The Development of Clinical Pharmacy Key Performance Indicators for Ambulatory Oncology: An Environmental Scan of the Canadian Practice Landscape

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Abstract

Background: Canadian clinical pharmacy key performance indicators (cpKPIs) have been developed for inpatient hospital practice but have yet to be established for ambulatory oncology. This study is the first step of the development process to establish ambulatory oncology cpKPIs.

Objectives: To describe the current landscape of pharmacy services in outpatient oncology, and identify barriers surrounding the development and implementation of cpKPIs in this practice setting.

Methods: In this national cross-sectional study, a web-based questionnaire was distributed to the Canadian Association of Pharmacy in Oncology membership group. Participants who self-identified as practicing in an outpatient oncology setting were eligible. Survey questions focused on participants' demographics, oncology pharmacy services provided, captured metrics and pharmacists' perceptions of cpKPIs. All data were analyzed using descriptive statistics.

Results: A total of 44 responses were received, with the majority of respondents practicing in community hospitals in British Columbia, Ontario and Atlantic Canada. The services most commonly provided were: chemotherapy order verification, laboratory monitoring, identification and resolution of drug therapy problems, and counselling on cancer medications. Twenty-six of 44 (59%) respondents indicated that performance metrics or patient outcomes are tracked at their institution, with none being universally captured. Overall, 98% of respondents favoured the development of cpKPIs for ambulatory oncology practice.

Conclusions: Despite growing patient care needs in ambulatory oncology, there is significant heterogeneity in the pharmacy services being provided in this setting across Canada, and how their impact is being assessed. This study demonstrates a clear need for national consensus cpKPIs to inform pharmacy resource utilization, and patient-care quality improvement initiatives.

Keywords: clinical pharmacy key performance indicator, key performance indicator, ambulatory oncology, oncology pharmacy, outpatient oncology, Canada

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Introduction

Clinical pharmacy key performance indicators (cpKPIs) are quantitative measures of quality; they reflect pharmacy practice activities associated with evidence-based improvements in meaningful patient outcomes.(1,2) Using standardized metrics such as cpKPIs are valuable for a number of reasons but ultimately can measure progress towards minimum practice standards, demonstrate the value of pharmacy services and justify resource allocation. They also allow for comparison within and between institutions and identify opportunities for improvement and advancement, with the goal of ensuring all patients are receiving the highest quality healthcare.

In 2015, the Canadian Society for Hospital Pharmacy (CSHP) published a Canadian consensus guideline, which detailed eight cpKPIs that relate to inpatient hospital pharmacy.(1) However, these metrics are not generalizable to activities performed in an ambulatory pharmacy setting, which can vary significantly from inpatient care. In fact, very few international cpKPIs exist for ambulatory pharmacy, and to our knowledge, there are none established for oncology pharmacy practice.(3,4)

Over recent years, oncology pharmacy practice has evolved towards a more specialized and patient-centred focus, in order to meet the increasing patient care needs that have resulted from the growth of complex anticancer therapies, multiple lines of therapy and increased overall survival.(5–7) Oncology pharmacists have become important members of multidisciplinary care teams and their contributions to optimizing drug therapy have had meaningful impacts on patient outcomes.(8–22) They are involved in routine direct patient care activities such as medication reconciliation, but also participate in services such as clinical trials, which indirectly impact patient care.(6,8,19) Given the wide spectrum of toxicities with

anticancer therapies, oncology pharmacists also play a critical role in patient education, preventing drug interactions, monitoring for adverse effects, and adjusting supportive medications.(8,17,23–26)

In parallel to these advancements, there has been a notable shift towards providing cancer treatments in outpatient clinics and within the community.(8) This has created opportunities for clinical pharmacy services within ambulatory oncology. For example, these pharmacists may also be involved in formal follow-up programs and adherence assessments.(5,11,21,27,28) Nonetheless, the pharmacists' role in ambulatory oncology remains largely undefined within and across organizations. Without benchmarks or metrics to capture the impact of pharmaceutical care activities, the evolution of this practice area has lacked a guiding direction. To ensure continued practice advancement that will translate to improved quality of care for oncology patients across Canada, it is imperative to define appropriate objective indicators.(7) Thus there exists a need to determine consensus of what constitutes a cpKPI for ambulatory oncology pharmacy.

Before cpKPIs can be established in this practice setting, it is crucial to first understand the current practice landscape in Canada. This study's primary objective was to describe what ambulatory oncology pharmacy services are being provided across Canada and how their impact is currently being assessed. A secondary objective was to describe oncology pharmacists' perceptions surrounding the development, implementation, and evaluation of cpKPIs in this practice setting. It was anticipated that the results of this study would identify gaps in ambulatory oncology pharmacists' services, demonstrate a need for standardized metrics and help inform future steps for developing candidate cpKPIs.

Methods

An anonymous, online, cross-sectional survey was distributed via email to 650 oncology pharmacists in Canada from March to September 2020. This study was reviewed and approved by University of Waterloo Research Ethics Committee (ORE#41716).

