

Wait Time from Primary to Specialty Care: A Trend Analysis from Edmonton, Canada

Temps d'attente entre les services de première ligne et les soins d'un spécialiste : analyse de la tendance à Edmonton, Canada



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Abstract

Medical wait time is a top health policy issue in Canada. Reliable data on the referral wait time from primary to specialty care are limited. Existing data on referral wait times are generally self-reported by specialists. In 2008, the Edmonton North Primary Care Network (PCN) developed a Centralized Referral Program, including a specialist database that contains information on specialists' referral requirements, forms and protocols, and has the capability of tracking referrals that the PCN makes on behalf of its family physicians to specialty care. We performed 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). The study provided a unique and comprehensive picture of wait times for 22 specialties. We identified a decrease in the overall wait time year over year, and improvement in the number of referrals that are accepted the first time. Additionally, specific opportunities for further improvement in referral wait time were noted.

Résumé

Les temps d'attente pour les services médicaux constituent un des principaux enjeux de politique de santé au Canada. Il y a peu de données fiables sur le temps d'attente entre les services de première ligne et l'aiguillage vers les soins d'un spécialiste. Les données sur ces temps d'attente sont généralement signalées par les spécialistes eux-mêmes. En 2008, le réseau Edmonton North Primary Care Network (PCN) a mis au point un programme centralisé d'aiguillage, doté d'une base de données spécialisée qui contient des renseignements sur les conditions, les formulaires et les protocoles d'aiguillage vers les spécialistes. Cette base de données permet d'assurer le suivi des aiguillages que le PCN fait au nom des médecins de famille vers les soins de spécialistes. Nous avons effectué une analyse de la tendance des temps d'attente pour l'aiguillage (défini comme étant le temps entre la recommandation de la part du médecin de famille et la date de rendez-vous chez le spécialiste), de 2009 à 2011, à l'aide de la base de données du programme (n=33 281 aiguillages). L'étude brosse un portrait unique et complet des temps d'attente pour 22 spécialités. Nous avons observé un déclin, d'année en année, du temps général d'attente ainsi qu'une amélioration du nombre d'aiguillages qui sont acceptés dès la première fois. De plus, nous avons dégagé des occasions précises pour améliorer davantage le temps d'attente pour les aiguillages.

REFERRAL WAIT TIME REFERS TO THE WAIT TIME FROM REFERRAL BY A FAMILY physician (FP) to appointment/consultation with a specialist. According to Barua and colleagues (2010), the median referral wait time in Canada, across 12 specialties (plastic surgery, gynaecology, ophthalmology, otolaryngology, general surgery, neurosurgery, orthopaedic surgery, cardiovascular surgery, urology, internal medicine, radiation oncology and medical oncology) and 10 provinces surveyed was 8.9 weeks in 2010. The referral wait time varies greatly by province, with the shortest being reported in Saskatchewan (6.7 weeks) and the longest in New Brunswick (24.6 weeks). In Alberta, the median wait time was 9.9 weeks (or 69.3 days), and reducing wait times is one of the priorities identified in Alberta's Five-Year Health Action Plan (established by the Government of Alberta and Alberta Health Services in 2010).

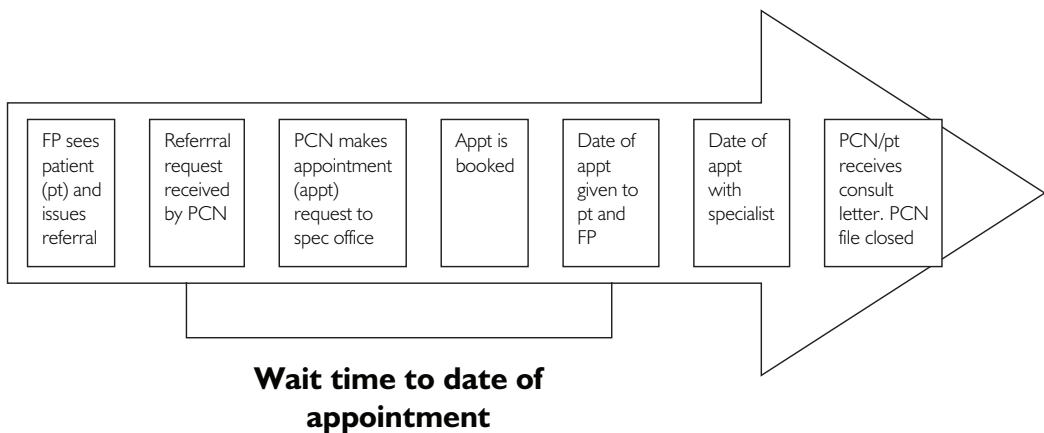
A primary care network (PCN) is an independent, stand-alone organization jointly owned by a group of FPs practising in a geographic area and Alberta Health Services. Formed by a trilateral agreement in 2003 among the Alberta Medical Association, Alberta Health and Alberta Health Services, Alberta's 40 PCNs are tasked with achieving five provincial objectives that include, among others, increasing the number of Albertans with access to primary care services and improving coordination of primary health services with other healthcare services including hospitals, long-term care and specialty care services (Primary Care Initiative 2012).

