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Magnetic Resonance Imaging / Formation image de résonance magnétique

Variations in Magnetic Resonance Imaging Provision and Processes Among Canadian Academic Centres

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Abstract

Purpose: Increasing demand has led to questions regarding the appropriateness of advanced imaging exams, particularly for magnetic resonance imaging (MRI). The study aimed to explore variability in MRI service provision and request variation within Canadian academic medical imaging departments, particularly factors potentially affecting appropriate MRI service provision.

Methods: All Canadian academic centres with medical imaging residency programs were invited to participate. Participation involved completing an institution-level survey and submitting exam requests for all MRI exams completed in a common 24-hour period. The surveys and request forms were analysed and contrasted.

Results: The 13 participating institutions reported scanner operating hours per week ranging from 101-672; large urban centres typically had higher hours. A total of 42% of sites housed multiple scanners, and 28% housed a 3-T scanner. Most accept requests from all general practitioners and specialists. Only 1 institution has a solely electronic request submission process. Requisitions are focused on patient safety, including contrast considerations, metallic foreign bodies, and implants. Request prioritization scales vary substantially across institutions. Few use referral guidelines to evaluate request appropriateness.

Conclusions: Our analysis showed great variation among facility-level factors such as hours of operation, request forms, and prioritization scales among institutions and facilities. Opportunities exist to create standardized processes and improve request forms to focus more on specific information required for appropriateness, increase consistency in patient care, and promote demand balancing, minimizing unnecessary exams and therefore reducing wait times.

Résumé

Objet : Une hausse de la demande a suscité des interrogations sur la pertinence des examens d'imagerie médicale poussés, particulièrement des examens d'imagerie par résonance magnétique (IRM). L'étude vise à explorer la variabilité dans l'offre de services d'IRM et dans les demandes faites auprès des départements d'imagerie médicale des centres universitaires canadiens, notamment des facteurs qui influent potentiellement sur l'offre de services d'IRM appropriés.

Méthodes : Tous les centres universitaires canadiens dotés de programmes de résidence en imagerie médicale ont été invités à participer à l'étude. Pour ce faire, les centres devaient remplir un questionnaire portant sur les activités au niveau de l'établissement et envoyer les demandes pour tous les examens en IRM effectués pendant une période commune de 24 heures. Les questionnaires et les formulaires de demande ont été analysés et comparés.

Résultats : Les 13 établissements participants ont indiqué que leurs appareils fonctionnaient entre 101 et 672 heures par semaine. Le nombre d'heures d'utilisation était habituellement plus élevé dans les centres urbains. Au total, 42 % des établissements possédaient plusieurs appareils, et 28 % des établissements possédaient un appareil de 3 T. La plupart des centres acceptent les demandes de tous les omnipraticiens et spécialistes. Un seul établissement utilise uniquement un processus entièrement électronique d'envoi de demandes. Les demandes portent principalement sur la sécurité des patients, notamment sur des questions de contraste, de corps étrangers métalliques et de prothèses. Les échelles de priorité des demandes varient grandement selon les établissements. Peu d'entre elles se fient à des directives pour évaluer la pertinence des demandes.

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Conclusions : Notre analyse indique un grand écart entre les établissements quant aux facteurs applicables au niveau des établissements tels que les heures d'exploitation, les formulaires de demande et les échelles de priorité. Il serait possible de créer des processus normalisés et d'améliorer les formulaires de demande afin de mettre davantage l'accent sur les renseignements exacts requis pour augmenter la pertinence, accroître l'uniformité dans les soins aux patients et favoriser un équilibre des demandes afin de réduire au minimum les examens évitables et, par conséquent, les temps d'attente.

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Key Words: Appropriateness; Magnetic resonance imaging; Radiology departments; Referral processes; Resource capacity; Service provision

Access to magnetic resonance imaging (MRI) remains problematic across Canada, with many Canadians still waiting lengthy periods of time before receiving a needed MRI exam. At the provincial level in 2013, the 90th percentile wait time ranged from 60 days for Ontario up to 247 days for Alberta [1]. Wait times are driven by demand and operational aspects within the MRI suite. Over the past decade a variety of initiatives have been undertaken to improve MRI access in Canada. These included expanding capacity with the addition of new scanners, growing the total number of MRI scanners in Canada from 185 in 2005 to 308 in 2012 [2] and increasing operating hours, combined with efforts to improve the efficiency of imaging processes.

However, demand has also increased substantially, reflected in the increased number of MRI exams performed from just less than 1 million in 2005–2006 to just over 1.7 million in 2011–2012 [2–4]. This growth is fueled in part by continued technological developments, expanded clinical indications, and better recognition of its superior diagnostic capabilities [5–7]. Yet compounding this justifiable growth is demand that arises from physicians and other providers requesting inappropriate exams. That inappropriate exams are requested is not surprising given the variability of provider expertise and the ever-increasing complexity of today's medical care with multiplicity of clinical indications, clinical scenarios, and medical imaging modalities now available [8]. However, the acquisition of inappropriate exams lengthens overall patient wait times, and strains already tight budgets. Despite being a pressing concern for many years, it is still unclear what percentage of completed MRI exams across Canada are inappropriate. A recent review yielded estimates ranging from 2%–28.5% of all MRI exams obtained [9], with results varying based on study methods and the indications for imaging being studied.

Thus far little work has been published regarding MRI facility processes and operations, despite the impact these activities may have on patient wait times and exam request appropriateness evaluations. The goal of this research is to explore the range and variability of MRI related pre-exam operations across academic medical imaging departments in Canada with an emphasis on how these factors may impact upon wait times, system resource allocation and the provision of appropriate MRI service. We chose to focus on academic medical imaging departments offering residency programs as these centres are training our future radiologists.

Materials and Methods

A survey was developed to assess aspects of MRI operations at academic health science centres as part of a larger study assessing MRI appropriateness. An invitation to participate was sent to all 16 academic medical centres offering medical imaging residency programs across Canada. Participating institutions were asked to complete the survey either in soft or hardcopy form as a Microsoft Word document, or online using FluidSurveys (www.fluidsurveys.com) and submit a blank version of their MRI requisition form(s). Our research team analysed all results collected. The identities of participating institutions were anonymized based on a number assigned in random order.

The survey requested basic facility details including institution identification; the number, strength, and operating hours of operating MRI scanners; details regarding any referral restrictions; and identification of which types of health care providers are permitted to submit exam requisitions as well as the mode(s) of requisition submission. It also requested information regarding requisition processing procedures, including identification of the initial requisition recipient, who assesses the requisitions for appropriateness, and which, if any, appropriateness guidelines are used; priority levels used; and information regarding who determines the priority level of each request and the imaging protocol. Individual institutional wait time targets and the estimated wait times for each priority level and various procedure categories were also collected. Information was also collected on how and when patients are notified of their appointment time. The final section of the survey asked about the use of standardized protocols. The full survey can be found in [Appendix 1](#).

We analysed the requisition forms to determine similarities and variations found among the forms and the manner by which requisitions are assessed for appropriateness and priority. The number of priority levels used were compared along with specific institutional priority level definitions. Submitted requisition forms were compared across participating institutions for the variety of patient clinical details asked including safety screening information. The types of questions and information found on the forms were broadly categorized into 4 categories: information useful for determination of protocoling or appropriateness, timing of appointment booking, patient accommodation (eg, if they will need additional assistance), and safety within the magnet environment. Question frequency was quantified as the number of questions

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