Participants

The target survey population consisted of pharmacists in Canada providing care for patients with malignant disease in an outpatient setting. This definition included pharmacists in an outpatient healthcare institution or specialty community pharmacy. The survey was distributed to all members of the Canadian Association of Pharmacy in Oncology (CAPhO), a national organization of oncology pharmacy practitioners. Participants self-identified as meeting the above inclusion criteria and provided informed consent before beginning the survey. Exclusion criteria included any pharmacists solely working in an inpatient oncology practice and incomplete survey responses.

Survey questionnaire

An online questionnaire was created based on the study objectives and was informed by relevant publications that investigated pharmacist interventions in ambulatory oncology. The survey collected demographic information about the participants (e.g., years in oncology practice, practice site setting/province, oncology sub-specialties, amount of direct oncology patient care), as well as pharmacy oncology services provided, and details of the metrics captured by either individual pharmacists or their institution. Participants were asked to

identify how often they provided listed patient care activities according to a 4-point Likert scale (ranging from “never” to “often”). Lastly, participants were asked to provide feedback regarding the development and implementation of ambulatory oncology cpKPIs. The survey questionnaire was piloted for content validity, comprehensiveness, and clarity by five oncology pharmacists in the study working group. These five pharmacists were excluded from participating in the survey.

Data collection

The survey was conducted using Qualtrics Research Core software, version 05-09/2020 (Copyright© 2020, https://www.qualtrics.com). An invitation detailing the purpose and participation in the study was distributed through CAPhO’s website, social media page and e-newsletter, as well as via personal communication with pharmacists in the field. Responses to the survey were voluntary and no compensation or other incentives were offered. Participants could withdraw from the survey at any time before their responses were submitted. Respondents were assured that all information was anonymous and no individual could be identified from the results. Two email reminders were sent out during the survey distribution period – one month into survey collection and one month before the last day of the survey.

Statistical analysis

All data were synthesized and presented as descriptive statistics including frequencies, means and standard deviations.

Results

A total of 44 ambulatory oncology pharmacists self-identified as meeting the study inclusion criteria and completed the survey. The demographics and practice characteristics of these pharmacists are presented in Table 1. Survey responses were received from nine provinces; however, the majority of respondents practiced in British Columbia, Ontario or Atlantic Canada. On average, respondents had been practicing in oncology care for 10 years, ranging from 0.5 to 30 years. Most respondents worked in community hospitals, with 27% working in a university-affiliated teaching hospital, and 10% working in specialty oncology pharmacies or government organizations such as BC Cancer. The majority (65%) of respondents reported they spend more than half of their day on direct oncology patient care services and just over 50% report they see 10 to 50 cancer patients per week in a direct patient care setting.

Pharmacist Services

Figure 2 details the direct and indirect patient care activities performed by respondents. Twenty of 44 respondents (45%) reported that their institution currently has a formal pharmacist-led monitoring program for oncology patients, with the follow-up duration varying considerably from one cycle to all treatment cycles. The direct patient services most commonly provided by the oncology pharmacists included: chemotherapy order verification, laboratory monitoring, identification and resolution of drug therapy problems, and counselling on new oncology prescriptions. In contrast, the services provided the least often included: pain management, follow-up call-backs, collaborative prescribing, and drug access coordination.

Similar trends were observed when stratified by the amount of time respondents spent on direct patient care (Table 2).

With respect to indirect patient care activities, 23% to 43% of pharmacists reported they were “sometimes” or “often” involved in activities such as drug-use evaluation, clinical trials or practice-based research (Figure 2). However, a number of additional activities were recognized by survey respondents, such as education of pharmacy learners and other healthcare providers, protocol development, and participation in hospital committee work such as formulary management and software programming. When stratified by the amount of time spent on direct patient care, oncology pharmacists who had less time for direct patient care were also less likely to be involved with indirect patient care services (Table 2).

Pharmacy Performance Metrics and Outcome Measures

Fifty-nine per cent of respondents stated that either they or their department currently track pharmacy performance metrics or statistics related to patient outcomes. Of the institutions that do track, half collect data longitudinally across multiple clinic visits. Metrics were more often captured via the pharmacy department; however a handful of pharmacists report that they personally track outcome measures (Figure 3). No metric was universally captured; metrics most often collected included time spent on patient care visit and phone calls, pharmacist intervention rate, serious adverse events, and medication error rate. One respondent reported that both they and their institution track CSHP’s national consensus cpKPIs. The use of an electronic documentation system (55%) and self-reporting (27%) were the most common

methods to capture this information; patient surveys (16%) and Microsoft Excel (2%) were less utilized.