Edmonton North PCN, started in 2007, is one of the largest PCNs in the province both in terms of number of patients and number of member FPs. It is made up of 140 FPs working in over 45 clinics providing care to over 150,000 patients. The PCN employs over 90 staff to support the FPs in delivering primary care.

From its inception, improving links with specialists and reducing the referral wait time from family practice to specialty care has been a key priority for this PCN. The Centralized Referral Program, developed in 2008, maintains a customized specialist database with capacity for two data sets. The first involves a comprehensive list of over 800 specialists in and around Edmonton, including their referral requirements, forms and protocols. The second data set contains tracking information on the referrals the PCN makes on behalf of its participating FPs to specialists.

There are 6.8 full-time equivalent (FTE) coordinators who process referrals at the Edmonton North PCN. (Of note, PCN staff do not process urgent referrals as these are made directly by the FP.) The referral process involves seven milestones as shown in Figure 1. After receiving a referral request from the FP, PCN staff make an appointment request to the specialist office. If the referral is accepted by a specialist, the date of booking and date of appointment are noted. If a referral is declined, PCN staff continue to seek an appointment from subsequent specialists until an appointment is received. The advantages of the program are twofold in improving wait time. By tracking the wait time for each specialist, staff can refer patients to the one with the shortest wait list (unless the FP requests a certain specialist). Furthermore, PCN staff ensure that all forms and labs are completed and do relevant investigations to improve the quality and appropriateness of each referral, thus increasing the likelihood that the referral is accepted the first time.

FIGURE 1. Referral process at PCN



Anecdotal feedback on the program has been positive, and some other PCNs in the province are now using the Edmonton North PCN database; however, the impact of the Centralized Referral Program and its database has never been quantitatively reviewed. Partly to fill this gap, given the unavailability of both control data and baseline data, we performed a trend analysis of the referral wait time from 2009 to 2011 using data from the Edmonton North PCN database.

Methods

Because the referral wait time was calculated from the date of referral received by the PCN to the date of appointment with a specialist, referrals that had not yet received an appointment date were excluded from the study. We used both univariate and multivariate statistical techniques for describing and analyzing the referral wait time among referrals with an appointment date, in terms of mean, median, percentile 90% and percentage of referrals with a wait time of less than or equal to three months – a cut-off that was previously used by Carrière and Sanmartin (2010).

The univariate analysis was undertaken to describe the referral wait time by year (2009, 2010 and 2011) and by characteristics of patients (age and sex) and characteristics of referrals (seasons, referral modes, re-referrals and specialties). The multivariate analysis was used to compare the wait time in 2010 and 2011 to that of 2009, controlling for potential confounders, which were the characteristics of patients and the characteristics of referrals. We used a multiple linear regression for the mean, a multiple quantile regression for the median and for the percentile 90% (Hao and Naiman 2007), and a multiple logistic regression for the percentage of referrals with a wait time of less than or equal to three months.

In this study, male and female patients were categorized into three age groups representing children (0–18 years old), adults (19–64 years old) and seniors (65 years or older).

We grouped referrals with a referral date between February and April as spring, between May and July as summer, between August and October as fall, and between November and January as winter. Referral modes included telephone (where specialists accept referrals by telephone) or letter (where specialists do not make appointments over the telephone but first require a faxed letter). Re-referrals represented instances when a first referral is declined by the specialist, necessitating a subsequent referral to another specialist. Reasons for specialists' declining referrals included not accepting new patients, not assessing or treating the problem listed in the referral, failure to receive required laboratory findings, or the patient's having previously seen another doctor in the same specialty (and who thus should be referred back to that physician). Specialties refer to the medical specialties to which the patients were referred. We included 22 specialties and one "other" category, which comprised a number of specialties having a small number of referrals (this combination was for increasing the statistical power); all are listed in Table 3 (available online at longwoods.com/content/23375).

