

TITLE:

**Demand-Side Control of Diagnostic Imaging
Through Electronic Clinical Decision Supports:
A Pilot Using Appropriateness Guidelines**

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Final: October 5th 2005

Abstract

Objective

This pilot study had two primary objectives: (1) to test the acceptability of clinical support at the point of initial DI referral to improve appropriateness of ordering; and (2) to test the Percipio™ software in a Canadian setting for this monitoring process. Secondary objectives were to measure the rate of inappropriate DI test ordering and to assess whether improvements in DI referral appropriateness could be obtained if electronic prompts were supplied at the point of initial test ordering.

Methods

A small (N=5) convenience group of primary care clinicians were recruited as volunteer participants. The clinicians shared the same patient panel and made all their DI referrals to the same regional centre. All DI tests placed by this group over a six month period went through the same software portal, which monitored all tests initiated, even those abandoned or changed through the course of test ordering. In addition to the test request, the software recorded the clinical information and rationale (differential diagnosis) for each test requisition. A total of 315 orders entered analysis.

Two analyses were conducted. The first examined the effect of a sub-set of guideline prompts that were interactive during the pilot. The second analysis retrospectively applied the full set of available practice guidelines (CAR, other published and local) to all tests ordered.

Results

When clinical appropriateness prompts were fired, referring clinicians modified their test ordering behaviour in compliance with the prompt. However, prompts about existing duplicate tests were routinely overridden.

The retrospective analysis, applying all available guidelines found that 86% of tests ordered were entirely appropriate. In 9% of orders a different test would have been more efficient; about half of those changes were to a simpler modality. Four percent of tests ordered were not required for patient management according to the full set of appropriateness guidelines. Although referring clinicians had the most difficulty appropriately ordering advanced DI tests (CT, MRI, NM and BD) the volume of basic tests (XR, US, FL, MM) (89%) made any inappropriate ordering in these categories costly to the health care system.

There were significant differences among the referring clinicians in the appropriateness of their DI ordering over all.

Both radiologists and referring clinicians were pleased with what they got out of the support system for clinical decision making. Radiologists appreciated having the additional clinical information the software required referring clinicians to provide.

Referring clinicians were better satisfied with the contribution of radiology to the management of their patients.

Conclusions

The data and our experience in this pilot lead us to the conclusions that clinical support at the point of DI ordering is appreciated by primary care clinicians and that direct measurement of the rate and type of inappropriate DI ordering is possible. Furthermore, supplying clinical decision support to referring clinicians at the point of test ordering improves the appropriateness of DI referrals. Larger demonstration projects using these methods are indicated.

Introduction

There is a significant gap between currently common wait times¹ and the clinically acceptable wait time benchmarks for diagnostic imaging (DI)². Access to DI also acts as a bottleneck to definitive diagnoses and treatment in other areas of medicine with unacceptably high waiting times: cardiology, oncology and orthopedics. Examination of the DI demand shows an expected increase of 33% over the next six years³ while the supply curve remains stable. Without significant interventions, the current DI access gap will continue to grow at an exponential rate.

To manage this increasing divergence, three general management principles must be applied simultaneously: control demand, improve efficiencies and increase supply (in equipment and manpower, especially with non-specialist labor). Demand control and efficiency improvement can be achieved with attention to the appropriateness of DI referrals supported by an electronic/digital delivery system for test ordering and results distribution.

There are three types of inappropriate DI referral:

1. when diagnostic tests are built up from low information yield to high instead of obtaining the one most appropriate test first;
2. when unnecessary repeated tests are conducted because the original records and results are lost or inaccessible; and
3. when diagnostic imaging is required for neither diagnosis or treatment.

Although these sources of inappropriate referrals are common, firm figures on their rates are not easily available. The test build up phenomena is observed in most locales with inadequate access to definitive DI testing. An expert panel session for Canada Health Infoway, April 7th 2005 presented a 7% estimate for unnecessary repeated tests in Canada⁴. In areas where medicine is practiced defensively, imaging rates might be expected to be higher without relationship to diagnosis or management. Israeli studies indicate 10% of CT tests were not necessary as were 17% of the MRIs⁵. In the US, rates for unnecessary tests have been measured at 24% in CT and 16% for MRI⁶.

