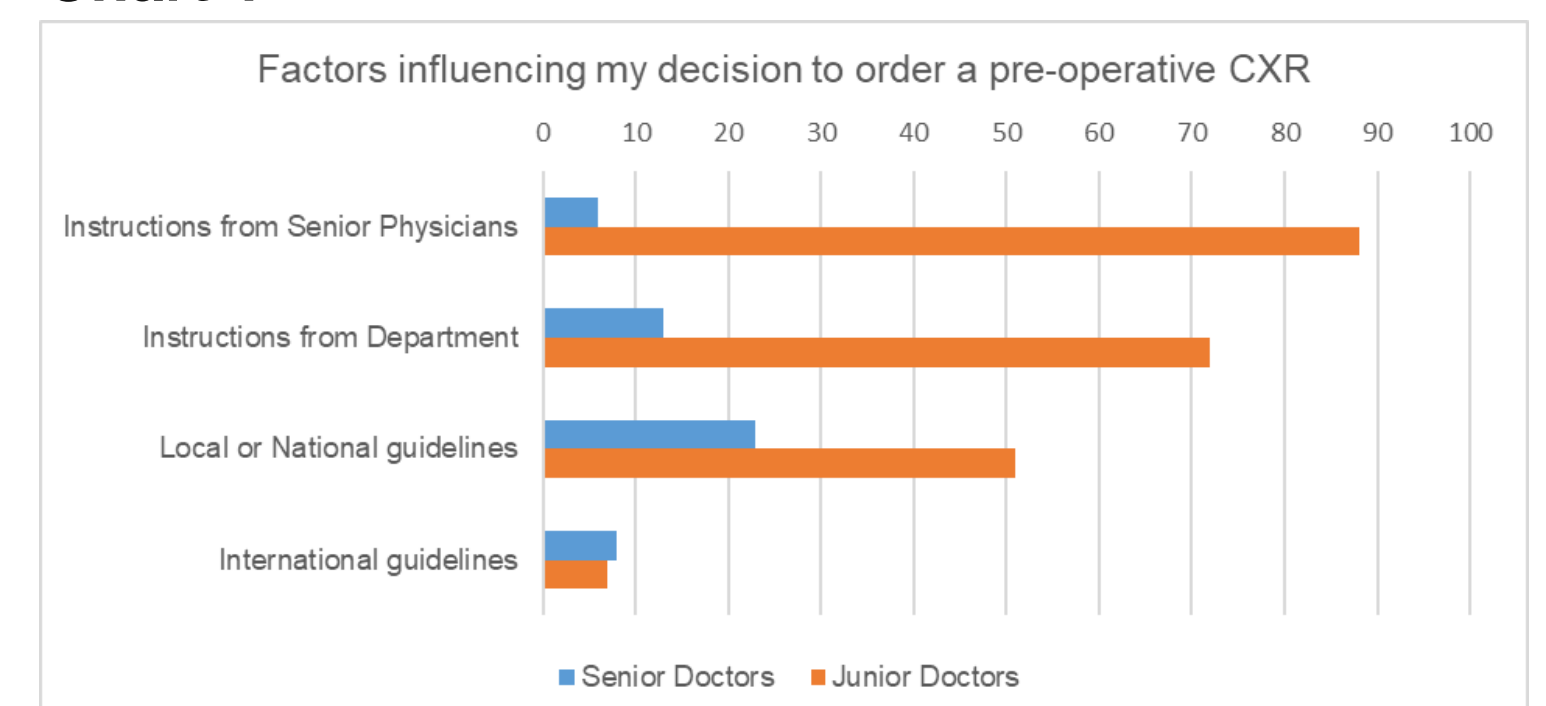
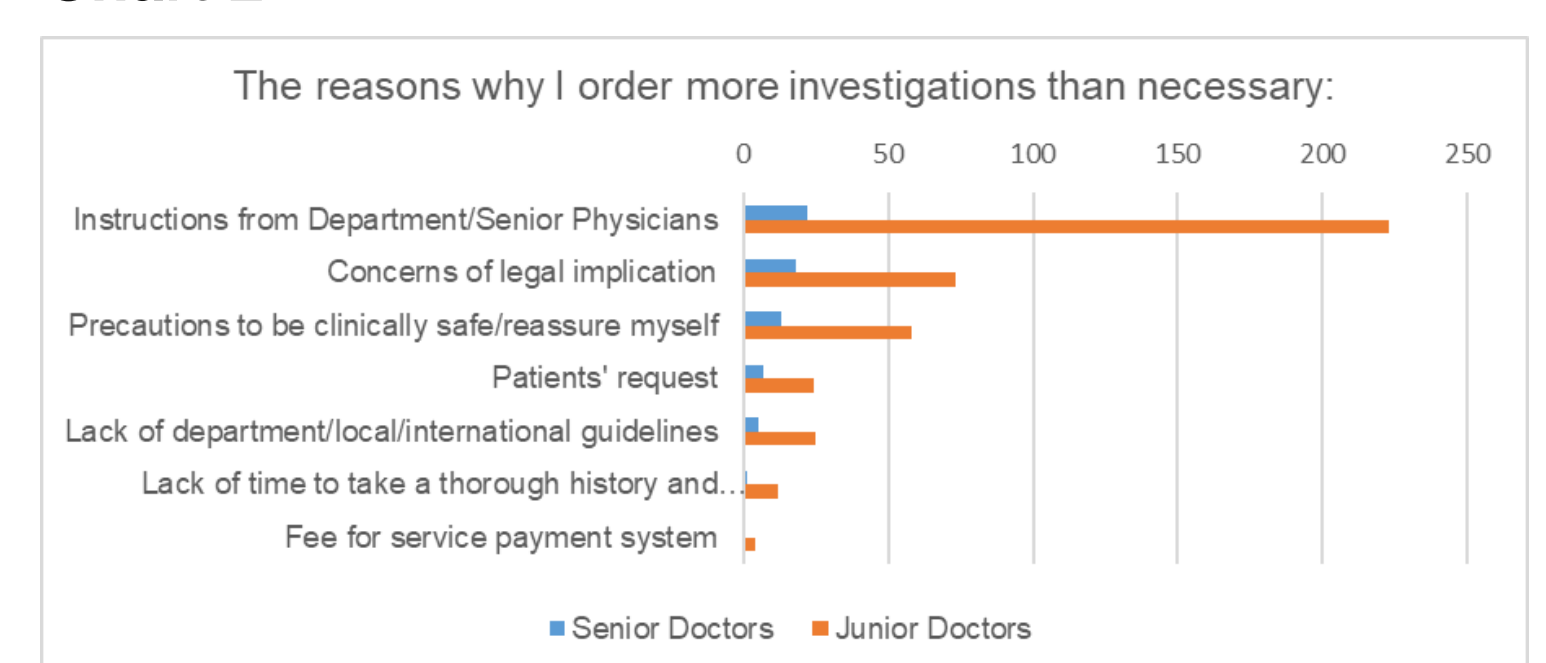