Pharmacists' Perceptions of Key Performance Indicators for Outpatient Oncology

Overall, 98% of respondents would favour the development of cpKPIs for ambulatory oncology. Respondents reported that cpKPIs were an opportunity to set practice standards across institutions, facilitate training of new staff, provide a tool to demonstrate the value of clinical pharmacy activities and enable negotiations with management for increased staffing. Reported barriers were fairly consistent across responses – common themes included the lack of time and staffing to implement and document cpKPIs, difficulties with accurately capturing metrics across different electronic systems, lack of evidence in the literature to support clinical pharmacy activities in ambulatory oncology, and challenges in achieving consensus within and across provinces and institutions. Respondents also reported a number of enablers that could help to overcome these challenges, such as the use of technology and expanding the role of registered pharmacy technicians.(29) Furthermore, several respondents mentioned the strong network that exists within oncology pharmacy in Canada, which is supported by a national organization (i.e., CaPhO) and could assist with value messaging and pharmacist buy-in.

Discussion

To our knowledge, this is the first study that attempted to describe pharmacist services provided in ambulatory oncology and identify how these activities are being assessed. Our study captured pharmacists' perspectives from nearly all provinces in Canada and across a

variety of ambulatory oncology practice settings – from hospitals to specialty community pharmacies.

Overall, the activities performed by pharmacists in this practice setting were quite heterogeneous, which was recognized by survey respondents as a potential barrier to the cpKPI development process. Nonetheless, pharmacists appeared to be involved in a core group of activities – namely chemotherapy order verification, laboratory monitoring, identification and resolution of drug therapy problems, and counselling on new oncology prescriptions. A recent systematic review reported that the largest benefit of pharmacist activities in outpatient oncology was the improvement in medication safety.(8) It is therefore reassuring that the majority of respondents were heavily involved in activities that contribute to this outcome, such as identification and resolution of drug therapy problems. The provision of patient education has also previously been reported as a key intervention by pharmacists in ambulatory oncology.(9,30–32) This intervention significantly decreases symptoms related to cancer, reduces adverse events, and leads to improvement in patient quality of life.(9) Pharmacist-led patient education is a valued service, as evidenced by its inclusion as a consensus cpKPI in other practice settings.(3,4,33) Laboratory monitoring was another core activity identified in our survey; however, surprisingly there is a lack of literature to draw any conclusions about the overall effectiveness of this service. For example, a recent systematic review found that only one of its eight included studies reported laboratory monitoring as an established pharmacy service for oncology outpatients.(19)

Less than half (45%) of the respondents report that their institution has a formal pharmacist-led monitoring program and even fewer report they are often involved in toxicity

assessments. This is comparable to a previous study conducted in Atlantic Canada, which found fewer than 60% of practice sites had a follow-up service facilitated by the pharmacy department.(5) This presents an opportunity for expanded pharmacy services, as these programs have been shown to reduce treatment-related adverse effects and are effective at identifying drug therapy problems.(5,11,21,23,34) Given an increasing number of patients are taking oral cancer therapies at home, the assessment of medication adherence also becomes increasingly important. Pharmacist involvement in such assessments have been shown to improve patient outcomes; however without formal follow-up programs in place, this intervention is less likely to be conducted or meaningfully assessed.(8,10,19,27,28)

This study identified that symptom control with supportive medications was a commonly performed activity by outpatient oncology pharmacists in Canada. This intervention has consistently been associated with positive impacts on patient symptoms scores, including improvements in nausea, emesis, constipation and pain scores. Pain management in particular was the service provided the least by survey respondents, with 43% of pharmacists either rarely or never involved in this activity. This is a surprising finding given the available evidence, and also when we compare to prior pharmacy-based research that found pain scores to be the second most common patient-related outcome measure.(8,9)

In a recent U.S-based study, a Delphi expert panel was used to identify the clinical services that board-certified oncology pharmacists most frequently perform.(31) Similar to our study, pharmacists were highly involved in adjusting chemotherapy, patient education, and managing adverse events. Interestingly, the Delphi panel also identified pharmacist involvement in pain management, and toxicity assessments, which does not align with the

results of our study. Unfortunately, this Delphi panel study does not appear to incorporate literature or patient outcomes to help guide their consensus activities and thus may not represent evidence-informed practice.

Our results identified that pharmacy performance metrics are only captured by approximately half of the surveyed institutions. Clinical outcomes were most often evaluated indirectly through the use of pharmacist intervention rate, whereas direct clinical outcomes (e.g., symptom scores) were less commonly captured. Metrics pertaining to patient safety was a dominant theme, with two of the most common metrics being serious adverse events and medication error rate. This is not surprising as medication safety is a key and valuable role that pharmacists are regularly involved in – one which forms the basis for many pharmacist interventions. In fact, a systematic review concluded that the largest benefit of ambulatory clinical pharmacy services was just that – the improvement in medication safety.[4] The time spent on patient care visits was also commonly collected, which likely pertains to pharmacy resource allocation. It is unclear exactly how these metrics are utilized in practice by pharmacy management or organizations, as this was outside the scope of this study.