Appropriateness review of DI tests ordered has been expected of radiologists for many years. This review, as outlined in CAR standards, is based on clinical signs and relevant information required to be part of any referral for DI services. However, with the limited human resources in primary care and increased demand, complete clinical information is only rarely submitted with referrals to DI, limiting the radiologists' ability to assess the appropriateness of the order. Too often, it is easier and faster in the short-term, if much more costly and vastly more inefficient in the long term, to simply perform all DI tests as ordered. In addition, while there has been rapid technological advancement in DI and an increase in availability of modern DI modalities across the country due to significant government investment in recent years, very little training has been offered to referring clinicians in order to appropriately use DI resources. As a response, many regions require a specialist referral to DI resources, particularly the higher cost resources such as

CT and MRI. Sometimes radiologists themselves operate this screening. Either way efficiency in patient management and the connection with primary care is lost.

A Proposed Solution

A key to more appropriate DI use is to improve decision making at the point of initial referral. We have known for some time that clinical decision making and patient outcomes can be improved by immediate access to evidence-based best practice prompts supplied electronically through the normal course of test ordering⁷. We also know the features critical to success in improving clinical practice using decision support systems⁸. For maximal effect, appropriateness guidelines must be made seamlessly available as part of the ordering clinician's regular workflow. For diagnostic imaging, this will mean supplying an electronic DI test ordering system with embedded real time electronic prompts towards the correct imaging study to be performed for the specific patient's condition.

The Canadian Association of Radiologists (CAR) has developed and tested appropriateness guidelines for the full spectrum of DI tests. Medicalis, a Canadian company, has developed software (Percipio™) that can offer instant electronic clinical decision support as well as a portal through which the ordering physician can schedule DI studies and retrieve results including digitized pictures. Although Medicalis' Percipio™ systems are deployed in a number of US locations⁹, the pilot study described here was the first test application in Canada.

This pilot was designed to meet two primary objectives: (1) to test the acceptability of clinical support at the point of initial DI referral to improve appropriateness of ordering; and (2) to test the Percipio™ software in a Canadian setting for this monitoring process. Secondary objectives were to measure the rate of inappropriate DI test ordering and to assess whether improvements in DI referral appropriateness could be obtained if electronic prompts were supplied at the point of initial test ordering.

Methods

The pilot study was conducted in cooperation with the Atlantic Health Sciences Corporation (AHSC) located in Saint John, New Brunswick. AHSC is the province's largest accredited regional health authority serving a population of 200,000 with 12 hospitals and a number of health centers within a 200 kilometer (120 mile) region. Approximately 45% of the radiology imaging service requests coming to AHSC originate from primary care clinicians, which in New Brunswick includes both general practitioners (GPs) and nurse practitioners (NPs).

The pilot group chosen for this study was a group of primary care clinicians operating in a collaborative practice model of a Community Health Center in the urban center of Saint John, New Brunswick. The pilot group consisted of 5 practitioners (3 GP's and 2 NP's).

Access to all imaging modalities was available during the pilot, including general radiography, ultrasound, fluoroscopy, CT, nuclear medicine, and MRI. During the pilot period of 6 months, December 1st, 2005 to May 31st, 2005, this group of referring clinicians placed 315 DI orders.

Throughout the pilot, data was collected and analyzed about ordering practices, results delivery, and the qualitative relationship between referring clinicians and the imaging providers. Because this was the first pilot and there was concern about clinician acceptance, only a small selection of the clinical decision supports (CAR Appropriateness Guidelines) was activated. The full data set was reanalyzed at the conclusion of the pilot employing a full set of best practice guidelines (retrospective analysis reported below). The full set of guidelines added other published guidelines and local practice guidelines to the CAR Appropriateness Guidelines.

Electronic Clinical Decision Support

The Percipio™ radiology portal application launches from the referring clinicians' desktops in the form of a browser-based thin client application served from a central location within the AHSC network infrastructure. Referring clinicians log onto the Percipio™ portal, select a new patient form and create a structured order. Signs and symptoms, relevant history, and a differential diagnosis are collected as mandatory fields. Each of the data fields is selected from a context sensitive screen with little or no data input required from the referring clinicians.

