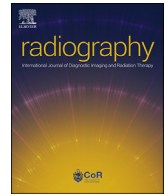




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Bridging the communication gap between radiographers and patients to improve chest radiography image acquisition: A multilingual solution in the COVID-19 pandemic



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ABSTRACT

Introduction: A chest X-ray (CXR), taken in full inspiration, is important to ensure pathology in the lungs will not be missed. To achieve this, effective communication on breathing instructions for patients is crucial. During the COVID-19 pandemic, radiographers in Sengkang General Hospital (SKH) were challenged when performing CXR for the patients whose native language is not English. Most of these patients were foreign workers living in the same dormitory which had formed the largest COVID-19 cluster in Singapore. These dormitory residents found it difficult to understand and adhere to breathing instructions, resulting in a suboptimal degree of inspiration when the CXRs were taken. This may ultimately affect the diagnostic value of the radiographs. This paper aims to share and evaluate how radiographers tackled this issue and continued to acquire fully-inspired CXR for the dormitory residents despite the language barrier.

Methods: Using a combination of online survey and retrospective analysis of the rejection rates of CXR done over the period of early April to early June, a team of radiographers evaluated the effectiveness of using audio recordings in managing the issue of not achieving a fully inspired CXR for patients due to language barrier.

Results: The rejection rate for CXR due to suboptimal inspiration decreased from 26% to 9% upon implementation of the audio recordings. 92.3% of the CXRs taken within this period also fulfilled the criteria of a fully-inspired CXR, as evidenced by having at least 9 posterior ribs seen above the right hemidiaphragm. Survey results found a fairly balanced number of radiographers who agreed and disagreed that a fully-inspired CXR was achieved for most of their patients after utilisation of translation manuals and audio recordings.

Conclusion: After the implementation of audio recordings, the decrease in rejection rate of CXR and an audit which demonstrated that CXR quality was upheld had proven that the radiographers successfully achieved fully-inspired CXR for suspected COVID-19 patients. This confirmed that using pre-recorded audio instructions was an efficient intervention albeit being a one-way communication, leads to more accurate imaging results, aligning with existing literature on communication experiences between radiographers and patients. Moreover, the decreased rejection rate of CXRs had increased department efficiency consequently reducing departmental expenses in the long run.

Implications of practice: Given that we have an ageing population and the vast majority of the elderly converse in their various dialects, positive feedback from radiographers presented opportunities to expand the translation manual and audio recordings to include local dialects. These can be seamlessly integrated in CXR and other procedures in the hospital setting. To ensure that the translations are culturally sensitive, attention should be paid to the translation process of instructions into other languages and local dialects by enlisting the help of native speakers.

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Introduction

The prevalence of the highly infectious coronavirus disease, COVID-19, has caused massive health and socio-economic upheavals worldwide. In the immensely overloaded medical infrastructures and healthcare systems, the devastating impacts of the COVID-19 pandemic^{1,2} were highly evident. Being the nearest acute hospital to the largest cluster of COVID-19 cases arising from S11 dormitory @ Punggol, a foreign worker dormitory in Singapore, the Department of Radiology in Sengkang General Hospital (SKH) had to accommodate the increasing orders of CXR for these patients from the S11 dormitory.^{3,4} CXR is widely used for the medical triaging of suspected COVID-19 patients presented with moderate to severe upper respiratory symptoms^{5,6} and a fully-inspired CXR should be acquired to visualise small pulmonary abnormalities better.⁷ The diagnostic value of a chest radiograph can be affected if the CXR is acquired with suboptimal inspiratory effort by the patient.⁸ Poor inspiration may cause increased opacification of the lung bases and affect the presentation of multifocal peripheral lung changes of ground glass opacity, which is a key feature in CXR findings in COVID-19 cases.^{9,10}

During the start of the COVID-19 outbreak in the dormitory, radiographers realised that they were faced with many difficulties when delivering verbal instructions to non-local dormitory residents during their CXR examination. This was because there was a lack of common language as the dormitory residents were from other Southern Asian countries who came to work mainly in the construction sector. Majority of these dormitory residents do not speak or understand English, which is the common language in Singapore. The outbreak within the dormitory led to it becoming the largest COVID-19 cluster in Singapore^{3,4} and without a common language, the process of image acquisition was hindered. Effective communication is important to ensure patients adhere to the breathing instructions given so as to acquire CXRs in full inspiration^{11,12,13}.

When faced with a communication barrier, most radiographers made use of non-verbal cues to aid patients' understanding.⁹ This included eliminating the usage of medical jargons and expressing instructions in simple English, coupled with body language such as mimicking the action of shirt removal and breath-holding motions. These non-verbal cues were often carried out and repeated when patients failed to understand instructions initially. Even then, the body language was limited by the donning of the full Personal Protective Equipment (PPE) gear which included a disposable hair cover, face shield or goggles, N95 mask and gloves. Consequently, patients were unable to visualise the breathing motion which was expressed through facial expressions and chest rise action demonstrated by the radiographers. This resulted in radiographers struggling to acquire CXR in full inspiration for dormitory residents as they were unable to understand the breathing instructions.

