CURRENT ONCOLOGY
A Canadian Cancer Research Journal

ORIGINAL ARTICLE

Making molehills out of a mountain: experience with a new scheduling strategy to diminish workload variations in response to increased treatment demands

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ABSTRACT

Purpose A new scheduling strategy was implemented. Before implementation, treatments and planning computed tomography (CT) imaging were both scheduled at the same time. Maximal wait times for treatment are defined by the Quebec Ministry of Health's plan of action according to treatment aim and site. After implementation, patients requiring rapid treatment (priorities 0–3) continued to have their treatments scheduled at the same time as their planning CT; treatments for priority 4 (P4) patients were scheduled only after the treatment plan was approved. That approach aims to compensate for unexpected increases in planning workload by relocating less delay-sensitive cases to other time slots. We evaluated the impact on the patient experience, workload in various sectors, the care team's perception of care delivery, access to care, and the department's efficiency in terms of hours worked per treatment delivered.

Methods Three periods were defined for analysis: the pre-transitional phase, for baseline evaluation; the transitional phase, during which there was an overlap in the way patients were being scheduled; and the post-transitional phase. Wait times were calculated from the date that patients were ready to treat to the date of their first treatment. Surveys were distributed to pre- and post-transitional phase patients. Care team members were asked to complete a survey evaluating their perception of how the change affected workload and patient care. Operational data were analyzed.

Results We observed a 24% increase in the number of treatments delivered in the post-transitional phase. Before implementation, priority 0–3 patients waited a mean of 7.9 days to begin treatments ($n = 241$); afterward, they waited 6.3 days ($n = 340$, $p = 0.006$). Before implementation, P4 patients waited a mean 15.1 days ($n = 233$); after implementation, they waited 16.1 days ($n = 368$, $p = 0.22$). Surveys showed that patients felt that the time it took to inform them of treatment appointments was acceptable in both phases. No significant change in overtime hours occurred in dosimetry ($p = 0.7476$) or globally ($p = 0.4285$) despite the increased number of treatments. However, departmental efficiency improved by 16% ($p = 0.0001$).

Conclusions This new scheduling strategy for P4 cases resulted in improved access to care for priority 0–3 patients. Departmental efficiency was improved, and overtime hours did not increase. Patient satisfaction remained high.

Key Words Scheduling, treatments, efficiency, satisfaction, workflow, optimization, delays

Curr Oncol. 2016 Aug;23(4):e369-e376 www.current-oncology.com

INTRODUCTION

Our centre is currently operating 4 linear accelerators and a brachytherapy unit. Approximately 1740 patients are treated each year. Treatment demand and the costs of cancer treatment are rising in Quebec[1] and in North America[2]. In the context of an increased influx of patients, of the need to maximize resources, and of our commitment to maintaining rapid access to care, a novel approach to delivering cancer care was required. One

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such approach was to innovate with a more effective method to schedule patients.

Maximal wait times for treatment are defined by the Quebec Ministry of Health's action plan[3]. Data about the relationship between wait times in radiotherapy and clinical outcomes have been published[4–10] and are used to attribute a priority to each pathology. Patients attending our centre are scheduled according to the following categories: priorities 0–2 (P0–2) represent patients whose palliative and urgent treatments should be initiated within 3 days of the patients being ready to treat[11]. Priority 3 (P3) refers to patients who should begin treatment within 2 weeks (for example, curative therapy for lung and digestive tract), and priority 4 (P4) patients are those who should begin within 28 days (for example, therapy for prostate or breast)[12]. Table I provides a complete list of treatment indications and the corresponding delays deemed acceptable by our centre.

Beyond the delay thresholds, we adhere to the ASARA principle: wait times should be "as short as reasonably achievable"[13] to minimize delays that could produce significant clinical deterioration. In addition to the importance of wait times to treatment outcomes, research demonstrates that shorter delays make for reduced stress levels and increased satisfaction for patients[14,15]. A recent study in breast cancer patients for whom treatment included radiotherapy showed that stress levels in patients were highest between simulation CT and first treatment[16].