The software can be set to intervene during the ordering process with clinical decision support flags based on the type of exam ordered and the clinical data supplied about the patient. These clinical decision supports can be calibrated to different levels of intervention. Varying experience levels or patient panels of the referring clinicians may indicate different intervention levels. Similarly, local practice patterns and DI modality availability may require alteration in the application of best practice guidelines in order to maximize patient safety and provide optimal guidance to the referring clinicians during order creation. The software can allow decision support suggestions to be ignored and a rationale collected for the decision to ignore a clinical prompt. Consultation with a radiologist before completing an order can be suggested or mandated at any point in order creation. For the pilot the software was set to enable clinicians to ignore prompts without requiring an explanation, although the fact was recorded that a prompt was provided of a particular type.

A completed DI order can be sent electronically within the Percipio™ software to the appropriate imaging center for scheduling or walk-in general X-ray to ensure accurate data capture for the interpreting radiologist. The pilot was conducted off-line from routine hospital function, so electronic scheduling was not available. Each referring clinician printed hard copy of the completed DI requisition and handed it to the patient who made their own arrangements to have the tests completed.

Once the DI test is performed the image data is captured and managed using the regional PACS infrastructure. When the radiology report is available, the results are immediately sent to the referring clinicians via the Percipio™ radiology portal and the patient care system. The referring clinician has the option to use either as a viewing tool. The Percipio™ radiology portal places the report on an active “review” work list for each referring clinician thereby focusing attention on important results.

Results

The purposes of the pilot were achieved: decision support was well accepted by referring clinicians and the Percipio™ software functioned well in the Canadian setting. The method did detect inappropriate DI referrals and there is some evidence that supplying prompts improves appropriateness of DI test ordering.

Quantitative Results

We hypothesized that providing clinical prompts would improve the appropriateness of DI orders. There is modest support for that hypothesis in the pilot results collected during the interactive phase when a few clinical prompt fields were made available to referring clinicians.

Advice type	Number of times fired	As a % of total orders	Exam Occurred	Exam did not occur
Clinical Reminders (i.e. that patient should also have blood drawn)	14	4%	14	
Question order appropriateness	2	1%		2
Point out order duplication	34	11%	30	4
Question patient safety (i.e. “MRI is contraindicated for patients have a pacemaker, internal cardiac devices, brain aneurysm clips, or inner ear implants. Patients with surgical staples should not be imaged until 7 days post-op unless approved by a radiologist.”)	7	2%	7	

More than 1/3 of the duplications pointed out were for examinations already completed; almost all of these (93%) were reordered by clinicians. In the remaining 62% of duplications noted, the test had been already ordered but the examination had not yet been performed; again most of the test orders (90%) were repeated by the referring clinician.

Indications of improved appropriateness possible with clinical prompts become much stronger in the retrospective analyses when the full array of appropriateness criteria was applied.

Suggested Changes from Retrospective Analysis

		% of Total
Total Orders	315	100%
No Change	272	86%
Suggest Exam Change	29	9%
No Imaging required	14	4%

NOTE: The above table ignores all duplicates. No duplicate was considered inappropriate simply because it duplicated a current order. Exams were identified as inappropriate only if they were clinically inappropriate using the guidelines.

	No Change	Suggested Change to initial Exam	No Imaging required	Total	Suggest Change or No Imaging Required
X-Ray	165	15	8	188	23 (12.2%)
Ultra Sound	46	3	2	51	5 (9.8%)
MRI	0	1	3	4	4 (100.0%)
CT	16	8	0	24	8 (33.3%)
Mammography	26	0	1	27	1 (3.7%)
Bone Density	4	0	0	4	0
Nuclear Medicine	3	2	0	5	2 (40.0%)
Fluoroscopy	12	0	0	12	0
Totals	272 (86%)	29 (9%)	14 (4%)	315 (100%)	43 (13.7%)

We hypothesized that referring clinicians would need to be prompted more frequently to use the more complex modalities appropriately. This hypothesis was partially sustained. For the purposes of this study complex modalities were defined as including: CT, MRI, nuclear medicine (NM) and bone densitometry (BD). X-ray, ultrasound (US), fluoroscopy (FL), and mammography (MM) were defined as 'basic' tests.

Only half of the changes suggested to initial orders were to more complex modalities; an equal number of suggestions indicated that a simpler test would be preferable.