There was practically unanimous support from survey respondents for the development of cpKPIs. They recognized that in order to make a compelling case to management for increased pharmacy staffing, it is imperative to demonstrate that pharmacy services have significant value on patient outcomes. Unfortunately, we found that high-quality evidence to support this case is very limited and future practice-based research is likely needed to bridge some of these evidence gaps.(9) There were relatively few published studies that focused on outpatient oncology pharmacy and much of the literature was single-centre observational

studies with small sample sizes. Many of the studies described outpatient pharmacy services but lacked control groups, specific medication-related outcomes or sufficient details of the pharmacy interventions – all of which make it more difficult to draw conclusions about which services are associated with improved patient outcomes.

A commonly cited barrier to cpKPI implementation was staff shortages and lack of time to take on additional responsibilities. This is supported by our results, with 15 of 44 (36%) reporting they already spend less than half of their day on direct patient activities. As noted earlier, this subgroup of pharmacists were also less involved in indirect patient care activities. Since the list of services on the survey questionnaire is by no means exhaustive, this likely reinforces the extent of administrative responsibilities not captured in the survey that ambulatory oncology pharmacists can be heavily involved in. Based on these reported concerns, pharmacists will likely place value on cpKPIs that are practical to implement and efficient to measure. Further, although respondents reported they were challenged by workload and documentation, they provided a number of suggestions and insights to overcome barriers associated with the development and implementation of cpKPIs. For example, the increased use of electronic reporting platforms may also help facilitate ease-of-use and feasibility of cpKPI tracking.

Limitations & Future Directions

This study does have limitations that should be highlighted. First, the number of survey responses was low. The study was conducted during the COVID-19 pandemic and did not provide incentives, which may have negatively impacted study participation. We were also

unable to calculate a true survey response rate, because CAPhO membership also includes pharmacists working in an inpatient setting and pharmacy learners. These pharmacists would have been excluded from the study, and thus we could not accurately determine the total number of eligible participants who received the survey. Moreover, since not all ambulatory oncology pharmacists are CAPhO members, there is likely an underrepresentation of pharmacists working in a specialty pharmacy setting.

Additionally, this data was primarily driven by a few select provinces. It is therefore challenging to state whether these results are generalizable to all Canadian pharmacists working in ambulatory oncology. More extensive subgroup analyses were limited by the relatively small sample size of this study and would be exploratory in nature. As such, we are unable to describe variation in workload or allocation of pharmacy resources across institutions and provinces. Similarly, we could not confidently determine workplace factors that may be impacting pharmacists' activities or contributing to reported cpKPI barriers.

To address these limitations and move forward with the cpKPI development process, the next phases of this research are currently underway, which include structured interviews and focus group discussions with both pharmacy management and front-line pharmacists. Given the aforementioned barriers to cpKPIs, it will also be valuable to engage previous members of the CSHP cpKPI project to gather insights around successes and opportunities for process improvement. Ultimately, the results of this survey will help inform the question development for future Delphi panel surveys.

Conclusion

In conclusion, these survey results suggest there is significant heterogeneity in the services that pharmacists provide to oncology outpatients across Canada. Similarly, a wide range of metrics and patient outcomes are being captured by only a limited number of institutions. This study demonstrates a clear need, and end-user interest in national consensus cpKPIs within this practice setting. However, further practice-based research is likely needed to fill evidence gaps and inform their development.

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References

1. Fernandes O, Gorman SK, Slavik RS, Semchuk WM, Shalansky S, Bussières JF, et al. Development of Clinical Pharmacy Key Performance Indicators for Hospital Pharmacists Using a Modified Delphi Approach. Ann Pharmacother [Internet]. 2015;49(6):656–69. Available from: https://doi.org/10.1177/1060028015577445
2. Lo E, Rainkie D, Semchuk WM, Gorman SK, Toombs K, Slavik RS, et al. Measurement of clinical pharmacy key performance indicators to focus and improve your hospital

pharmacy practice. Can J Hosp Pharm. 2016;69(2):149–55.

3. Shawahna R. Development of key performance indicators to capture in measuring the impact of pharmacists in caring for patients with epilepsy in primary healthcare: A Delphi consensual study. Epilepsy Behav [Internet]. 2019;98:129–38. Available from: https://doi.org/10.1016/j.yebeh.2019.07.034

4. Lima T de M, Aguiar PM, Storpirtis S. Development and validation of key performance indicators for medication management services provided for outpatients. Res Soc Adm Pharm [Internet]. 2019;15(9):1080–7. Available from: https://doi.org/10.1016/j.sapharm.2018.09.010

5. Edwards S, Abbott R, Dranitsaris G. Patient monitoring programs in oncology pharmacy practice: A survey of oncology pharmacists in Atlantic Canada. J Oncol Pharm Pract [Internet]. 2019;25(4):891–5. Available from: https://doi.org/10.1177/1078155218790801

6. Holle LM, Michaud LB. Oncology pharmacists in health care delivery: Vital members of the Cancer Care Team. J Oncol Pract. 2014;10(3):e142–5.