We used the 5% significance level and Stata MP 11.2 (StataCorp, College Station, Texas, USA) for data analyses.

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This study and the Centralized Referral Program were approved by the North Edmonton PCN board of directors, which provides overall approval, oversight and accountability for all PCN programs, including their management, evaluation and research.

Results

In total, 33,281 referrals with an appointment date were included for analysis. Of these, 33% were received by the PCN in 2009, 38% in 2010 and 29% in 2011. The reduced number of referrals in 2011 may be explained by the exclusion of incomplete referrals (those still pending an appointment at year end). The number of referrals also varied greatly across the characteristics of patients and referrals, and across specialties. For example, the most frequent age group, sex, season and referral mode was “19–64,” “female” (Table 1), “summer” and “letter” (Table 2), respectively. Re-referrals accounted for 10% of all referrals (Table 2). Regarding specialties, dermatology had the most (4,219 referrals, or 13%) and neurosurgery had the least (107 referrals, or 0.3%) number of referrals (Table 3 – available online at longwoods.com/content/23375).

TABLE 1. Referral wait time (days) by year and characteristics of patients

	Measures	Year			Total
		2009	2010	2011	
All referrals	N	10,919	12,742	9,620	33,281
	Mean	96	88	73	86
	Median	63	63	56	61
	p90	209	185	154	181
	% ≤3 months	66%	66%	71%	67%
Characteristics of patients					
Age groups					
0–18 years old	n	719	920	645	2,284
	Mean	93	95	74	89
	Median	65	71	55	63
	p90	181	202	168	187
	% ≤3 months	65%	60%	71%	64%
19–64 years old	n	7,834	9,097	6,864	23,795
	Mean	99	88	75	88
	Median	67	64	57	63
	p90	217	185	158	183
	% ≤3 months	65%	66%	70%	67%
65+ years old	n	2,366	2,725	2,111	7,202
	Mean	87	84	67	80
	Median	55	57	51	55
	p90	189	181	143	168
	% ≤3 months	71%	69%	75%	71%

TABLE 1. Continued

	Measures	Year			Total
		2009	2010	2011	
Characteristics of patients					
Sex					
Male	n	2,783	4,840	3,791	11,414
	Mean	94	88	72	84
	Median	63	63	55	60
	p90	202	187	153	174
	% ≤3 months	67%	64%	71%	67%
Female	n	4,953	7,498	5,444	17,895
	Mean	103	87	74	87
	Median	69	63	57	62
	p90	227	185	156	184
	% ≤3 months	63%	67%	71%	67%
Unknown sex	n	3,183	404	385	3,972
	Mean	88	86	69	86
	Median	57	65	51	57
	p90	185	169	144	180
	% ≤3 months	69%	69%	74%	70%

Tables 1, 2 and 3 show descriptive statistics of the wait time by year and by characteristics of patients, characteristics of referrals and specialties. For all referrals and years, the wait time mean, median and percentile 90% were 86 days, 61 days and 181 days, respectively. Referrals with a wait time of less than or equal to three months accounted for 67% of all referrals (Table 1).

The trend of wait times showed improvement over time. From 2009 to 2011, the mean decreased from 96 days to 73 days, median from 63 days to 56 days, percentile 90% from 209 days to 154 days and the percentage of referrals with a wait time of less than or equal to three months increased from 66% to 71% (Table 1). The trend of improvement seemed to be consistent among characteristics of patients and referrals, but varied greatly by specialties. For example, the generally positive trend was reversed in the specialties of allergy and clinical immunology, otolaryngology and rheumatology. Between 2009 and 2011 in allergy and clinical immunology, the mean increased from 79 days to 181 days, median from 48 days to 180 days, percentile 90% from 113 days to 276 days and the percentage of referrals with a wait time of less than or equal to three months decreased from 89% to 7%. The corresponding changes in otolaryngology were mean from 71 days to 94 days, median from 37 days to 84 days, percentile 90% from 155 days to 188 days and the percentage of referrals with a wait time of less than or equal to three months from 74% to 53%. In rheumatology, the trend was reversed for mean (from 78 days to 82 days), median (from 73 days to 78 days) and the percentage of referrals with a wait time of less than or equal to three months (from 72% to 57%), but percentile 90% dropped (from 148 days to 136 days) (Table 3 – available online at longwoods.com/content/23375).