To bridge the communication gap, a team of radiographers came up with audio recordings of simple instructions for performing a CXR, such as "Remove your shirt" and "Breathe in and hold your breath", in 11 languages, native to the dormitory residents presented in the SKH Emergency Department (ED) Isolation zone. The X-ray procedure room at the intervention site was set up with a Bluetooth speaker and a playlist of all the instructions were downloaded onto a laptop. Radiographers could playback the recorded instructions for dormitory residents during their chest examinations. A set of translation manual was also made available in A5-size flip-card model enhanced with pictorial illustration. These cards were laminated to uphold high adherence to infection control standards. (Annex A: Translation Manual).

This paper aims to explore the effectiveness of using pre-recorded audio instructions in bridging the communication gap

between radiographers and the dormitory residents to achieve full inspiration CXR.

Methods

A survey was conducted between 25/05/2020 to 10/06/2020 to evaluate the radiographers' perspective on the effectiveness of the audio recordings and Translation Manual. All radiographers working in the ED were invited to participate in the survey.

Survey questions were specially crafted to investigate the challenges faced by radiographers when performing a CXR for the dormitory residents, and to gauge the radiographer's confidence level in terms of patient communication with the aid of the Translation Manual and audio recordings playback of breathing instructions in different languages. The survey consisted of 5 multiple-choice questions using a 5-point Likert scale.

Reject rate analysis (RRA) in Digital Radiography aims to help radiographers identify educational gaps, and guide them to improve the workflow, hence increase department efficiency. A rejected image is defined as a radiograph that is deemed unacceptable by the radiographer, at the time of image acquisition.¹⁴ The radiographer makes the judgement to reject an image that does not fulfill stringent technical qualities to contribute to the medical diagnosis, and therefore performs a repeat radiograph.

Data on the CXR taken for all dormitory residents in the ED since the beginning of the COVID-19 outbreak in S11 dormitory were collected by the department's RRA team. Data on CXR rejected under reject reason "Inadequate inspiration" between 06/04/2020 to 31/05/2020 were extracted for analysis.

Results

Survey results

A total of 22 radiographers participated in the survey. This translates to a participation rate of 55%. 49% of the participants found it a challenge to get the patient to follow the breathing instructions when using the Translation Manual and audio recordings of translated breathing instructions. 40.9% of the participants are confident that the patient can understand the breathing instructions when using the Translation Manual and audio recordings of translated breathing instructions. 54.5% of the participants agreed that they can acquire full inspiration CXR when using the Translation Manual and audio recordings of translated breathing instructions. 95.5% of the participants agreed that the Translation Manual and audio recordings of translated breathing instructions were useful.

RRA results

Fig. 1 depicts the reject rate of all dormitory residents' CXRs performed between the beginning of April (Week 1) to end May (Week 8) in the ED Isolation zone.

A steep increase in reject rate for CXR due to inadequate inspiration was observed from week 3 to week 4, this was the point where there was an increase in the dormitory residents who sought medical treatment at the ED. The audio recordings were implemented on week 6 and a significant drop in reject rate was observed immediately, suggesting that the audio recordings playback had been effective in helping radiographers achieve full inspiration CXR.

To eliminate confounding factors that might have caused the decrease in reject rate post-intervention (i.e. radiographers passing suboptimal images of inadequate inspiration), an image audit of all the CXRs done from Week 6–8 was conducted. All the CXRs were screened by two radiographers from the team. Based on the CXR audit, 92.3% of the CXRs fulfilled the criteria of at least 9 posterior ribs

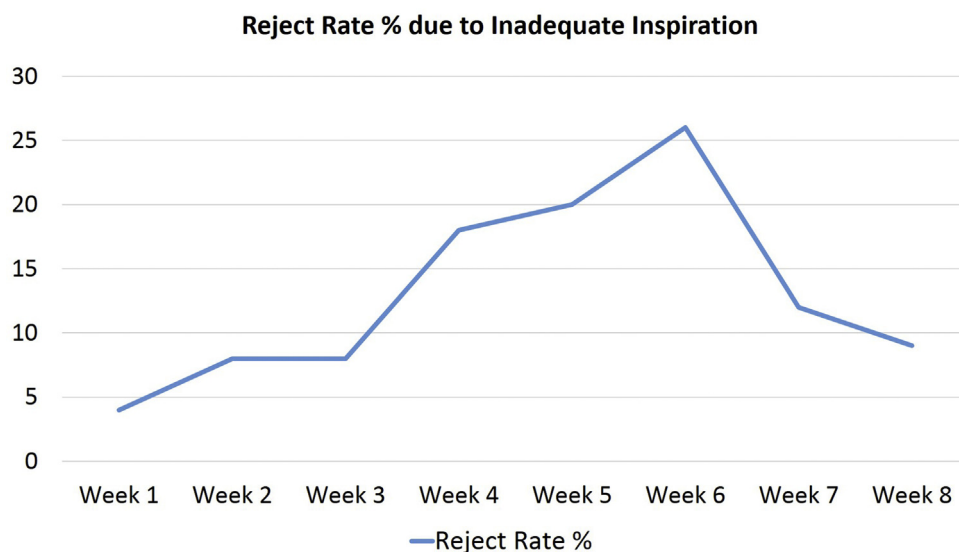


Figure 1. Reject rate of all CXRs due to inadequate inspiration.

seen above the right hemi-diaphragm.² This demonstrated that the quality of the CXR was maintained despite a drop in reject rate, indicating that radiographers were consistently acquiring CXR in full inspiration.