7. Schmidt L, Klink C, Iglar A, Sharpe N. Implementation of performance metrics to assess pharmacists' activities in ambulatory care clinics. Am J Heal Pharm AJHP Off J Am Soc Heal Pharm. 2017 Jan;74(1):e76–82.

8. Maleki S, Alexander M, Fua T, Liu C, Rischin D, Lingaratnam S. A systematic review of the impact of outpatient clinical pharmacy services on medication-related outcomes in patients receiving anticancer therapies. J Oncol Pharm Pract [Internet]. 2019;25(1):130–9. Available from: https://doi.org/10.1177/1078155218783814

9. Colombo LRP, Aguiar PM, Lima TM, Storpirtis S. The effects of pharmacist interventions on adult outpatients with cancer: A systematic review. J Clin Pharm Ther. 2017;42(4):414–24.

10. Parsons LB, Edwards K, Perez A, Letton C, Bondarenka C. Positive Outcomes Associated with a Pharmacist-Driven Oral Chemotherapy Program. J Hematol Oncol Pharm [Internet]. 2015;5(4):99–108. Available from: www.JHOPonline.com

11. Patel JM, Holle LM, Clement JM, Bunz T, Niemann C, Chamberlin KW. Impact of a pharmacist-led oral chemotherapy-monitoring program in patients with metastatic castrate-resistant prostate cancer. J Oncol Pharm Pract. 2016;22(6):777–83.

12. Randolph LA, Walker CK, Nguyen AT, Zachariah SR. Impact of pharmacist interventions on cost avoidance in an ambulatory cancer center. J Oncol Pharm Pract. 2018;24(1):3–8.

13. Ribed A, Romero-Jiménez RM, Escudero-Vilaplana V, Iglesias-Peinado I, Herranz-Alonso A, Codina C, et al. Pharmaceutical care program for onco-hematologic outpatients: safety, efficiency and patient satisfaction. Int J Clin Pharm. 2016;38(2):280–8.

14. Wong SF, Bounthavong M, Nguyen CP, Chen T. Outcome assessments and cost avoidance of an oral chemotherapy management clinic. JNCCN J Natl Compr Cancer Netw. 2016;14(3):279–85.

15. Ruder AD, Smith DL, Madsen MT, Kass FH. Is there a benefit to having a clinical oncology pharmacist on staff at a community oncology clinic? J Oncol Pharm Pract. 2011;17(4):425–32.

16. Shah S, Dowell J, Greene S. Evaluation of clinical pharmacy services in a hematology/oncology outpatient setting. Ann Pharmacother. 2006;40(9):1527–33.

17. Valgus J, Jarr S, Schwartz R, Rice M, Bernard SA. Pharmacist-led, interdisciplinary model for delivery of supportive care in the ambulatory cancer clinic setting. J Oncol Pract. 2010;6(6):1–4.

18. Walter C, Mellor JD, Rice C, Kirsa S, Ball D, Duffy M, et al. Impact of a specialist clinical cancer pharmacist at a multidisciplinary lung cancer clinic. Asia Pac J Clin Oncol. 2016;12(3):e367–74.

19. Gatwood J, Gatwood K, Gabre E, Alexander M. Impact of clinical pharmacists in outpatient oncology practices: A review. Am J Heal Pharm. 2017;74(19):1549–57.

20. Imamura M, Ogawa D, Takatori T, Yamaguchi M, Takata T, Hada T, et al. A retrospective study of the effects of oncology pharmacist participation in treatment on therapeutic outcomes and medical costs. Biol Pharm Bull. 2017;40(11):1956–62.

21. Lam MSH, Cheung N. Impact of oncology pharmacist-managed oral anticancer therapy in patients with chronic myelogenous leukemia. J Oncol Pharm Pract. 2016;22(6):741–8.

22. Liekweg A, Westfeld M, Braun M, Zivanovic O, Schink T, Kuhn W, et al. Pharmaceutical care for patients with breast and ovarian cancer. Support Care Cancer. 2012;20(11):2669–77.

23. Escudero-Vilaplana V, Ribed A, Romero-Jimenez RM, Herranz-Alonso A, Sanjurjo-Saez M. Pharmacotherapy follow-up of key points in the safety of oral antineoplastic agents. Eur J Cancer Care (Engl). 2017;26(3).

24. Lopez-Martin C, Garrido Siles M, Alcaide-Garcia J, Faus Felipe V. Role of clinical pharmacists to prevent drug interactions in cancer outpatients: a single-centre experience. Int J Clin Pharm. 2014;36(6):1251–9.

25. Caracuel F, Baños Ú, Herrera MD, Ramírez G, Muñoz N. Influence of pharmaceutical care on the delayed emesis associated with chemotherapy. Int J Clin Pharm. 2014;36(2):287–90.