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TABLE 2. Referral wait time (days) by year and characteristics of referrals

Characteristics of referrals	Measures	Year			Total
		2009	2010	2011	
Season/months					
Spring (Feb–Apr)	n	2,572	3,196	2,835	8,603
	Mean	94	90	79	88
	Median	57	61	59	59
	p90	209	199	174	192
	% ≤3 months	68%	67%	68%	68%
Summer (May–Jul)	n	2,928	3,223	2,731	8,882
	Mean	104	92	80	92
	Median	68	69	63	67
	p91	229	192	162	189
	% ≤3 months	61%	63%	65%	63%
Fall (Aug–Oct)	n	2,818	3,185	2,215	8,218
	Mean	93	85	66	82
	Median	64.5	63	54	61
	p92	189	181	129	166
	% ≤3 months	68%	66%	76%	69%
Winter (Nov–Jan)	n	2,601	3,138	1,839	7,578
	Mean	93	83	63	82
	Median	63	62	45	57
	p93	205	165	141	168
	% ≤3 months	67%	68%	79%	70%
Modes of referrals					
Phone	n	3,561	3,446	2,964	9,971
	Mean	70	63	66	66
	Median	50	46	49	48
	p90	134	127	149	138
	% ≤3 months	77%	78%	74%	77%
Letter	n	7,114	8,991	6,583	22,688
	Mean	109	97	76	95
	Median	71	71	58	67
	p90	237	201	158	198
	% ≤3 months	61%	61%	70%	64%
Unknown mode	n	244	305	73	622
	Mean	105	80	74	89
	Median	77	48	68	62
	p90	217	204	143	200
	% ≤3 months	56%	68%	66%	63%
Re-referrals					
No	n	9,646	11,366	8,801	29,813
	Mean	82	80	70	78
	Median	58	58	54	56
	p90	170	165	148	161
	% ≤3 months	70%	69%	73%	71%
Yes	n	1,273	1,376	819	3,468
	Mean	203	150	106	159
	Median	145	118	90	118
	p90	468	309	204	332
	% ≤3 months	31%	38%	51%	38%

Table 4 (viewable online at longwoods.com/content/23375) shows results from multiple regressions on the wait time. Controlling for characteristics of patients, referrals and specialties, the regressions show an improvement in the wait time over time. Compared to 2009, the mean (median; percentile 90%) of wait time was reduced by 11 days (2 days; 18 days) in 2010 and by 21 days (7 days; 27 days) in 2011. All the differences were statistically significant. The odd ratios of the logistic regression indicated that compared to 2009, the percentage of referrals with a wait time of less than or equal to three months increased by 6% in 2010 and by 23% in 2011. However, only the difference between 2009 and 2011 was significant.

Regarding patient characteristics, there was a significant difference in wait time between men and women. However, the “unknown sex” group, which accounted for 12% of the sample, may bias this association. Compared to patients aged 19–64 years, patients aged 18 years or younger (referred to all specialties) had a significantly longer wait time, while patients aged 65 years or older had a significantly shorter wait time.

On average, referrals in summer had 4 days', 11 days' and 12 days' longer wait time than those in spring, fall and winter, respectively. This variance is likely explained by the summer vacation season.

Patients who needed to be re-referred waited 68 days longer than those whose initial referrals were accepted. Patients referred to specialists who required letters before an appointment could be made had to wait 23 days longer than those whose doctors accepted appointments over the telephone. These patterns held true for median and percentile 90% of the wait time and true for the percentage of referrals with a wait time of less than or equal to three months. All the differences were statistically significant.

The wait time varied substantially among specialties. Compared to paediatrics, the shortest wait time mean specialty (of note, only 54% of children aged 18 years or younger were referred to paediatricians), all other specialties had a significantly longer wait time and a significantly lower percentage of referrals with a wait time of less than or equal to three months. The exceptions were cardiology, dermatology and respirology for percentile 90%, and dermatology and respirology for the percentage.

Discussion

The main finding of this study is the trend of improvement in referral wait time from 2009 to 2011 at the Edmonton North PCN. It is possible that the Centralized Referral Program – by tracking and maintaining specialist data, striving to ensure referrals are accepted the first time and referring patients to specialists with shorter wait lists – has had a positive impact. However, this attribution is weakened by the absence of control data. During the study time period, some specialties in Edmonton implemented a number of strategies and activities to reduce their wait times (Alberta Health Services 2010, 2011), and it is possible these also had a positive impact on the wait time. In order to confirm whether the Centralized Referral Program has had a positive impact on wait times, control data are required.

