Specialist Wait Time Reporting Using Family Physicians' Electronic Medical Record Data: A Mixed Method Study of Feasibility and Clinical Utility

Michelle Naimer (✉ michelle.naimer@sinaihealth.ca)

Ray D. Wolfe Department of Family Medicine, Sinai Health, Toronto ON

Babak Aliarzadeh

Department of Family and Community Medicine, University of Toronto, Toronto ON

Chaim M. Bell

Department of Medicine, Sinai Health, Toronto ON

Noah Ivers

Department of Family and Community Medicine, University of Toronto, Toronto ON

Liisa Jaakkimainen

Department of Family and Community Medicine, University of Toronto, Toronto ON

Warren McIsaac

Ray D. Wolfe Department of Family Medicine, Sinai Health, Toronto ON

Christopher Meaney

Department of Family and Community Medicine, University of Toronto, Toronto ON

Rahim Moineddin

Department of Family and Community Medicine, University of Toronto, Toronto ON

Joanne A. Permaul

Ray D. Wolfe Department of Family Medicine, Sinai Health, Toronto ON

Tutsirai Makuwaza

Women's College Hospital, Toronto ON

Sahana Kukan

Ray D. Wolfe Department of Family Medicine, Sinai Health, Toronto ON

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Abstract

Background: More than 50% of Canadian patients wait longer than four weeks to see a specialist after referral from primary care. Access to accurate wait time information may help primary care physicians choose the timeliest specialist to address a patient's specific needs. We conducted a mixed-methods study to assess if primary to specialist care wait times can be extracted from electronic medical records (EMR), analyzed the wait time information, and used focus groups and interviews to assess the potential clinical utility of the wait time information.

Methods: Two family practices were recruited to examine primary care physician to specialist wait times between 2016 and 2017, using EMR data. The primary outcome was the median wait time from physician referral to specialist appointment for each specialty service. Secondary outcomes included the physician and patient characteristics associated with wait times as well as qualitative analyses of physician interviews about the resulting wait time reports.

Results: Wait time data can be extracted from the primary care EMR and converted to a report format for family physicians and specialists to review. After data cleaning, there were 7141 referrals included from 4967 unique patients. The 5 most common specialties referred to were Dermatology, Gastroenterology, Ear Nose and Throat, Obstetrics and Gynecology and Urology. Half of the patients were seen by a specialist within 42 days, 75% seen within 80 days and all patients within 760 days. There were few patient or provider differences amongst the wait times for referrals. Overall, wait time reports were perceived to be important since they could help family physicians decide how to triage referrals and might lead to system improvements.

Conclusions:

Wait time information from primary to specialist care can aid in decision-making around specialist referrals, identify bottlenecks, and help with system planning. This mixed method study is a starting point to review the importance of providing wait time data for both family physicians and local health systems. Future work can be directed towards developing wait time reporting functionality and evaluating if wait time information will help increase system efficiency and/or improve provider and patient satisfaction.

Introduction

Canada has the longest wait times to see a specialist physician according to a recent Commonwealth Fund survey of eleven countries.¹ More than 50% of patients wait longer than four weeks to see a specialist, compared to the international average of 36%.¹ Median wait times to see specialists in Ontario range from 39 to 76 days for medical specialists and 33 to 66 days for surgical specialists.² Wait times from primary to specialty care in Canada have been increasing and are 155% longer than in 1993.³ Waiting for specialists may be associated with adverse consequences such as increased pain and suffering, inferior medical outcomes, and economic costs from lost wages and productivity.^{4,5}

In 2007, Willcox et al conducted a cross-national comparison of strategies used by countries to measure and reduce waiting times.⁶ Five countries used supply-side strategies, like targeting funding toward increased hospital capacity and staff. Some countries used more complex initiatives that addressed demand side techniques, such as using explicit criteria to prioritize access to surgery. The authors recommended that policymakers consider extending the measurement of waiting times to include the point of referral to treatment in order to reflect patients' actual experience. To date, there are few benchmarks in place targeting wait times from primary to specialty care.^{5,7} In addition, there are limited interventions found in the literature that have shown impact on reducing wait times from primary care to specialty care. Jaakkimainen et al published a study that outlines patient and provider characteristics of wait times from primary to specialty care.² They found that patient factors and most physician factors do not seem to be consistently associated with wait times, except for family physician practice location and practice size.