Suggested Upward Movement:

- From CT to MR: 3
- From NM to MR: 1
- From X-ray to MR: 7
- From X-ray to CT: 1
- From US to CT: 3
 - Total = 15 orders

Suggested Downward Movement:

- From CT to US: 4
- From CT to X-Ray: 1
- From MR to CT: 1
- From NM to X-ray: 1
- From X-Ray to X-ray: 7 (simpler exam within same modality)
 - Total = 14 orders

However, the referring clinicians had more difficulty appropriately ordering the complex tests. Thirty one percent of the advanced orders should have been changed and 8% were not required at all. In the basic group, only 6% of orders triggered a change suggestion and 4% were not required.

From Retrospective Analysis

	Total # of Orders	No Change	Suggest Exam Change	No Imaging required
Absolute Values	315	272	29	14
as a % of Total		86%	9%	4%
Advanced / Basic Imaging Breakdown				
Advanced: (CT, MRI, NM, BD)				
Absolute Values	37	23	11	3
as a % of Total		61%	31%	8%
Basic: (XR, US, FI, MM)				
Absolute Values	278	249	18	11
as a % of Total		90%	6%	4%

Clinicians vary significantly in their clinical behaviour and DI ordering was not expected to be any different. We expected to see considerable variation across the participating clinicians even though they shared a patient population. We did not expect to see the differences between NPs and GPs that were observed in the data.

NP/GP Breakdown	Total # of Orders	No Change	Suggest Exam Change	No Imaging required
NP				
Absolute Values	81	74	6	1
as a % of Total		91%	7%	1%
GP				
Absolute Values	234	198	23	13
as a % of Total		85%	10%	6%

This training difference is suggestive, but given the large variation across the three physician participants, the observed differences between NPs and GPs are better explained as part of the general clinical variation.

Physician 1:

- 62 total DI orders
- 12 (19%) of orders should have changed
- No imaging required: 5 (8%)
- Exam change suggested: 7 (11%)
 - Movement upward in complexity: 2
 - Movement downward: 5

Physician 2

- 91 total DI orders
- 11 (12%) of orders should have changed
- No imaging required: 1 (1%)
- Exam change suggested: 10 (11%)
 - Movement upward in complexity: 5
 - Movement downward: 5

Physician 3

- 81 total DI orders
- 12 (15%) of orders should have changed
- No imaging required: 7 (9%)
- Exam change suggested: 5 (6%)
 - Movement upward in complexity: 3
 - Movement downward: 2

Qualitative Results

Both radiologists and referring clinicians were pleased with what they got out of the clinical support system.

Radiologists appreciated having the additional clinical information supplied by the software supported ordering process. Radiologists also indicated a greater confidence in reading the exams when presented with the full clinical history of the patient. This translated into the reports with more specific detail about the exam and more applicability to the patient’s condition.

Radiologists	Pre	with Percipio
Please rate on a Scale of 1 to 5 how confident you feel you understand what is ailing the patient from the information you have available to you.	2.86	4.5
Please rate on a Scale of 1 to 7 how satisfied you are about the relevance of the diagnosis you can provide for the patient's conditions.	4.95	6

Referring clinicians also reported an improvement during the course of the pilot in the speed of DI information returned to the clinicians. They were also more satisfied with the contribution of the radiology referral in the management of their patients.

Referring Clinicians	Pre	with Percipio
Please rate on a Scale of 1 to 7 how satisfied you are with Radiology to help you manage your patients	5.75	6.27
Please rate on a Scale of 1 to 7 how satisfied you are about the speed of radiology reports to manage your patients	3.75	6
Please rate on a Scale of 1 to 7 how satisfied you are about the quality of the diagnosis provided from radiology to manage your patients conditions.	6.25	6.27

After the portal was operational, there was a significant gain in response time (12%) between when the radiology report was available and when it was reviewed by the referring clinician.

The number of non-essential phone calls or conversations decreased with the use of the portal, allowing radiology clerical staff to focus on activities that are more essential and contributed to an increase in their overall job satisfaction.

Qualitative analyses yielded further insight into the experience of referring clinicians with the clinical support system. Illustrative comments follow each query. Quotes are in italics.

Question 1: Did you find the electronic prompts helpful or irritating?

- *I was prompted maybe once or twice, but don't have a good recollection of the nature of the prompts or the exam I ordered.*

- *I was prompted regarding spinal stenosis, there wasn't a great deal of prompting other than suggesting an alternate exam, which I chose. Other prompting I ran into was about duplicate tests and I overrided the choice to cancel, as I was looking for a progress on treatment. More specific exams I can see benefit of this, but most work I order, like chests etc. would likely not change too much.*

Question 2: Were the rationales provided by the clinical support system adequate?