Treatment planning is a multi-step process that involves many interdependent care team members who must coordinate their interventions in an efficient and effective fashion. The task of scheduling patients with various treatment lengths and complexities is an imposing one when related aims to minimize wait times and maximize the use of human and technical resources are added. A significant challenge is the unpredictable arrival of urgent cases that must be rapidly introduced into the treatment schedule—even though, if resources are to be maximally scheduled at all times, those resources should already be at full capacity. Complex data-processing algorithms have been proposed[17–21] and might eventually be integrated into applications to optimize scheduling. For the time being, the daily decision-making process is the responsibility of clerical staff, who have to weigh the potential of double bookings against the impact of wasting precious time slots. Furthermore, dosimetry therapists face surges in workload with the addition of urgent treatment plans to the constant workflow associated with patients whose treatments have already been scheduled. On the one hand, there is the pressure to prepare treatments for urgent patients as rapidly as possible; on the other, there is the constraint of avoiding delays that would cause another patient to be rescheduled.

Given that context, we strived to create a scheduling procedure that would allow for the best possible access to and delivery of quality evidence-based care and that would reduce workload variations. We determined that one possible strategy would be to schedule less delay-sensitive cases in the time slots remaining after treatments for higher priority patients were scheduled. That strategy is contrary to the common approach of scheduling treatments as soon as possible after consultation, without knowledge of how many urgent cases will have to be integrated into the schedule at a later time; however, it aims to allow for more agile and efficient management of the workflow in the department. We evaluated the impact of implementing that strategy on access to care, the patient experience, the care team's perception of the care they deliver, and the department's efficiency.

METHODS

Before the project was initiated, our approach to scheduling was to determine every patient's entire treatment schedule at the date of their planning CT imaging. The project introduced an approach in which patients requiring rapid treatment (P0–3) continued to be scheduled for treatments at the time of their CT planning, but treatments for P4 patients were scheduled only after the treatment plan was approved.

Three analysis periods were chosen: The pre-transitional stage spanned 6 January 2014 to 12 May 2014 and included a baseline analysis of efficiency in which we measured the number of hours that were worked globally for each treatment delivered. Accessibility of treatment was assessed using the wait time between the ready-to-treat date and the onset of treatment. The new system was implemented on 12 May 2014, and the transition phase lasted until 30 June 2014, during which the two scheduling approaches overlapped. The post-transitional phase spanned 30 June to 15 December 2014, during which time only the new scheduling approach was in use.

Patients deemed to have sufficient literacy and health status were asked to complete surveys evaluating their experience with the care they received, both in the pre-transitional and the post-transitional phases. Questionnaires were distributed by the therapists and were completed anonymously and privately by patients in their last week of treatment. The P0–3 and P4 questionnaires were analyzed separately. Patients were not informed that there would be or had been a change in the way that P4 patients were scheduled.

Care team members were asked to complete an anonymous survey evaluating their expectations of how the procedural change would affect their workload, patient care, and departmental operations. Members were given a questionnaire before and after implementation of the new approach to scheduling. Pre-transitional surveys were used to anticipate problems and dissatisfactions that could arise; post-transitional surveys were used for an impact analysis and to generate the discussions presented in this article.

Operational data from 5 January to 13 December 2014 were extracted from the MOSAIQ information system (version 2.41: Elekta, Stockholm, Sweden); all patients who had CT imaging appointments during that period were included. All data pertaining to the continuum of care, from the date of ready-to-treat status to treatment onset were analyzed. Data concerning clinic personnel work hours were obtained from the Espresso GRH-Paie system (version 4.3.0.22: Logibec, Montreal, QC) for the same time period. Statistical analyses were performed using the IBM SPSS Statistics software application (version 22.0 for Windows: IBM, Armonk, NY, U.S.A.) in collaboration with a third-party consulting firm specializing in health care change management and evaluation.

TABLE I Priority classification for consultation and treatment initiation, by treatment indication

Clinical situation or diagnosis	Priority	Delay for consultation	Delay for Tx once patient is medically ready
Cord compression	0	Immediate	Immediate
Cauda equina syndrome Symptomatic nerve root compression Superior vena cava syndrome Hemorrhagic syndrome (bladder, bronchus, cervix, etc.)	1	1 day	1 day
Brain metastasis Symptomatic bone metastasis Bronchus, visceral, or vascular compression[a] All other palliative cases	2	3 days	3 days
All cases in which tumour is in place[b] Breast with neoadjuvant chemotherapy Preoperative radiotherapy Hodgkin disease Non-Hodgkin lymphoma Brain tumour Seminoma Inflammatory breast cancer All head-and-neck malignancies (adjuvant or otherwise) Vulvar cancer (adjuvant or otherwise) Cervical cancer (adjuvant or otherwise) Inoperable endometrial cancer	3	7 days	14 days
Prostate cancer Skin cancer Adjuvant postoperative treatments (unless otherwise stated above) Prophylactic whole brain irradiation Splenic irradiation	4	14 days	28 days

[a] Excluding superior vena cava syndrome.
[b] Excluding prostate cancer and skin tumours.
Tx = treatment.