Historically, there has been little information available to primary care physicians about which specialists have long waits or are available in different regions. Physicians rely on an ad hoc system based on personal experience, word of mouth, electronic medical record (EMR) or internet searches to identify specialists. At times, physicians may refer a patient and find out months later the referral was never received or additional information is needed.⁸ Neimanis et al. analyzed 770 referrals and found that 36.4% of referrals received no response within a 5 to 7 week period.⁸ Access to accurate wait time information may help family physicians choose the most suitable specialist to address a patient's specific needs.

Objective

This mixed methods study assessed the feasibility of creating primary to specialist care wait reports from primary care electronic medical records (EMRs). The clinical utility of the resulting wait time data was evaluated through focus groups with family physicians and specialist physicians.⁹

Methods

Study Setting

A convenience sample of two primary care clinics from the University of Toronto Practice-based Research Network (UTOPIAN)¹⁰ were recruited for this study: an academic family health team in downtown Toronto, Ontario, and a community primary care clinic in Vaughan, Ontario. Both are affiliated with Sinai Health and utilized the same EMR (Nightingale), at the time of the study. We included both sites to study community and downtown academic family practice perspectives and to include data from diverse referral networks. Ethics approval was obtained from the Sinai Health Research Ethics Board.

Data Collection

Patients from the two study sites were included if they had one or more referral records between January 1st, 2016 and December 31, 2017, and if they had at least 2 visits in 3 years prior to December 31, 2017. Age was calculated at January 1st 2016. The unit of analysis is a “visit”, where multiple visits can be nested for a patient. For example, one patient might have referrals to both cardiology and endocrinology, possibly over different visits during the study window. Variables in the final dataset included: family practice location, age, gender, urgency of visit coded to 4 categories (as per availability, within 1 month, within 1 week and urgent), specialist name, specialty, specialist department or clinic, specialist address, referral date, referral status and appointment date. Routine referrals were considered those indicated by the referring physician “as per availability” and “within 1 month”. Urgent referrals included those marked “urgent” and “within 1 week”. Referral data was further cleaned by manual review by the lead study author (MN) to remove referrals with an unknown site, missing department/speciality or to a specialty that was not applicable to this study (for example, referrals to physiotherapy or optometry) and referrals where the wait time was missing. Where referrals to a specific specialty were fewer than 50 patients, specialities were grouped into an “other” category. To validate the accuracy and completeness of the wait times calculated, a random sample of 150 referrals was selected and a research assistant reviewed the charts to assess the agreement between wait times calculated through EMR data that was extracted, cleaned and coded, and wait times calculated through manual chart review (the gold standard).

Creation of Wait Time Reports

The format of the wait time report was developed with input from the study investigators. A sample report is included in Appendix 1 and has been anonymized for purposes of publication.

Statistical Analysis

Quantitative Analysis

Wait times do not have a normal distribution therefore the analysis included the calculation of median and 75th percentiles.² Median wait times were calculated and stratified by specialist/department and by practice location. Exploratory, bivariate analyses were conducted examining the median wait time including completeness of wait time data, patient or physician characteristics that may contribute to wait times such as patient age or sex, patient income¹¹, socioeconomic status¹¹, marginalization indices¹² or physician age, sex and location of practice. Area-level indices such as income quintiles, socio-economic status and marginalization indices were derived using patients’ 6-digit postal codes. Wilcoxon rank-sum tests were used to assess the association between these patient/provider characteristics and median wait-times. We calculated the proportion of referrals that were seen within a benchmark of 18 weeks (a benchmark used in the United Kingdom where 90-95% of referrals are targeted to be booked within 18 weeks).¹³