- *I don't know if the rationale is that important to me personally. The fact that a Radiologist reviews these rule sets that drive imaging protocol would be fine with me. They are the experts in this matter. I simply need the answers that I'm looking for.*
- *In the case mentioned (above), a MRI was suggested, however there didn't appear to be much in terms of rationale. Detail was not presented, just the exam suggestion with choices to accept or override.*

Question 3: Did you find yourself 'fighting' the prompts (trying to override)?

- *Navigation when trying to back out of a mistake made in ordering was more of a problem when encountered. Once again, between the two of us we may have encountered a Decision Support type prompt maybe 3 – 4 times total.*
- *(Problem with) specification of differential diagnoses in terms of Patient viewing the requisition.*

Question 4: Did the system change how you ordered DI for subsequent patients?

- *one clinician reported changing patient management as a result of a suggested change in DI test, but indicated that the case was not generic enough to make a permanent change in DI test ordering.*
- *Once again, low incidence of actually running into this event, but probably would be influenced by decision support in terms of future ordering for generic changes in exam protocol (i.e. requesting a general chest X-ray before a CT if appropriate).*

Question 5: Did you learn anything as a result of participation in the pilot?

- *Found one woman that defied Ottawa Ankle Rule, so decision support is not always clear cut and exceptions do exist, reminding that decision support is not a complete substitute of decision making authority in placing orders.*

Question 6: Would you have used a system of advanced clinical decision support, for example, immediate telephone consult with a radiologist accessed by a mouse click on a screen icon?

- *Likely not with an outpatient practice, it may be more in line with inpatients. If advice seemed unclear or multiple paths presented there may be opportunity for questioning of Rad's online. When needing to get a hold of a Radiologist now, there has been no problem. The system works, so why fix it.*

Question 7: Do you have any other suggestions for:

(a) the electronic clinical support system as a whole (software and hardware);

- *Largest problem with system as a whole is the time involved to place orders and navigate internal IS systems, login's, power saving modes, etc. of existing equipment. Once logged into Percipio, flow was generally good with some reverse navigation issues. (i.e. undo features / Go Back)*
- *Location of equipment if not portable was an issue and is perceived that if portable, battery life issues, etc. may come up.*
- *Having to provision paper requisition for patients was painful. Waiting for the printer to power up if in power save mode, etc.*
- *System needs to be integrated with DI ordering, as well as with Hospital systems. We work in multiple systems and just adding another system to the mix with improper integration would be a cause of failure in our eyes.*

(b) How the system is introduced to clinicians;

- *The time aspect of using this application is huge. If I have a busy practice, and need to spend 2 – 3 minutes extra per patient, just to order an exam ... you'd better not cut off the old practice of paper requisitions. In a busy day I might see 35 patients which could translate to 70 – 90 minutes extra per day. The patient loses in this scenario. Not a track to take given physician shortages.*

(c) How the system is supported in operation?

- *Support was fine, easy to use. No issues over trial.*

(d) Any other suggestions for improvement?

- *Mandatory criteria like differential diagnosis should be removed, in some cases it caused difficulty.*
- *Exam Tree needs to have more combo's, otherwise I have to place 2 and 3 orders per patient to receive desired results.*

- *To use this, we need either an easier way to deal with the paper (req slip) or it needs to be fully removed from process.*
- *Can't say this enough. The time factor is a large player in terms of my satisfaction.*
- *'Other' field, helpful ..*

Discussion

The data and our experience in this pilot lead to the conclusion that referring clinicians appreciate functional clinical decision support and that direct measurement of the rate and type of inappropriate DI ordering is possible with the Percipio™ software. Furthermore, supplying clinical decision support to referring primary care clinicians through the software at the point of test ordering will improve the appropriateness of DI referrals.

If even the 4% unnecessary tests observed in this pilot were not performed across Canada that would total 1,400,000 DI tests or the annual workload of 82 radiologists¹⁰. This capacity could be invested in addressing the wait lists for DI services. Further possible efficiencies are indicated by the observed 9% of DI tests that required a change to the initially ordered examination in order to be in compliance with best practice.