Working hours in the P0–3 and P4 categories were pooled to generate a mean for each of the pre- and post-intervention periods, both for working hours and for overtime hours, in each of the functional areas. Standard deviations and p values were calculated to determine if any changes experienced as a result of the introduction of the intervention were statistically significant.

The implementation of the strategy was an organizational change deemed necessary by the department. Data were collected to ensure objective analysis of the process and to facilitate future organizational decisions. The intervention therefore did not constitute a clinical trial, and no approval by an ethics committee was required. Patient consent was therefore not sought, although questionnaire participation was, of course, optional.

RESULTS

Access to Care and Efficiency

In the pre-transitional phase, an average of 449.4 radiation treatments were delivered weekly. In the post-transitional phase, treatment volume increased 24%, to an average of 558.5 treatments weekly. P4 patients represented 49% of pre-transitional patients and 52% of post-transitional patients. Because our primary concern is appropriate and timely access to care, we measured delays between the time that patients were ready to treat and the time of treatment onset. A statistically significant improvement was observed in P0–3 wait time for treatment ($p = 0.006$). Before implementation of the new scheduling procedure, those patients waited a mean 7.9 days ($n = 241$); after implementation, they waited 6.3 days ($n = 340$). The P4 patients waited a mean of 15.1 days before implementation ($n = 233$), and 16.1 days after ($n = 368$); that difference was not statistically significant ($p = 0.22$). For P4 patients, the wait from the date their plan was approved to the date of first treatment increased (to 6.9 from 4.7 days, $p = 0.0001$), as did the wait from the date that they were ready-to-treat to the date that they were imaged for planning (to 8.6 from 6.2 days, $p < 0.0001$).

In Table II, we report work hours in relation to the number of treatments delivered. Notably, no change in

TABLE II Hours worked per treatment delivered, by sector

Variable	Measured value (*n*)	
	Before transition	After transition
Weeks	18	24
Dosimetry work hours		
Mean	3.18±1.42	3.60±0.68
p Value	0.221	
Dosimetry overtime hours		
Mean	0.14±0.11	0.13±0.09
p Value	0.7476	
CT imaging work hours		
Mean	3.61±0.86	3.81±1.52
p Value	0.6195	
CT imaging overtime hours		
Mean	0.12±0.08	0.11±0.07
p Value	0.6688	
Treatment work hours		
Mean	1.09±0.20	0.89±0.05
p Value	<0.0001	
Treatment overtime hours		
Mean	0.01±0.01	0.02±0.02
p Value	0.0591	
Global work hours		
Mean	2.58±0.40	2.17±0.14
p Value	<0.0001	
Global overtime hours		
Mean	0.04±0.02	0.05±0.05
p Value	0.4285	

CT = computed tomography.

overtime hours per treatment delivered was observed, either globally or in the surveyed discipline segments individually: dosimetry, planning CT imaging, and treatment rooms. However, we did observe a significant reduction in total hours worked globally: 2.17 hours per treatment delivered after implementation compared with 2.58 before, corresponding to a 16% increase in efficiency ($p < 0.0001$).

Patient Satisfaction

Questionnaire completion rates were 49% in the pre-transitional phase and 58% in the post-transitional phase. Table III presents patient characteristics. The new scheduling strategy was applied to all P4 patients unless a strict schedule restriction had to be respected, such as a need for adapted transportation. Of all P4 patients, 16 (4.35%) received the full schedule of their treatments at time of CT planning for such reasons.

Table IV presents the before-and-after patient survey responses. When asked whether they felt that the members of the health care team were concerned about their transportation needs during radiotherapy, 66% of patients surveyed before implementation agreed. In the post-transition surveys, that number increased to 91% for both P0–3 and P4 patients. When asked whether the members of the care team considered patient preferences when scheduling treatments, a positive response was given by 85% of pre-transition patients and by 97% of post-transition patients (both priority groups combined); of post-transition P4 patients, 94% gave a positive response. Patients indicated feeling that all parts of their care, including scheduled visits, clinic time, treatments, and lab tests were well coordinated. They generally felt that the time it took to inform them of their treatment appointments was acceptable. Post-transitional P4 patients, who were to be notified of treatment onset 48 hours in advance, agreed in 91% of surveys that the notification delay was acceptable. Notably, the 48-hour rule to inform patients was not respected in 23% of P4 cases.