Qualitative Analysis

A review of the literature helped to inform the design of the qualitative aspect of the study.^{14,15} Specialists from the top 7 specialties referred to by family physicians at both practice sites were invited to participate in a focus group. The aim was to have 6-8 participants in the specialist focus group, and in each of the Toronto and Vaughan family physician focus groups. Individual interviews were scheduled with participants who were unable to attend a focus group. Focus groups and interviews were conducted in-person by the qualitative research assistant and the Principal Investigator. At the start of the session, physicians received a paper wait time report to review that included median wait times of specialists (anonymized) by practice address for 7 specialty areas. Specialists received a similar paper report plus a more detailed confidential report with their personal wait times listed for each referral made to them specifically. A semi-structured interview guide was used for family physicians (Appendix 2) and specialists (Appendix 3) that asked about the relevance, clinical utility and acceptability of the wait time reports. Focus groups and interviews were conducted over 2 months from October to November, 2018. Interviews lasted 60 minutes and were audio-recorded and transcribed verbatim and anonymized.

Research team members performed line by line open coding of interview transcripts¹⁶ using an inductive approach with principles of constant comparison¹⁷ for analyzing data. Inductive analysis was appropriate for use in this research since there were no previous studies dealing with the phenomenon under investigation.¹⁸ NVivo 11 (NVivo qualitative data analysis Software; QSR International Pty Ltd. Version 11, 2016) was used for data management.

Results

Quantitative Analysis

Figure 1 summarizes the wait time data extraction and cleaning process from the EMR. The data cleaning process required some manual review of spreadsheets to remove some referrals as noted in the Figure. It took approximately 2–3 hours of time to identify and remove missing referrals, and specialties that were not applicable. Validation of wait time calculations from 150 charts demonstrated a wait time concordance rate of 100%. Referrals analyzed included referrals where appointments dates were pending or not recorded in the EMR. The final sample of specialist referrals where wait time information was available included 7141 referrals (4967 unique patients).

Table 1 outlines characteristics of the referrals. Of the 4967 unique patients, 69% had one referral, 22% had 2 referrals, 6% had 3 referrals and 3% of patients had 4 or more referrals. There were 1357 unique specialist names in the database and 596 unique departments. The list was reduced to 33 unique specialties by grouping similar specialty services/departments (Table 2). The top 10 specialties consulted were Dermatology, Gastroenterology, Ear Nose and Throat, Obstetrics and Gynecology, Urology, Ophthalmology, Immunology, Orthopedics, General Surgery and Rheumatology.

Table 1
Referral Characteristics (N = 7141)

Characteristic	N	%
Referral Site:	4242	59.4
• Mount Sinai Academic FHT	2899	40.6
• Sherman Health and Wellness		
Sex:	4501	63.0
• Female	2640	37.0
• Male		
Age Group of patient referrals (years)	410	5.7
• 0–19	2012	28.2
• 20–44	2428	34.0
• 45–64	2291	32.1
• 65+		
Urgency of Referral	4471	62.6
• Regular	296	4.1
• Urgent	2374	33.2
• Urgency Missing on Referral		
Year of referral	3343	46.8
• 2016	3798	53.2
• 2017		

Table 2
List of Specialties Referred to (N = 7141)