Referring clinicians had more trouble correctly ordering the complex DI tests (CT, MRI, nuclear medicine and bone density), but it would be an error not to support better use of the 'basic' group (X-ray, ultrasound, fluoroscopy and mammography) as well due to much larger number of these basic tests ordered. A 12% change in the use of X-ray resources, as indicated in this pilot, will make a significant impact on the available resources of any radiology unit.

The pilot experience with clinical decision support produced positive outcomes for both referring clinicians and radiologists. Radiologists appreciated having more clinical information with which to guide their work and the referring clinicians were more satisfied with radiology's contribution to managing their patients.

A range of suggestions and cautions were noted about improving the clinical support system. Most critical among these was the instruction to integrate the prompting software into a fully functional electronic order entry system in order to improve workflow for referring clinicians.

The qualitative results also pointed out an important strength of electronic clinical support systems. Clinicians indicated that they might use an automated link to call a radiologist when they thought they needed help (*"if advice seemed unclear or multiple paths presented"*). In addition to this type of acknowledged need for support, a functional clinical decision support system must intervene when an ordering clinician

objectively needs help as indicated by the discrepancy between their test ordering and best practice, whether the clinician is aware of the discrepancy or not. The opportunity for a private, just in time radiology consultation would go a long way to reducing the variability of care, producing better patient outcomes and more efficient use of DI resources.

Strengths and Limitations

The pilot involved a very few referring clinicians and did not offer them access to the full set of clinical decision-making supports available through the CAR Appropriateness Guidelines. These two factors severely limit the extent to which results can be extrapolated.

A notable strength was the degree of collegiality the process engendered between participating primary care referring clinicians and the radiologists to which they referred.

Implications

The pilot indicates a potential direction for medical leadership in creating and sustaining positive change in health care systems at local, regional, provincial and national levels. Improvements in the appropriateness of care provided most immediately impacts patients, other health care providers and local health care systems. All individual and system resources could be used more efficiently, which will make improved health benefits more widely and more promptly available.

There are national level implications as well. Specialty societies have a responsibility to help their members prepare for the future. The future of all professions lies in maintaining the currency of their contribution to society. Medicine is challenged at present to find a positive, respected and effective role in solving the social conundrum of ever increasing costs in health care. The rate of cost escalation in health care has diminished the capacity for both public and private funding in other areas of social and personal investment.

Optimizing the efficiency with which health care resources are used is one potential role for medical professional leadership. This was the conclusion of a futures study conducted in 2003-04 by the CAR¹¹. Three mechanisms were chosen for further study;

1. Reduce or eliminate inappropriate DI referrals through evidence based guidelines delivered in a manner effective in changing referring clinicians' DI test ordering behaviours.
2. Promote alternate delivery models in DI: delegation of practice acts.

3. Facilitate cost-savings and productivity capture as healthcare evolves across modalities (best test first), across specialties (interventional radiology instead of surgery) and across sites (teleradiology).

Future Directions

The pilot study reported here has indicated the potential for supporting more appropriate DI test ordering. Demonstration projects of sufficient coordination and scale are now required to show potential for system-level impact including reductions in wait times for DI.

The most recent federal budget established a fund to address large-scale change projects relevant to reducing wait times at the systems level. Health Canada holds \$15M of this fund, which will be made available on a grant basis. The CAR is seeking to access these funds in conjunction with provincial, regional and local partners to define and conduct relevant demand-side control studies in diagnostic imaging. The CAR is working with potential sites interested in measuring the efficiency improvements possible when DI ordering has full clinical decision support across all modalities. The hypothesis is that if the rates of inappropriate DI testing observed in this pilot can be redirected, the released DI capacity would be applied to wait lists resulting in observably reduced wait times. Other interim measures would also be tracked (i.e. number of DI test orders changed after clinical prompt; case matched practice patterns across ordering physicians; type and reason for clinical prompt overrides by referring physicians). Management and culture change requirements for moving demand-side control into larger applications would also be studied.

Statement on Authors' Competing Interests

Neither authors nor analysts received, or expect to receive, any form of compensation for their participation in the project described in the paper other than from their principle employers.

Notes & References

- ¹ for the purposes of this study ‘**wait time**’ was defined as the time between the clinician’s ordering an elective procedure and the earliest scheduled time slot for that procedure.
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