26. Gagnon L, Fairchild A, Pituskin E, Dutka J, Chambers C. Optimizing pain relief in a specialized outpatient palliative radiotherapy clinic: Contributions of a clinical pharmacist. J Oncol Pharm Pract [Internet]. 2012;18(1):76–83. Available from: https://doi.org/10.1177/1078155211402104

27. Muluneh B, Schneider M, Faso A, Amerine L, Daniels R, Crisp B, et al. Improved Adherence Rates and Clinical Outcomes of an Integrated, Closed-Loop, Pharmacist-Led Oral Chemotherapy Management Program. J Oncol Pract. 2018;14(6):e324–34.

28. Simons S, Ringsdorf S, Braun M, Mey UJ, Schwindt PF, Ko YD, et al. Enhancing adherence to capecitabine chemotherapy by means of multidisciplinary pharmaceutical care. Support Care Cancer. 2011;19(7):1009–18.

29. Read H, Ladds S, Rhodes B, Brown D, Portlock J. The impact of a supplementary medication review and counselling service within the oncology outpatient setting. Br J Cancer. 2007;96(5):744–51.

30. Krikorian S, Pories S, Tataronis G, Caughey T, Chervinsky K, Lotz M, et al. Adherence to oral chemotherapy: Challenges and opportunities. J Oncol Pharm Pract [Internet]. 2019;25(7):1590–8. Available from: https://doi.org/10.1177/1078155218800384

31. Ignoffo R, Knapp K, Barnett M, Barbour SY, D'Amato S, Iacovelli L, et al. Board-certified oncology pharmacists: Their potential contribution to reducing a shortfall in oncology patient visits. J Oncol Pract. 2016;12(4):e359–68.

32. Crespo A, Tyszka M. Evaluating the patient-perceived impact of clinical pharmacy services and proactive follow-up care in an ambulatory chemotherapy unit. J Oncol Pharm Pract [Internet]. 2017;23(4):243–8. Available from: https://doi.org/10.1177/1078155216634180

33. Fernandes O, Toombs K, Pereira T, Lyder C, Bjelajac Mejia A, Shalansky S, et al. Canadian Consensus on Clinical Pharmacy Key Performance Indicators: Quick Reference Guide. 2015; Available from: https://www.cshp.ca/sites/default/files/files/publications/Official Publications/CPKPI/CSPH-Can-Concensus-cpKPI-QuickReferenceGuide_June_2017.pdf

34. Battis B, Clifford L, Huq M, Pejoro E, Mambourg S. The impacts of a pharmacist-managed outpatient clinic and chemotherapy-directed electronic order sets for monitoring oral chemotherapy. J Oncol Pharm Pract. 2017;23(8):582–90.

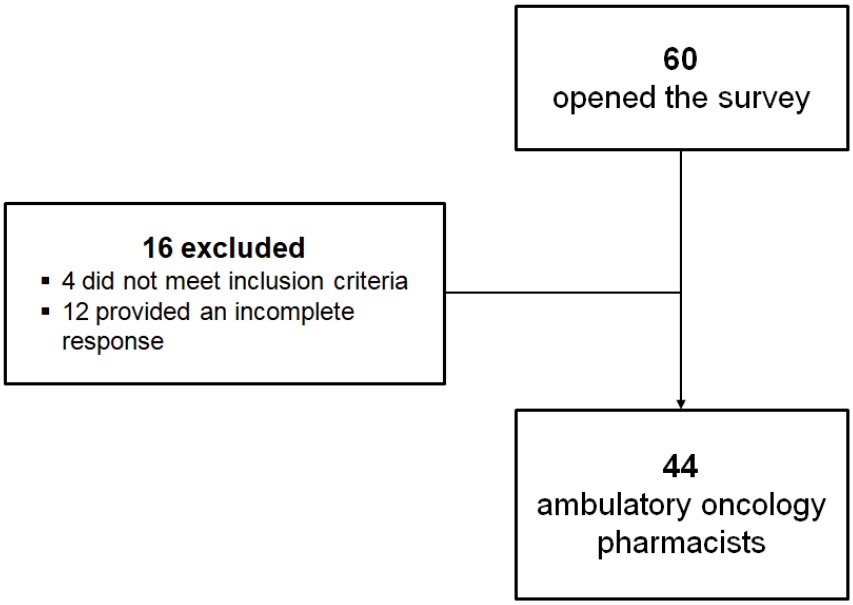

Figure 1. Survey completion rates and reasons responses were excluded from the final analysis