Specialty	Number of Referrals	%	Minimum	25th Pctl	Median	75th Pctl	Maximum
All Specialities	7141	100	1.0	22.0	42.0	80.0	760.0
Dermatology	1405	19.7	1.0	18.0	34.0	63.0	746.0
Gastroenterology	1040	14.6	1.0	21.0	41.0	82.0	616.0
ENT	673	9.4	2.0	21.0	35.0	64.0	561.0
Ob/Gyn	584	8.2	1.0	30.0	52.0	87.0	458.0
Urology	321	4.5	3.0	36.0	75.0	112.0	551.0
Ophthalmology	309	4.33	1.0	18.0	38.0	62.0	451.0
Immunology	288	4.0	3.0	35.0	70.0	111.5	213.0
Orthopaedics	269	3.8	1.0	15.0	37.0	71.0	760.0
General Surgery	241	3.4	1.0	16.0	41.0	71.0	323.0
Rheumatology	221	3.1	1.0	35.0	62.0	99.0	228.0
Neurology	209	2.9	1.0	31.0	51.0	100.0	407.0
Endocrinology	201	2.8	1.0	29.0	54.0	97.0	469.0
Cardiology	182	2.5	1.0	21.0	38.0	79.0	215.0
Plastic Surgery	175	2.5	1.0	37.0	59.0	100.0	259.0
Psychiatry	170	2.4	2.0	22.0	40.5	63.0	400.0
Sports Medicine	129	1.8	2.0	15.0	24.0	37.0	441.0
Hematology	92	1.3	3.0	26.5	56.5	97.5	237.0
Urogynecology	92	1.3	2.0	32.0	51.5	96.0	452.0
Sleep Clinic	87	1.2	2.0	22.0	46.0	88.0	400.0
Nephrology	73	1.0	3.0	16.0	22.0	52.0	388.0
Respirology	71	1.0	8.0	26.0	50.0	77.0	216.0
Vascular Surgery	56	0.6	5.0	23.5	48.0	76.5	161.0
Physiatry	48	0.7	1.0	53.0	70.0	100.5	219.0
Pediatrics	44	0.6	1.0	14.0	32.0	48.0	114.0

Note: %: percentage; 25th Pctl: 25th percentile; 75th Pctl: 75th percentile

Specialty	Number of Referrals	%	Minimum	25th Pctl	Median	75th Pctl	Maximum
Genetics	43	0.6	9.0	58.0	101.0	186.0	532.0
Geriatrics	21	0.3	8.0	24.0	42.0	55.0	399.0
Oncology	21	0.3	8.0	15.0	23.0	52.0	121.0
Internal Medicine	19	0.3	2.0	9.0	19.0	58.0	219.0
Pain Clinic	19	0.3	1.0	40.0	75.0	165.0	546.0
Neurosurgery	17	0.2	14.0	31.0	49.0	104.0	439.0
Hepatology	11	0.2	10.0	32.0	79.0	156.0	159.0
Infectious Disease	9	0.1	18.0	27.0	40.0	47.0	227.0
Palliative Care	1	0.01	21.0	21.0	21.0	21.0	21.0
Note: %: percentage; 25th Pctl: 25th percentile; 75th Pctl: 75th percentile							

The median wait time of all referrals was 42 days, 75% of patients were seen within 80 days and all patients were seen within 760 days. Almost 90% of patients saw the specialist within an 18 week benchmark, and 99.53% of referrals were seen within the year (Fig. 2).

Wait times differed slightly across age groups, with patients over age 65 years having a median wait time of 40 days, and patients age 0–19 years having a median wait time of 46 days. There was no difference in wait times by sex. Wait times for referrals marked as urgent had a shorter wait time compared to routine referrals: 13 days versus 43 days respectively. There was no change to wait times based on the season that a referral was made, nor practice year (2016 or 2017). Analysis of income level and material and social deprivation level for patients with an available postal code did not show any meaningful difference in wait times by income quintile before or after taxes, or by material or social deprivation.

Qualitative Analysis

We completed 2 family physician focus groups, one specialist focus group and two one-on-one specialist interviews, involving 6 specialists and 14 family physicians total. Socio-demographic surveys were completed by 17 of the 20 (85%) participants (Table 3). Thirteen of the 17 respondents (76%) were based at academic type practices, with years in practice varying from 4.5 to 21 years. Table 4 summarizes the information obtained from the focus groups and interviews organized by topic area discussed in the semi-structured interviews.

