Impact of PACS on ICU nursing work practices

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Highlights

Interviews with 49 nurses and observations of 23 nurses in three Australian metropolitan teaching hospital ICUs with varying stages of PACS implementation found that:

- Nurses with access to PACS were able to independently and easily access images and did so more frequently than nurses without access.
- Improved access to images for nurses allows them to act autonomously and raise the alarm when they detect abnormalities.
- Nurses perceived that access to PACS had the potential to positively impact upon patient safety.

The introduction of PACS to ICU settings promotes changes in nursing work practices by providing nurses with the ability to act more autonomously, with the potential to enhance patient care.

Background

Picture archiving and communication systems (PACS) store and provide faster access to electronic medical images such as x-rays, CTs and MRIs and have the potential to assist clinicians in their decision making. Accessing and utilising medical images is an integral part of the work of intensive care nurses, for example to determine the position of nasogastric tubes on chest x-rays prior to commencement of feeding. No previous studies have focused on the use of PACS by intensive care nurses, nor its impact on their work practices. The aim of this study was to understand whether and how intensive care nurses access and use medical images in their work, and to examine the impact of PACS on nursing work practice innovation.

Methods

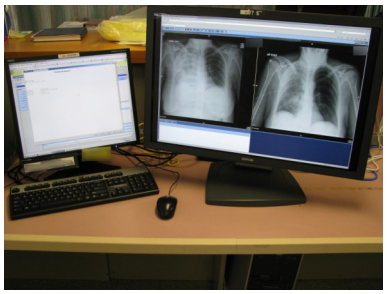
We interviewed 49 nurses and asked about how PACS has changed or will change their work practices, patient safety and their role. We also observed 23 nurses for 35.5 hours and recorded information about the ways in which nurses carried out their day-to-day work, including viewing medical images. ICU 1 had longstanding (nine years prior) access to PACS from bedside and central workstation computers, ICU 2 introduced PACS eight months prior to the study, accessed from central workstation computers, and ICU 3 had not yet implemented PACS. Our results present the themes arising from both interview and observational data.

Results

Nurses viewing images independently

In ICU 1 nurses stated that they viewed chest x-rays at least once or twice per shift for intubated patients. Few nurses perceived that they relied on doctors to access and review images. They reported that because PACS is available at the bedside, they are able to access images when required with convenience, without leaving the patient.

Nurses in ICU 2 also reported viewing images at the start of their shifts, especially for intubated patients who routinely receive a chest x-ray early each morning, and later in the day if required. They stated spending less time searching for x-rays, and that images were available to view more quickly than before PACS.



In ICU 3 nurses conveyed that they infrequently viewed images independently. Instead, they mainly viewed images at the multi-disciplinary “handover round”. Many predicted that when PACS is introduced, with access only from the central workstation computers, that it will not be as useful as it would be at bedside computers.

Collaborative image viewing practices

In ICU 2, multidisciplinary ward rounds were carried out each day, with an effort made for each nurse caring for a patient to be present at the bedside while their patient was examined by doctors.

If doctors reviewed images during the round they did so at the central workstation where PACS was available, while most nurses stayed with their patient.

In ICU 3, nurses reported mainly viewing images each morning at the multi-disciplinary "handover round" at the multi-viewer lightbox. The introduction of PACS in ICU 3 may change the handover work practices, and nurses may no longer have the opportunity to view the images in collaboration with doctors or alone.

> ***"… well I think having the PACS that handy it just allows you for a double check quickly… you know your doctors are always checking but for you to check as well it just feels better you know just being able to look at it yourself."***

Conversely, in ICU 1, nurses had few opportunities to view images in collaboration with doctors as there were no multi-disciplinary meetings, and doctors rarely viewed images at the patient bedside where nurses were usually located.

Work practices and patient safety

Nurses in ICU 1 believed that by looking at x-rays themselves and not just relying on the doctors they could assess the x-ray, and raise an alarm if they saw an abnormality.

Prior to the introduction of PACS in ICU 2, films were often misplaced around the unit or taken elsewhere in the hospital and locating old films was cumbersome. Many nurses in ICU 2 commented that they perceived access to x-rays had improved with the introduction of PACS simply because they no longer had to search for films. They thought the loss or misplacement of hard films impacted negatively on patient safety. However some nurses found the hard copies delivered to the patient bedside each morning acted as a visual prompt (which they no longer had) to remind them to view their patients' images.

In ICU 3 where PACS had not yet been implemented nurses anticipated there will be less need to "chase up films" with "treatment initiated quicker".

Discussion and implications for practice

Our study found that nurses working in ICUs with PACS were able to more frequently view x-rays separately from doctors, to check the position of tubes before proceeding with nasogastric feeding for example, potentially contributing to the safety of their patients. The improved access to images for nurses which PACS provides in the settings we examined, allows them to act autonomously and raise the alarm when they detect abnormalities.

In the ICU without PACS (ICU 3), and to a lesser extent in the ICU with PACS at the central workstation (ICU 2), nurses had the opportunity to view images alongside doctors, and were able to participate in discussions with them. In the ICU with PACS at the bedside, nurses lacked those opportunities, but they did access images autonomously. Many of the ways for integration of PACS into nursing work practices appear to be coming to fruition in ICU settings with better access to images and improved delivery of education. Further work should examine the impact of these changes on doctor-nurse communication and patient care. The context of the way work is carried out in each of the ICUs appears to influence the ways in which the introduction of PACS innovates work practices.

Further information

This summary is based upon the following published paper which presents full details of the research and is the correct citation for this information.

Creswick N, Hains IM, Westbrook JI (2011) **Innovation in intensive care nursing work practices with PACS.** *Studies in Health Technology and Informatics*. **169:** 402-406 IOS Press: Amsterdam.

Acknowledgements and partners

We would like to thank the nurses from the ICUs for their participation, and Anne Marks for her work in collecting some of the data.

This research was funded by an ARC Linkage grant LP0989144 in partnership with Sydney South West Area Health Service.
Partner investigators are: Associate Professor Kathy Gibson, Liverpool Hospital and Associate Professor Richard Paoloni, Concord Repatriation General Hospital.

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Centre for Health Systems and Safety Research, Australian Institute of Health Innovation
Faculty of Medicine, University of New South Wales, Level 1, AGSM Building
UNSW SYDNEY NSW 2052
Email: chssr@unsw.edu.au
Web: www.aihi.unsw.edu.au