In terms of related data, Alberta has a wait time registry where Albertans interested in treatment options can view wait time information (including trends over time) on medical procedures and diagnostic tests and then discuss their choices with their healthcare provider (Alberta Health and Wellness and Alberta Health Services 2012). However, the registry defines wait time as the interval between a patient's or specialist's decision that a procedure or test is required and the date the procedure or test is performed. Because this is different from the definition in the current study, outcomes cannot be directly compared. Another source of data showing the trend over time of referral wait times is the series of reports titled *Waiting Your Turn: Wait Times for Health Care in Canada* by the Fraser Institute (Barua et al. 2010, 2011). By surveying practitioners of 12 specialties, the reports show that the median referral wait times in Alberta in 2009, 2010 and 2011 were 10.0, 9.9 and 10.7 weeks, respectively. Compared to this self-reported trend, our results favour the Centralized Referral Program.

Several findings from this study have policy implications. First, the referral wait time and its trend over time vary substantially by specialty. More investigation is warranted to understand these differences and resolve any bottlenecks, especially for specialties with a long wait time and those with the reverse trend. Second, patients have to wait for more than two months longer if they need to be re-referred, suggesting that efforts to improve referral appropriateness, such as those attempted through the Centralized Referral Program, are warranted. Third, patients have to wait considerably longer if a specialist requires a letter of referral before a booking is made rather than making an appointment over the telephone (with a letter to follow). Simply eliminating this one step in the booking process could result in reducing wait times by over three weeks.

A limitation regarding the data that needs to be acknowledged is that, as the data were extracted in early January 2012, the referrals received by Edmonton North PCN in late 2011, or referrals in 2011 that needed a long time to receive an appointment date, were not included in the analysis (that is, only completed referrals were included). Such exclusions may bias the wait time results in 2011. However, the wait time improvement from 2009 to 2010 is unlikely to be biased. One may also argue that the wait time improvement between 2009 and 2011 is due to the reduction in the volume of referrals. However, this seems unlikely as there was also an improvement of the wait time between 2009 and 2010, when the volume increased. Finally, the wait time from the date on which a FP sees the patient and issues a referral to the date on which the PCN receives the referral was not available for this analysis.

In conclusion, this study demonstrates the potential value in tracking referral information from primary to specialty care. While there is not enough evidence to attribute the improvements directly to the Centralized Referral Program, the study findings are encouraging and further investigation, preferably through a controlled study, is recommended. Referral wait time from primary to specialty care is an immensely complex issue, and substantive improvement will likely require focused system-level attention. However, this study suggests that change is possible and that further improvements can be made.

Acknowledgements

We would like to thank Lindsay Steward, Physician Administrative Services Manager, and Carly Strong, Executive Assistant at the Edmonton North PCN, for their input and assistance, as well as Nate Schmold and Katherine Thielmann, data management specialists at Lexi.net, for extracting the data.

Funding from the Edmonton North PCN for this independent, external study is gratefully acknowledged.

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References

- Alberta Health Services. 2011. 2011–2015 *Health Plan*. Retrieved April 13, 2013. <<http://www.albertahealthservices.ca/Publications/ahs-pub-2011-2015-health-plan.pdf>>.
- Alberta Health and Wellness and Alberta Health Services. 2012. "Alberta Wait Times Reporting, Wait Time Trends." Retrieved April 13, 2013. <<http://waittimes.alberta.ca/>>.
- Barua, B., M. Rovere and B.J. Skinner. 2010. *Waiting Your Turn: Wait Times for Health Care in Canada* (20th ed.). Retrieved April 13, 2013. <<http://www.fraserinstitute.org/uploadedFiles/fraser-ca/Content/research-news/research/publications/waiting-your-turn-2010.pdf>>.
- Barua, B., M. Rovere and B.J. Skinner. 2011. *Waiting Your Turn: Wait Times for Health Care in Canada* (21st ed.). Retrieved April 13, 2013. <<http://www.fraserinstitute.org/uploadedFiles/fraser-ca/Content/research-news/research/publications/waiting-your-turn-2011.pdf>>.
- Carrière, G. and C. Sanmartin. 2010. "Waiting Time for Medical Specialist Consultations in Canada, 2007." *Health Reports* 21(2): 1–8. Statistics Canada Catalogue no. 82-003-XPE.
- Government of Alberta and Alberta Health Services. 2010. "Becoming the Best: Alberta's 5-Year Health Action Plan 2010–2015." Retrieved April 13, 2013. <<http://www.health.alberta.ca/documents/Becoming-the-Best-2010.pdf>>.
- Hao, L. and D.Q. Naiman. 2007. *Quantile Regression*. Quantitative Applications in the Social Sciences Series 149. Thousand Oaks, CA: Sage Publications.
- Primary Care Initiative. 2012. "About PCNs." Retrieved April 13, 2013. <<http://www.albertapci.ca/AboutPCNs/Pages/default.aspx>>.