Table 3
Sociodemographic Information of Focus Group Participants

	MSH FPs	Vaughan FPs	MSH Specialists
# Attended Focus Group	10	4	6
# Completed Questionnaire	8	4	5
Gender	2	1	5
Male	6	3	0
Female			
Age (years)	25%	100%	20%
31–40	25%	0%	20%
41–50	50%	0%	60%
> 50			
# Years in Practice	23.8	4.5	14.2
Mean	4–38	3–6	4–25
Range			
Mean # Years at Current Location	21.1	4.0	14.0
Practice Type	7	1	5
Academic	0	3	0
Community	1	0	0
Combined			

Table 4
Feedback from Focus Groups and Interviews

	Family Physician Focus Groups	Specialist Focus Group
Relevance of Wait Time Reports	<p>⌘ High degree of relevance of wait time reporting is seen for local, regional and provincial administration bodies (department Chiefs, Hospital CEOs, Standards Committees, LHINs, Ministry of Health, HQO)</p> <p>⌘ Provincial wait time data would highlight inequality in Ontario which may lead to improvements/better system planning</p>	<p>⌘ Data may highlight the disconnect between self-reported wait times and reality</p> <p>⌘ Sub-specialization wait time data provides more detail of where bottlenecks may be</p>
Clinical Utility of Wait Time Reports	<p>⌘ Majority of PCPs perceive wait time data to have significant clinical utility</p> <ul style="list-style-type: none"> • e.g. Would increase PCP and patient specialist choices and could allow family physicians to: • choose specialist based on closest geographical convenience for patient • choose specialist with shortest wait times • help to manage patient expectations 	<p>⌘ Variable perceptions about the clinical utility of wait time data:</p> <p>Benefits</p> <ul style="list-style-type: none"> • could reveal inefficiencies which would allow for redistribution of resources for some specialties <p>Limitations</p> <p>Even if aware, specialists may not be able to change their practice or how they are booked (ie. surgeons are limited by how many surgeries they can perform per day)</p>
Acceptability of Wait Time Reports	<p>⌘ Public reporting of wait time data acceptable but PCPs recognize it could cause challenges such as patients wanting to choose a different specialist than recommended</p> <p>⌘ Setting benchmarks may be unrealistic and have challenges based on geography, sub-specialization, however were recognized as being important to establish a standard of care</p>	<p>⌘ Public reporting of wait time data acceptable but should include education for patients so the public better understands clinic variances</p> <p>Setting benchmarks seen by some as important for setting standards and improving healthcare systems, by others as challenging and not realistic</p>
Recommendations	<p>⌘ Create an interactive platform so PCPs can choose specialist based on own criteria (ie geography, affiliation, urgency) which may change case by case</p> <p>Access to reports should link to the EMR, easily accessed at point of care, have real time data, an option to opt out</p>	<p>⌘ Consider a randomization trial-releasing data to a few to see if this has impact on actual wait time</p> <p>Educate PCPs about what constitutes 'urgent' referrals as this impacts wait times</p>

Family physicians perceived that having wait time information would be useful when deciding upon which specialist to refer. Some physicians reported that in non-urgent cases, they would refer to their

preferred specialist- this was often based on familiarity or a prior good working relationship. However, referring a patient to a specialist with a shorter wait, particularly when patient quality of life was of concern was seen as important by most, for example if the patient was in pain or had elevated anxiety. The following comment exemplifies this:

"A non-urgent referral doesn't mean that it can wait a year to be seen. It just means they don't have to be seen tomorrow. But if they are having significant sinus symptoms, and I've done everything in my arsenal to help them, do they need to be seen tomorrow for sinus symptoms? No. But I also don't want them to wait 4 months to see somebody and suffer for 4 months needlessly if they could see somebody within 2 weeks. So that would be super helpful information in my opinion." (Family Physician)

Wait time information was viewed as an important piece of information for local, regional and provincial planning.

"I think it's amazing. It seems like this would be really useful to be out there both for like a [specialty named] association, for government, for LHINs [Local Health Integration Network]. I've never seen data like this. So I think it would be incredibly useful." (Specialist)

Wait time information could also provide a means for family physicians to learn of new specialists and manage patient expectations around waiting for the referral. Having easy access to data at the point of care was identified as important to family physicians (versus paper reports or an email with wait time information). Specialists had variable perceptions about the clinical utility of wait time data. The data could reveal system inefficiencies and allow for redistribution of referrals for some specialties. However, even if aware, specialists acknowledge they may not be able to change their practice or appointment booking processes.