TABLE III Characteristics of respondents to patient survey

Characteristic	Value [*n* (%)]	
	Before transition	After transition
Respondents	71	72
Female sex	41 (58)	47 (65)
>60 Years	46 (65)	44 (62)
Priority 4 condition	42 (59)	39 (54)

Personnel survey response rates were 79% before implementation and 81% after. Table V presents the characteristics of the respondents. Participants were asked to voice their level of agreement with a number of statements, with each item being measured using a 1–5 Likert scale (1, complete disagreement; 5, complete agreement), and answers were compiled to generate an average agreement score (AAS) out of 5. The therapists assigned to simulation (AAS 4) and those assigned to treatment delivery (AAS 3.6) had the impression that their workload had increased after implementation. Dosimetry therapists reported a subjective increase in the efficacy of the trial scheduling strategy (AAS 3.6). Clinical therapists (AAS 3.5), physicists (AAS 3.3), and dosimetry therapists (AAS 3.4) felt that the change diminished overtime hours. Dosimetry therapists (AAS 3.6) and physicists (AAS 3.5) reported a positive impact on their work, but most other responder groups disagreed. Therapists assigned to simulation were most strongly in disagreement (AAS 1.5). Without access to operational data, 50% of the responders estimated that the new scheduling method had improved overall access to care, and 20% expected that access had worsened. Improved departmental performance was estimated by 40%; another 34% responded that they were uncertain of performance outcomes.

A large group of respondents to the care team survey expressed concern that the new scheduling process would negatively affect patient satisfaction with the quality of care. When asked whether the project would increase quality of care, 40% of responders believed that it would not. Similarly, 48% felt that the strategy did not respect patient needs when it came to scheduling. Among those who felt that there had been a negative effect, several reported that they sensed an increase in anxiety among the P4 patients, because those individuals did not know when they would start treatment. When asked whether the delay in informing patients of their appointments was acceptable, 32% of care team members said that it was not. When asked whether the current scheduling strategy

TABLE IV Results from patient satisfaction questionnaire, priority 0–3 and priority 4 patients pooled

Statement	Responses (%)					
	Before transition			After transition		
	Agree	Neutral	Disagree	Agree	Neutral	Disagree
The way my doctor and I communicate about my care meets my needs	98	1	1	97	0	3
I feel my care providers have sufficient knowledge about my treatment to ensure I receive the best possible care	99	1	0	97	0	3
I feel my care providers have the necessary information to make decisions about my care	98	1	1	97	0	3
I feel my care providers are knowledgeable and are able to help me	99	0	1	97	0	3
All parts of my care including scheduled visits, clinic time, treatment, and lab tests have been well coordinated	100	0	0	98	0	2
All members of my health care team respect my needs	99	0	1	98	0	2
I feel that the members of my health care team care about my transportation needs for my radiation treatments	66	34	0	91	7	2
It is important to me to have my radiation treatments at the same time every day	86	11	3	83	9	8
The time it takes to inform me of my radiation treatment appointments is acceptable	100	0	0	95	3	2
Members of the care team consider my preferences when scheduling my radiation treatment	85	14	1	97	2	1
I appreciate receiving the full schedule of my treatments	97	3	0	96	1	3
Administrative and clerical staff are helpful	97	0	3	97	0	3

TABLE V Roles of responders to personnel survey

Role	Value [*n* (%)]	
	Before transition	After transition
All respondents	49 (79)	50 (81)
Clerks	2	3
Nurses	2	5
Clinical technologists	1	2
Planning technologists	5	4
Dosimetrists	4	5
Treatment technologists	15	12
Technologists with multiple roles	3	2
Physicists	7	6
Radio-oncologists	8	8
Other	2	3

should be maintained, 52% answered yes, and 44% would have preferred to revert to the previous method.

DISCUSSION

Our centre experienced an improvement in overall efficiency, with fewer work hours needed per treatment. One possible explanation is that treatment slots were better managed, leading to a reduction in workload variation and an attenuation of wasted personnel time.