Discussion

Language barriers can directly affect the radiographer's ability to achieve a CXR in full inspiration due to the lack of effective communication. With reference to survey results, it was evident that radiographers found it a challenge in getting patients to adhere to breathing instructions. As the pre-recorded audio instructions provide solution in only a one-way communication, radiographers were unable to prepare patients in anticipating some pre-recorded instructions during the procedure.

The survey results revealed most of the participants were not confident that the patient can understand the breathing instructions when using the Translation Manual and audio recordings of translated breathing instructions. This could be due to the fact that there was no effective two-way communication between radiographers and patients; resulting in the radiographer's inability to check for the patient's understanding. This confidence level could be managed by rehearsing with the patient by playing the recording once to check for understanding before the procedure.

The patient's inability to adhere to breathing instructions might be attributed to the stress and fear that they are experiencing during this period of uncertainty. This pre-recorded audio instructions is something new and foreign to the patient and they might need more time to be accustomed to such new practice.

A majority of participants (95.5%) agreed that they will continue to use the pre-recorded audio instructions, indicating the sustainability of these methods in bridging the communication gap. This highlighted an opportunity for future studies to explore how the proposed intervention can be effectively integrated in other procedures in a hospital setting.

From the RRA, the decreased reject rate percentage (26%–9%) in the last 3 weeks of the study reflected an increased department efficiency. It also translates into increased radiographer's confidence in acquiring optimal images. This meant that radiographers spent less time to complete a CXR examination, hence resulting in

faster turnover rate. This remained especially crucial in the COVID-19 context as radiographers were expected to minimise contact time with suspected patients. In addition to faster turnover rate, patient dose was kept to the minimum, conforming to the guiding principle of radiation safety, the "ALARA" ("As Low As Reasonably Achievable") principle.¹⁵

Limitations

The main limitation of this study was a lack of control over the work processes in the ED Isolation X-ray room. For example when there was a change in the group of radiographers rostered to ED in the subsequent part of the study, the new group may be unaware of the presence of the pre-recorded audio instructions. Additionally, the research team was unable to fully ensure that all radiographers consistently utilise the proposed methods due to the segregation of employees, imposed by the hospital management as part of COVID-19 control measures. As such, the efficacy of proposed methods may not be accurately assessed.

Despite the challenges associated with the research methods stated in this study, we posit that they are still valuable in understanding and assessing interventions for radiographers when performing CXRs for patients who do not share a common language. Overall, this would be beneficial in progressing towards establishing a common practice to employ effective methods that can be adopted in other departments or hospitals. In the long run, this reduces departmental expenses as radiographers do not repeat CXR as often as the pre-intervention period.

The second limitation of this study was the short study period of one week for each proposed intervention. Due to the rapid development of COVID-19 in S11 dormitory, the team had to promptly review and adjust the implementation when the CXR reject rate percentage did not decrease after the first week post-intervention. In an ideal situation, each study period should be in place for at least 2 weeks before introducing any new changes.

Assumptions

Several assumptions were made in this study. In order for the efficacy of proposed methods to be accurately assessed, the study assumed that patients had no prior experience having a CXR taken.

When sieving the appropriate target audience (i.e. S11 dormitory residents) for RRA, the study assumed that all Medical Record Number (MRN) that began with the letter “G” and “F” are foreigners living in the S11 dormitory.

Conclusion

Translation manuals and pre-recorded audio instructions were explored and assessed in the study to address the issue of language barrier, as identified in the survey. They were utilised by radiographers to acquire CXRs in full inspiration, for dormitory residents who do not share a common language.

After the implementation of pre-recorded audio instructions, radiographers have successfully achieved fully-inspired CXRs for 92.3% of suspected COVID-19 patients. This was evident by a decrease in the reject rate for CXR, coupled with an audit that proved that the quality of CXR remained. This confirmed that pre-recorded audio instructions was an efficient proposed intervention, despite serving as a form of one-way communication tool to the patients.

Overall, these findings showed that better communication led to more accurate imaging results, corresponding to existing literature on communication experiences between healthcare professionals and patients. Moreover, the decreased rejection rate of CXRs had increased department efficiency and radiographers' confidence, consequently reducing departmental expenses in the long run.

Recommendations

The positive results promoted the continued use of the translation manual and audio recordings. Given that Singapore has an ageing population and the vast majority of our elderly converse in their various dialects, this implementation has the potential to expand to include local native languages and dialects. These can be seamlessly integrated in CXR and other procedures in the hospital setting. To ensure that the translations are culturally sensitive, attention should be paid to the translation process of instructions into other languages and local dialects by enlisting the help of native speakers.

Conflict of interest statement

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.radi.2021.02.004>.

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