"When you're looking at a process, it's either inefficient or it's a capacity problem. And at least from the [specialty named] side of things, there are some reasonable evidence based on a glance of the distribution that it's an inefficiency problem. So certain people are holding up the line, and certain people are not. And they're not being redistributed that way. But that's the way referrals have been made in Ontario for the last 200 years. And so that's why I think there's a lot more push now to create programs like a rapid assessment clinic. A lot of groups now are sort of first-come, first-serve, depending on individual practitioner wait times. And we're also starting to do that with surgery as well, at least within oncology. That in order to try and get down... Because in oncology, I have certain people who are holding up the line because we have a long wait list. And other people that have open OR times. So rather than asking for more resources, we're redistributing. So I guess the way I look at it is that it just confirms a lot of people's suspicion that within this is probably not a capacity issue right now, it's probably an inefficiency of distribution issue." (Specialist)

Focus groups and interviews furthermore highlighted that specialists may be unaware of their own actual wait times and levels of triaging referrals by specialist offices can vary widely. Specialists stated that sub-

specialist wait times would be another key piece of data for additional analysis to help determine where system bottlenecks may be.

Discussion

We conducted a mixed-methods study to evaluate the feasibility of producing primary to specialist care wait time reports from the EMR and conducted focus groups and interviews to determine the clinical utility of the wait time information. Primary care EMRs house valuable specialist wait time data, which has been an untapped resource in most jurisdictions. Interviews with family physicians and specialists demonstrated the relevance and clinical utility of wait-time related information, especially for family physicians.

Our top 10 list of specialties vary slightly from another Ontario study published in 2014 examining specialist wait times.² Our list includes obstetrics and gynecology, ophthalmology, and allergy/immunology in the top 10, whereas the other study includes mental health, cardiology and plastic surgery. Our study had a lower sample size of referrals, therefore our top 10 list of specialties would not reflect broader referral patterns, but was used to form the list of specialties when inviting physicians to the focus groups. There was no meaningful difference detected in wait times when comparing marginalized populations to high income populations, season referred, age or sex. Similar to the 2014 study, but using slightly different measures of socioeconomic status, specialist wait times in this study did not vary by patient income or social and material deprivation scales. It was reassuring to note that wait times were not impacted by a patient's income level in Canada's single payer system. In terms of the wait times themselves, the overall median wait time in this study was 42 days and the 75th percentile was 82 days. For the top 10 specialties considered, our results are similar to ranges seen in the 2014 study. Our range is 34–75 days for the median wait time compared to the median range 33–76 days in 2014, and 75th percentile of 62 to 112 days compared to 63 to 231.5 days in the 2014 study.² Interestingly, triaging does seem to happen on a system level with a median wait time that is 30 days less for urgent versus routine appointments. With approximately 94% of referrals being marked as “routine”, family physicians in these practices do not seem to be “overcalling” the urgency of the nature of the problem when making referrals to specialists, or do not use the option of marking the urgency of a referral.

Specialists and family physicians in this study highlighted that wait time reporting would enable primary care physicians to more comprehensively consider the factors when creating a referral. Such factors may include: (1) having the shortest wait time is most important to reduce suffering; (2) that geography is more important to a patient; or (3) it may be that seeing a specific specialist is most important, and a patient would be willing to wait longer for their consultation to see a particular specialist. Wait time data may also be useful for physicians newer to practice or those without a preferred specialist in mind to learn about specialists in the region. Additionally, combining referral data across practices/regions could lead to better local, regional and provincial specialist access information for human resource planning purposes. This could complement initiatives that may contribute to shortening specialist wait times

include virtual consults, physician directories and e-referral systems (i.e. province wide electronic health referral systems where wait times could be viewed and referrals could be tracked), pre-assessment in specialized clinics, and central intake.^{19,20} In 2008, the Edmonton North Primary Care Network (PCN) developed a provincial e-referral system, which includes a specialist database with information on specialist referral requirements, forms and protocols, and tracks wait times.²¹ A trend analysis of the referral wait time (defined as the time from referral by a family physician to an appointment date with a specialist) from 2009 to 2011 using the program database (n = 33,281 referrals) for 22 specialties showed a decrease in the overall wait time year over year.¹⁹