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TABLE 3. Referral wait time (days) by year and specialties

Specialties	Measures	Year			Total
		2009	2010	2011	
Allergy & Clinical Immunology	n	328	456	225	1,009
	Mean	79	107	181	114
	Median	48	98	180	87
	p90	113	200	276	229
	% ≤3 months	89%	45%	7%	51%
Cardiology	n	438	492	359	1,289
	Mean	64	60	53	60
	Median	47	43	46	45
	p90	126	114	96	112
	% ≤3 months	84%	84%	89%	85%
Dermatology	n	1,261	1,546	1,412	4,219
	Mean	62	46	39	48
	Median	53	33	27	36
	p90	104	92	86	95
	% ≤3 months	83%	90%	91%	88%
Gastroenterology	n	664	788	567	2,019
	Mean	183	131	91	137
	Median	135	105	78	104
	p90	419	271	178	279
	% ≤3 months	33%	43%	59%	44%
General Surgery	n	1,151	1,300	934	3,385
	Mean	101	71	57	77
	Median	64	56	49	55
	p90	220	126	102	142
	% ≤3 months	64%	80%	87%	77%
Internal Medicine	n	431	525	480	1,436
	Mean	71	70	58	66
	Median	49	48	50	49
	p90	151	149	118	133
	% ≤3 months	78%	74%	79%	77%
Neurosurgery	n	28	56	23	107
	Mean	175	158	79	146
	Median	114	108	68	98
	p90	400	322	190	318
	% ≤3 months	43%	43%	70%	49%
Neurology	n	567	692	531	1,790
	Mean	73	93	97	88
	Median	71	85	97	81
	p90	132	161	183	161
	% ≤3 months	68%	53%	49%	57%
Nephrology	n	87	104	80	271
	Mean	91	89	86	89
	Median	86	83	90	84
	p90	147	138	135	138
	% ≤3 months	55%	61%	51%	56%
Obstetrics and Gynaecology	n	1,044	1,304	1,010	3,358
	Mean	106	92	77	92
	Median	82	69	63	69
	p90	202	199	143	189
	% ≤3 months	55%	66%	74%	65%
Ophthalmology	n	495	514	491	1,500
	Mean	50	58	54	54
	Median	43	41	42	42
	p90	99	109	116	107
	% ≤3 months	86%	83%	83%	84%
Orthopaedics	n	1,046	912	385	2,343
	Mean	122	150	116	132
	Median	91	138	106	108
	p90	243	296	215	252
	% ≤3 months	50%	33%	42%	42%
Otolaryngology/ENT	n	929	928	727	2,584
	Mean	71	74	94	79
	Median	37	48	84	55
	p90	155	155	188	163
	% ≤3 months	74%	70%	53%	67%
Paediatrics	N	135	152	157	444
	Mean	53	63	44	53
	Median	37	44	30	37
	p90	120	118	91	108
	% ≤3 months	80%	79%	90%	83%
Physical Medicine & Rehab	n	182	119	52	353
	Mean	152	158	80	143
	Median	114	121	61	107
	p90	344	335	146	319
	% ≤3 months	43%	36%	67%	45%
Plastic Surgery	n	310	333	287	930
	Mean	170	104	87	121
	Median	88	90	78	84
	p90	442	208	155	274
	% ≤3 months	51%	51%	58%	53%
Psychiatry	n	127	217	132	476
	Mean	122	87	86	96
	Median	95	70	63	73
	p90	206	191	168	198
	% ≤3 months	48%	66%	70%	62%
Respirology	n	144	199	151	494
	Mean	68	68	61	66
	Median	53	60	58	56
	p90	111	103	98	101
	% ≤3 months	85%	81%	89%	85%
Rheumatology	n	288	434	357	1,079
	Mean	78	71	82	77
	Median	73	61	78	69
	p90	148	123	136	138
	% ≤3 months	72%	78%	57%	69%
Specialty Clinics	n	498	643	369	1,510
	Mean	129	106	48	100
	Median	79	63	38	54
	p90	334	302	90	276
	% ≤3 months	53%	63%	90%	66%
Urology	n	455	658	579	1,692
	Mean	81	100	98	94
	Median	57	96	83	76
	p90	173	173	189	181
	% ≤3 months	75%	49%	55%	58%
Vascular Surgery	n	54	63	47	164
	Mean	112	138	73	110
	Median	90	140	52	90
	p90	234	261	186	228
	% ≤3 months	52%	37%	70%	51%
Other Specialties	n	257	307	265	829
	Mean	89	88	53	77
	Median	57	50	37	46
	p90	215	202	111	179
	% ≤3 months	64%	67%	84%	72%