Chart 2



Conclusions

The number of unnecessary pre-operative CXRs ordered in SGH is significant despite established, robust clinical guidelines. In light of the barriers cited specific to the local context, this may suggest the importance of highlighting that guidelines are present to eliminate habits of ordering as a precautionary measure and to allay medicolegal concerns. Senior doctors should also set an example by ordering investigations only when medically indicated to inspire behaviour change amongst junior doctors as well. Taking these factors into consideration is pivotal in designing our subsequent implementation plans targeted to SGH.

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1 Singapore General Hospital. (2021). Guideline: Preoperative investigation guidelines for patients presenting for elective surgery.

2 Agency for Care Effectiveness Clinical Guideline: When not to order chest X-ray. Available from URL: [https://www.acehta.gov.sg/healthcare-professionals/ace-clinical-guidances-\(acgs\)/details/when-not-to-order-chest-x-ray](https://www.acehta.gov.sg/healthcare-professionals/ace-clinical-guidances-(acgs)/details/when-not-to-order-chest-x-ray).

3 Fleisher LA, Fleischmann KE, Auerbach AD, et al. 2014 ACC/AHA guideline on perioperative cardiovascular evaluation and management of patients undergoing noncardiac surgery: a report of the American College of Cardiology/American Heart Association Task Force on practice guidelines. J Am Coll Cardiol 2014; 64:e77.