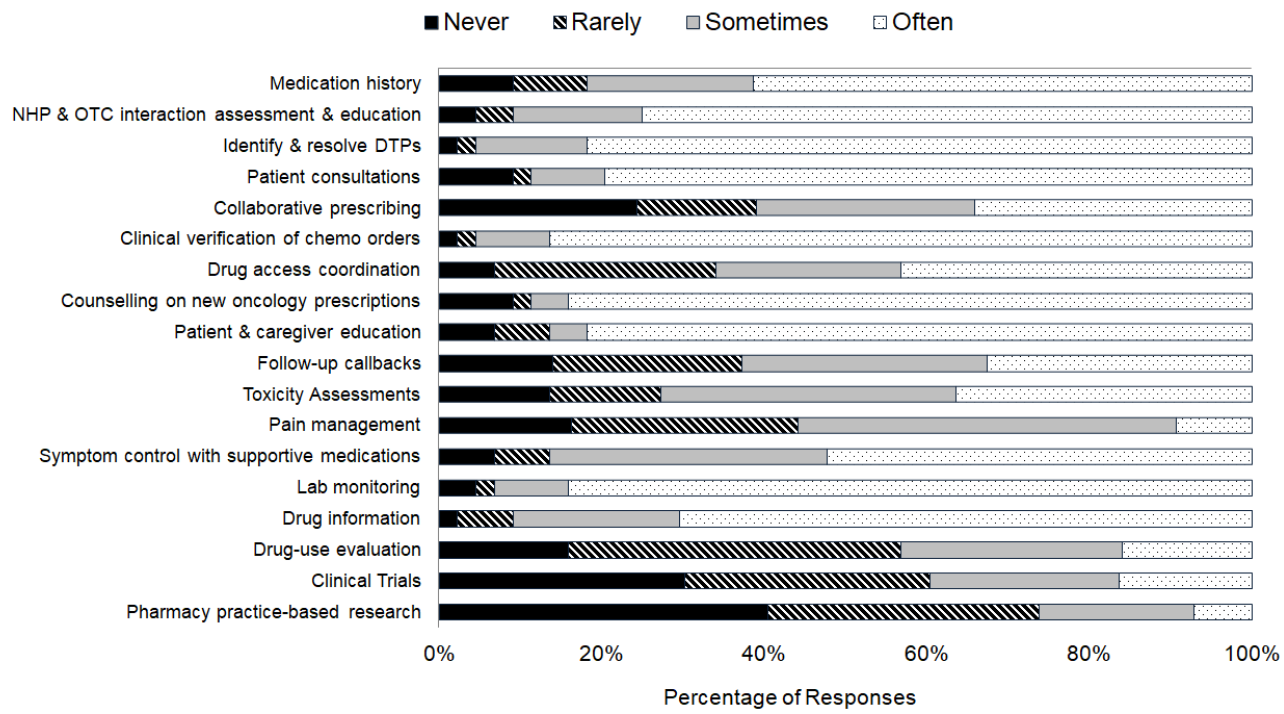

Figure 2. Frequency of Patient Care Activities Performed by Ambulatory Oncology Pharmacists. Other activities identified in the comments section of the survey: therapeutic drug monitoring, bedside rounds, education of learners and other healthcare providers, protocol development, hospital committee work such as formulary management, and software programming.