The United Kingdom's National Health Service (NHS) tracks wait times from the time a patient is referred to a specialist by the family doctor to the time the patient receives medical treatment from a specialist. The NHS has set a benchmark: 90–95% of patients should wait no longer than 18 weeks from the time at which they are referred to the time when they are treated.¹¹ In comparing our median wait time data with the NHS 18 week benchmarks it was interesting to note that about 90% of patients had a wait time within the 18 week target. Applying benchmarks could be another way to shift the needle on wait times. A first step is to be able to have access to the wait time information, which is presently not easily extractable and publicly available by most EMR vendors.

Limitations of the current study include a high degree of missing data such as postal codes and urgency of the referral, which were used to derive income quintiles, marginalization indices, and urgency of referral. The degree of missing data highlights the need to have these fields entered in a codifiable format in the EMR. The study also employed a small sample size (both in terms of unique patients and numbers of referrals) and only a single EMR. The same level of detailed referral data may not be available in all EMRs. The study setting focused on the Greater Toronto Area, and is likely not representative of wait times for a broader geography. The study also did not consider the time to make the referral in the first place (wait time 0), before it was sent to the specialist and the appointment was booked. However, the primary objective of the study was not to analyze the wait times themselves, but to explore the feasibility of extracting wait time data from the EMR and the clinical utility of the information for family physicians and specialists. The heterogeneity with which referral information is captured in primary care EMRs is a hurdle to scaling up wait time reporting to provincial/national levels. This study highlights important potential uses of wait time information for providers, patients and health regulators, and next steps would include the development of systems to more accurately collect and report this data. Centralized intake and e-referral services would enable more wide scale wait time reporting. Finally, the descriptive qualitative aspect of this research, never intended to reach saturation of all ideas related to wait time reporting, but rather act as a starting point to obtain information about how family physicians and specialists' view and value wait time information.

Conclusion

Wait time information is perceived as valuable information to family physicians and specialists. While there are challenges with scaling up the functionality of various EMRs to provide wait time data, this

study demonstrates that having access to specialist wait time information could aid provider and patient decision-making regarding specialist referrals, and potentially help with human resource planning and reduction of system bottlenecks. The use of technologies such as machine learning to code existing EMR data may improve the efficiency of their use in creating wait time reports. Future work can be directed towards developing primary care to specialist wait time reporting functionality through referral modalities such as e-referral systems. This way, family physicians and patients can make a more informed choice when considering the multitude of factors that go into the decision of which specialist to refer to.

Abbreviations

EMR
Electronic medical record
CPSO
College of Physicians and Surgeons of Ontario
UTOPIAN
University of Toronto Practice-based Research Network
PCN
Primary Care Network
NHS
National Health Service

Declarations

Ethics approval and consent to participate: Ethics approval was obtained from the Sinai Health Research Ethics Board in Toronto, Ontario (MSH REB #17-0356-E). Participants gave their verbal informed consent to participate in the study as described in the methods section of this paper, as was approved by the ethics committee. This research was conducted in accordance with the relevant guidelines and regulations as stated in the Declaration of Helsinki.

Consent for publication: Not applicable

Availability of data and materials: The datasets generated and/or analysed during the current study are not publicly available due to confidentiality but are available from the corresponding author on reasonable request.

Competing interests: The authors declare that they have no competing interests

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Authors' contributions. MN designed study, formed study team, coordinated meetings of team members, attended focus groups, drafted manuscript. NI, WM, CM, LJ, CB helped design study, reviewed qualitative survey tool, reviewed manuscript. CM, RM, BA data extraction, data analysis, manuscript review. TM led focus groups, qualitative analysis. JP: study coordination, data management, prepared wait time reports, data analysis, manuscript preparation and review. SK manuscript preparation and submission

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Figures

Figure 1

Wait Time Data Extraction Process

Figure 2

Wait Times Within 18 Weeks and Over 18 Weeks by Specialty

Supplementary Files

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- [AppendixFile1.pdf](#)
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