A computer simulation performed in collaboration with the engineering school Polytechnique Montréal considered the scheduling of dosimetry tasks and treatment times in accordance with our pre- and post-transition practice, the other task delays being fixed. The simulation obtained an average P0–3 waiting time of 5.9 days before transition and 5.7 days after. In our real-life evaluation of the strategy, it could always be argued that care team members simply recognized the increased demands and worked harder to maintain access to care. For that reason, it is interesting that the simulated environment, which is not subject to personnel mindset and motivation, also demonstrated improved results with implementation of the proposed strategy.

As for overtime hours worked in our centre, they remained stable per number of treatments. Could the overtime hours be improved? An interesting article by Sauré and colleagues[18] proposes a computer algorithm, developed in collaboration with our team, that integrates overtime costs into the calculation of optimal scheduling decisions in a radiation oncology department and takes into account necessary treatment delays. A simulation of that algorithm was used to generate treatment delays, which were then compared with the delays obtained with our post-transition approach. The algorithm outperformed the approximated current practice in terms of initiating treatments within the determined delays; however, it showed a trend for increased overtime utilization. We thought it interesting to compare the simulated results with our own results after application of the new scheduling strategy. The fact that our concrete application of the new method within a running department yielded comparable results in terms of improved treatment delays, but without the increased overtime hours, is satisfactory.

Our objective to improve access to care for P0–3 patients was reached, with a statistically significant 21% decrease in waiting time despite more numerous patient referrals. That result was achieved without significant lengthening of P4 delays and reflects better management of the treatment time slots by prioritizing P0–3 patients and relocating the less time-sensitive P4 patients so as to minimize empty slots. Had the new approach not been used, treatment slots would most likely have been saturated and P0–3 patients would have needed to be double-booked to respect the prescribed treatment delays, thus most likely increasing overtime hours. The only way to avoid that outcome would have been to reserve a predetermined number of slots to the P0–3 patients—slots that might not have been consistently filled, resulting in suboptimal use of resources.

Although the change in scheduling strategy was implemented in anticipation of a higher influx of patients, the ideal context in which to conduct this experiment would have been one in which the post-transitional and pre-transitional phases were comparable in terms of activity, which was not the case in our centre, where a 24% increase in the number of treatments delivered occurred. Although operational data can be mathematically adjusted to reflect the added load, it is clear that patient and personnel satisfaction are affected in a way that cannot be quantified. It is hard to interpret the impact of the scheduling change independently of the increased influx. For example, had the scheduling method remained exactly the same, post-transitional personnel surveys would most likely have revealed some sense of added workload and difficulty in scheduling patients according to their preferences simply because of a larger number of patients to be treated. Furthermore, although calculating work hours allows us to estimate efficiency, changes in personnel cannot be taken into account. Leaves of absence and training of new members affect efficiency and, again, cannot be objectively quantified and observed independently from the impact of scheduling. That being said, such complex and dynamic variations constitute the environment within which any health care management change must take place, and that environment is the only one in which such change can truly be put to the test.

In the context of increased activity, it was reassuring to see that patient satisfaction remained high. The percentage of patients who deemed their notice time adequate decreased slightly, but perhaps that variable can be improved with a more stringent application of the 48-hour rule for P4 patients. We noted improvement in the perception by patients that their scheduling preferences were being taken into consideration, even in the P4 patient subset, whose members we would expect to be harder to accommodate. A plausible way to explain that result is that, through increased concern for patient needs, and by screening P4 patients for constraints that would exclude them from the cohort subjected to the new scheduling method, personnel asked more questions about such issues and conveyed concern to the patients. Perhaps the perception that the care team listened to their needs was enough for those patients to feel that their needs were being considered, even if their specific scheduling demands could not be met. An analysis reported by Famiglietti and colleagues[14] quantified the effect of several factors on patient satisfaction during radiotherapy. Satisfaction with patient–provider relationships had the greatest influence, and treatment delays adequately explained by the therapy team were more strongly correlated with satisfaction than were actual wait times.

On a different note, it could be argued that post-transitional surveys cannot be compared with pre-transitional survey data because the patients were different. That argument is legitimate, but obviously cannot be addressed given the study design. We did identify some patients who had been treated twice, once before the project was initiated and once post-implementation, but their numbers were too small to draw any meaningful conclusions. Although we cannot quantify the effect of the scheduling change on patient satisfaction for the reasons already stated, it is safe to conclude that patient satisfaction remained high and was not negatively affected by the change.