Wait Time from Primary to Specialty Care: A Trend Analysis from Edmonton, Canada

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TABLE 4. Results from the multiple regressions on referral wait time

Independent variables	Linear regression for mean		Quantile regression for median		Quantile regression for p90		Logistic regression for % ≤ 3 months	
	Coef.	p-value	Coef.	p-value	Coef.	p-value	OR	p-value
2009 for reference								
2010	-11	0.000	-2	0.001	-18	0.000	1.06	0.084
2011	-21	0.000	-7	0.000	-27	0.000	1.23	0.000
Male for reference								
Female	2	0.048	1	.036	4	0.035	0.99	0.615
Sex unknown	-7	0.000	-3	0.001	-5	0.112	1.19	0.000
Age group 19–64 for reference								
Age 0–18	12	0.000	12	0.000	16	0.000	0.66	0.000
Age 65+	-4	0.000	-4	0.000	-2	0.334	1.18	0.000
Summer for reference								
Spring	-4	0.000	-8	0.000	-7	0.002	1.31	0.000
Fall	-11	0.000	-7	0.000	-18	0.000	1.43	0.000
Winter	-12	0.000	-10	0.000	-18	0.000	1.51	0.000
One-time referrals for reference								
Re-referrals	68	0.000	47	0.000	148	0.000	0.30	0.000
Phone for reference								
Letter	23	0.000	16	0.000	28	0.000	0.57	0.000
Mode unknown	18	0.000	11	0.000	29	0.000	0.56	0.000
Paediatrics for reference								
Allergy & Clinical Immunology	70	0.000	59	0.000	126	0.000	0.14	0.000
Cardiology	19	0.000	22	0.000	9	0.319	0.70	0.030
Dermatology	15	0.001	16	0.000	5	0.543	0.84	0.240
Gastroenterology	76	0.000	66	0.000	123	0.000	0.13	0.000
General Surgery	29	0.000	30	0.000	24	0.004	0.48	0.000
Internal Medicine	29	0.000	25	0.000	45	0.000	0.39	0.000
Neurosurgery	87	0.000	67	0.000	148	0.000	0.16	0.000
Neurology	52	0.000	56	0.000	75	0.000	0.14	0.000
Nephrology	46	0.000	60	0.000	34	0.005	0.16	0.000
Obstetrics & Gynaecology	45	0.000	42	0.000	72	0.000	0.26	0.000
Ophthalmology	22	0.000	23	0.000	18	0.043	0.55	0.000
Orthopaedics	77	0.000	76	0.000	118	0.000	0.11	0.000
Otolaryngology/ENT	32	0.000	27	0.000	48	0.000	0.28	0.000
Physical Medicine & Rehab	88	0.000	71	0.000	180	0.000	0.12	0.000
Plastic Surgery	87	0.000	66	0.000	160	0.000	0.11	0.000
Psychiatry	44	0.000	40	0.000	70	0.000	0.27	0.000
Respirology	22	0.000	31	0.000	-2	0.849	0.76	0.147
Rheumatology	35	0.000	44	0.000	33	0.000	0.29	0.000
Specialty Clinics	55	0.000	29	0.000	139	0.000	0.26	0.000
Urology	66	0.000	62	0.000	100	0.000	0.12	0.000
Vascular Surgery	68	0.000	66	0.000	112	0.000	0.13	0.000
Other Specialties	29	0.000	18	0.000	45	0.000	0.40	0.000