Review of Methods of Streamlining Emergency Department Radiology Studies as Part of a Clinical Redesign Project

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Learning objectives

To explore potential solutions to specific issues highlighted in the context of a clinical redesign project.

To review methods of streamlining radiology studies utilised in multiple centres as outlined in the literature.
Background

With the introduction of ETP (Emergency Target Performance) guidelines within emergency departments, there is increased pressure on radiology departments to undertake and report scans in the most time-effective manner possible. This literature review was undertaken as part of the Nepean Hospital Clinical Redesign Project, which was undertaken in collaboration with the Agency for Clinical Innovation. The redesign was conducted in keeping with the Centre for Healthcare Redesign Methodology, with the literature review carried out as part of the solution design portion of the project. The aim was to identify possible solutions for barriers to radiology services in the emergency setting that have previously been utilised in other centres with potential for implementation at Nepean Hospital.
The barriers to access to radiology services were identified during a series of multidisciplinary meetings involving medical staff from the radiology and emergency departments, administration staff, radiographers and nurses. The obstacles selected for the literature review were categorized into groups according to the core issue: interdepartmental contacts, roles and responsibilities, radiology rostering, referral processes for CT, and standardising protocols.

Multiple online databases were utilised in a literature search using keywords from the identified groups of issues. Articles were found outlining specific solutions implemented at other institutions to address similar obstacles, and distributed to the clinical redesign committee. Multiple methods were selected by the Clinical Redesign team from the literature review to address specific issues.

Defining roles and responsibilities

An exploration of "Lean" principles, a set of guidelines to improve efficiency and function within the automotive industry, has previously been adapted for use within radiology departments [1], and was utilised throughout this redesign.

In keeping with the Lean principles of standardization of work [1], specific staff roles in the referral process were clarified. This involved clearly defining all staff roles, including escort roles, with the goal of increasing efficiency and accountability. This was undertaken through the establishment of a working group between the emergency and medical imaging departments, the development of a multidisciplinary team working group to address workplace culture and the implementation of medical imaging department-wide meetings.

Interdepartmental contacts

It has been established that the communication and the effective handover of patients is important to avoid error in the radiology setting [2]. It has also been suggested that telephone calls are a significant disruptor to the workflow and efficiency of the radiologist [3]. In keeping with the Lean principle of improvement of the flow of all processes in a system [1], the goal of establishing new, efficient communications channels was formed.

A web-based, flexible communication system has been previously utilised in another centre in San Francisco with this goal, with good results and participation [4]. As part of this redesign, a "Radiology consult" function was built into the Cerner system, which generated an automatic page to the radiology registrar to prioritise specific plain film exams. The goal of this was to improve communication while reducing phone call
interruptions to the registrar. An updated method for contacting referrers in emergency department was put in place, with direct numbers for contacting team leaders provided to the registrars.

Radiology rostering

A review of current staffing and rostering allocations by a core team was undertaken, and changes made within the radiology department in keeping with the Lean principle of elimination of waste [1]. The introduction of rostering a radiologist specifically for the reporting of scans from the emergency department has previously been undertaken within a North American centre with the goal of expediting emergency studies, resulting in a decrease in time to final reports [5]. This solution was implemented as part of the Redesign, with the goal of a reduction of time from the performance of the study to the final reports being made available. Additionally, the introduction of a new imaging transport role was implemented to reduce waiting times due to transport issues.

While innovative, the introduction of medical students as paid emergency triage assistants as utilised by the Yale Department of Radiology [6] was thought beyond the scope of the project in the specific setting of Nepean Hospital.

Examination of IT processes within the department was undertaken with the goal of better utilising the time of the rostered radiology staff. The introduction of a DICOM-enabled workflow engine system has been previously suggested to increase efficiency in reference to number of scans performed in time for clinical review [7]. Likewise, the introduction of a paperless radiology workflow management system has been suggested to improve case turn-around times [8]. Within the clinical redesign project, the ongoing goal of improving IT access amongst departments was developed, as well as the improvement of the information available to the radiology department on RIS (Radiology Information System).

Referral processes for CT

The referral process for radiology has been demonstrated as an area particularly susceptible to error, which can affect efficiency and patient outcomes [2]. It has also been demonstrated in a UK study that many referrers are unaware of the presence of referral guidelines [9], which can be used to direct the referral process. Within the context of this clinical redesign, Lean principles [1] were used to identify, discuss and eliminate waste within the referral process.

In keeping with the Lean principle improvement of flow in all processes of a system [1], streamlining of specific non-contrast CT brains and cervical spines from the emergency department, without the need to contact the radiology registrar, was undertaken where specific criteria were met. This measure aimed to reduce unnecessary steps in the referral process, while decreasing disruptions to the reporting registrar.
It has previously been suggested that education of future doctors about appropriate radiology referral processes at the medical student level utilising an e-learning platform may be an effective method of improving referral practices [10], though this method was thought outside the extent of this particular project.

**Standardising protocols**

It has been recommended previously that the establishment of a core team to review and improve CT protocols is beneficial to ensure optimal studies and patient safety [11]. While a large-scale review of CT protocols was not undertaken as part of this project, a core team was formed to review the standard protocols for specific non-contrast CT scans streamlined from the emergency department. This further negated the need for the involvement of the registrar, in keeping with the Lean principles of elimination of waste and improvement of flow in all processes of a system [1]. Additionally, referral/preparation/contrast factsheets were made available on the hospital intranet with a goal in keeping with the Lean principle of standardizing work and minimising variations [1].
Fig. 1: Figure 1. Goals of the Clinical Redesign Project: to have 90% of emergency studies undertaken within an hour of request, and reported within one hour from the scan reaching exam status. Comparison is made with the percentages of studies within these time limits at commencement of the redesign. Graph prepared by the Nepean Hospital Medical Imaging Department.

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**Fig. 2:** Figure 2. Percentage of emergency CT and plain films reported within two hours over the course of the Redesign project. Graph prepared by the Nepean Hospital Medical Imaging Department.

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Conclusion

While many of the identified solutions utilised at other centres were deemed beyond the scope of this particular project, some options were selected for implementation. The key solutions implemented were in relation to staffing and rostering allocations, streamlining referral processes (especially for non-contrast head and spine CT scans), clearly defining staff roles, establishing new efficient communication channels and improving IT access. These solutions are currently being utilised as part of the Clinical Redesign project, and assessment is ongoing.
References