Survey responses from personnel varied by discipline. Dosimetry therapists felt that the new system increased their efficiency, reduced their overtime hours, and affected their work positively. That finding is consistent with our expectations, because it was among those individuals that we first identified a need for change and aimed to reduce workload variations. Although operational data analysis did not show a reduction in overtime hours in relation to the number of treatments, dosimetrists no longer had to dedicate their overtime hours to planning P4 cases that, while not deemed medically necessary for immediate attention, had been scheduled and became time-sensitive for managerial reasons. Overtime hours worked might perhaps have been interpreted as more efficiently spent or perhaps subjectively better distributed. As for the care team members who felt that their workload had increased (notably simulation and treatment therapists), several hypotheses can be considered. The first obvious factor is the increase in treatment demand, as already discussed. However, another key point was raised during interdisciplinary project meetings: when a patient's schedule is established, his or her treatment plan and medical file are prepared for use in the assigned treatment room. That preparation is the responsibility of the treatment therapist, who executes the task throughout the day, when time is available. Previously, P4 cases had been scheduled many days before treatment onset, providing ample time to complete the task. However, because the new scheduling strategy increased the number of patients whose files had to be prepared just 48 hours before onset, and because even that shorter delay was not respected in many cases, therapists were faced with more frequent last-minute preparations. Also, fewer empty treatment slots during which to work on this task were available. Again, we believe that this issue will be improved through stricter application of the 48-hour rule. Another key issue that will require monitoring as we go forward with this method is whether it increases the occurrence of errors.

With respect to the perception by care team members about the care they provided, a third of respondents expected a negative impact on overall patient satisfaction or unacceptably short notification delays. The perception of negative patient satisfaction was not reflected in the patient survey data, but it does raise some questions. Are those concerns simply reflections of the personal opinions of care team members (because they were aware of the previous method of scheduling), or do their answers reflect patient reactions and comments during their treatments? Did the patients express more anxiety and dissatisfaction to care team members than was reported in the surveys?

Once all of the foregoing results had been presented to the department and discussed, it was decided that the new scheduling method would be maintained. As a result, we are aiming to identify potential areas of improvement. We are emphasizing the importance of the 48-hour minimum period between scheduling and treatment onset to reduce patient stress and to give them time to prepare, but also to ensure sufficient time for treatment preparation and to reduce the risk of error. In that regard, Kapur and colleagues[22,23] reported an analysis of incident reports and the safety initiatives implemented for prevention. They describe a phenomenon of upstream delays (for example, in contouring) not translating into delay of treatment onset, but instead causing downstream tasks (such as quality assurance and medical record completion and verification) to be executed in a rushed and error-prone fashion. That negative outcome motivated implementation of a "no-fly" process, extending the treatment date proactively to restore downstream timelines, which, in conjunction with other strategies, lowered the error rate. Their analysis demonstrates the necessity for sufficient delay for treatment preparation. We will also aim to better educate P4 patients about acceptable treatment delays and consider giving them specific window periods for treatment onset, so as to reduce stress between simulation and the moment when they receive their schedule. We also think that it is possible to reduce the time between the point at which patients are medically ready and when they are imaged, so that they can be ready to integrate their schedule sooner.

CONCLUSIONS

A new scheduling strategy for P4 cases was implemented at our centre. As a result, access to care was improved for P0–3 patients and maintained for P4 patients despite increased patient influx. Departmental efficiency was improved, and overtime hours did not increase despite the greater number of treatments taking place with comparable human resources. Patient satisfaction remained high and seemed unaffected by the new strategy. Potential routes of improvement include better implementation of the 48-hour delay between scheduling and treatment onset, earlier imaging of P4 patients, and better patient education about the process and acceptable delay times.

CONFLICT OF INTEREST DISCLOSURES

We have read and understood *Current Oncology*'s policy on disclosing conflicts of interest, and we declare the following interests: co-authors FA and JP received compensation from Elekta Canada as consultants to collaborate with our institute to design, implement, analyze, and report on a study of the impact of an oncology information system on practice performance. The specific intervention reported in this paper (prioritization scheduling system) will not result in any commercial product or value to the co-authors. The remaining authors have no interests to declare.

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