DTP = drug therapy problem, NHP = natural health product, OTC = over the counter

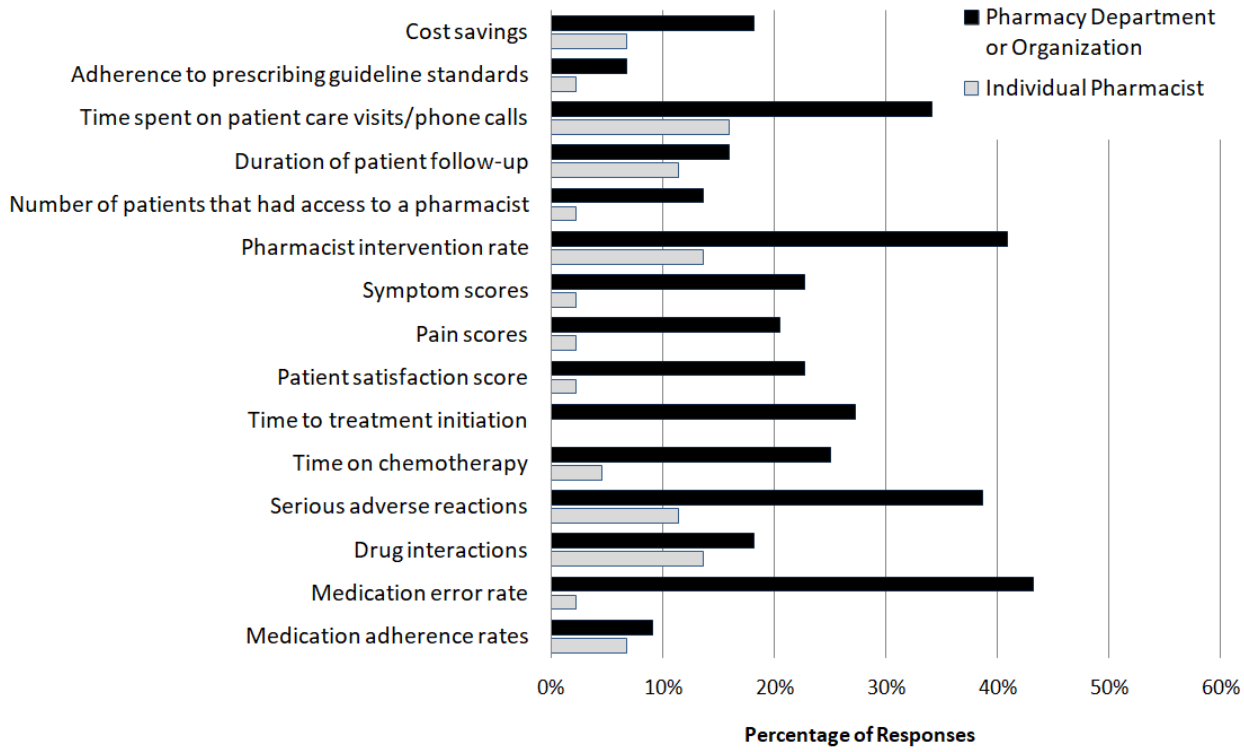

Figure 3. Pharmacy performance metrics and patient outcomes captured by individual pharmacists or by their respective pharmacy department or organization. Other metrics identified in the comments section of the survey: Canadian Society of Hospital Pharmacists' clinical pharmacy key performance indicators, intervention codes, number of new patients, total number of patients treated

Table 1. Participant Characteristics

Characteristic	**No. (%) of Respondents†**
Average number of year in practice (range)	9.7 (0.5 – 30)
Province or Territory	
British Columbia	8 (18)

Alberta	2 (5)
Saskatchewan	1 (2)
Manitoba	3 (7)
Ontario	13 (30)
Quebec	3 (7)
Newfoundland & Labrador	6 (14)
Nova Scotia	5 (11)
New Brunswick	3 (7)
Prince Edward Island	0 (0)
Territories	0 (0)
Practice Setting	
Community hospital, urban setting (>100,000 people)	20 (45)
University affiliated teaching hospital	12 (27)
Rural hospital (<100,000 people)	8 (18)
Specialty non-hospital oncology pharmacy	2 (5)
Other	2 (5)
Types of Patients	
Medical and/or hematologic oncology	40 (91)
Radiation oncology	26 (59)
Blood & bone marrow transplant	23 (52)
Pediatric	10 (23)

Direct oncology patient care services per day	
<25%	8 (18)
25 – 50%	7 (16)
51 – 75%	9 (20)
>75%	20 (45)
Number of cancer patients seen per week	
<10	8 (18)
10 – 50	26 (59)
51 – 100	6 (14)
>100	3 (7)
Did not specify	1 (2)

† Except when indicated otherwise

Table 2. Frequency of Direct and Indirect Patient Care Activities Performed by Ambulatory Oncology Pharmacists stratified by their reported amount of time spent on direct patient care per day

	Percentage of Respondents			
Activity	**Never**	**Rarely**	**Sometimes**	**Often**
Direct Patient Care Services				
Medication history				
> 50% DPC	3%	14%	17%	66%
< 50% DPC	20%	0%	27%	53%

NHP & OTC interaction assessment & education				
> 50% DPC	0%	7%	17%	76%
< 50% DPC	13%	0%	13%	73%
Identify & resolve DTPs				
> 50% DPC	0%	3%	17%	79%
< 50% DPC	7%	0%	7%	87%
Patient consultations				
> 50% DPC	3%	3%	10%	83%
< 50% DPC	20%	0%	7%	73%
Collaborative prescribing				
> 50% DPC	17%	17%	24%	38%
< 50% DPC	33%	7%	27%	27%
Clinical verification of chemo orders				
> 50% DPC	0%	0%	7%	93%
< 50% DPC	7%	7%	13%	73%
Drug access coordination				
> 50% DPC	3%	34%	28%	34%
< 50% DPC	13%	20%	13%	53%
Counselling on new oncology prescriptions				
> 50% DPC	3%	3%	7%	86%
< 50% DPC	20%	0%	0%	80%

Patient / caregiver education				
> 50% DPC	3%	3%	7%	86%
< 50% DPC	13%	13%	0%	73%
Follow-up call-backs				
> 50% DPC	10%	31%	28%	31%
< 50% DPC	20%	7%	33%	40%
Toxicity Assessments				
> 50% DPC	10%	14%	41%	34%
< 50% DPC	20%	13%	20%	47%
Pain management				
> 50% DPC	14%	34%	48%	0%
< 50% DPC	20%	13%	47%	20%
Symptom control with supportive medications				
> 50% DPC	0%	10%	38%	52%
< 50% DPC	20%	0%	27%	53%
Lab monitoring				
> 50% DPC	0%	0%	14%	86%
< 50% DPC	13%	7%	0%	80%
Drug information				

> 50% DPC	0%	7%	17%	76%
< 50% DPC	7%	7%	27%	60%
Non-Direct Patient Care Activities				
Drug-use Evaluation				
> 50% DPC	17%	52%	24%	10%
< 50% DPC	27%	20%	27%	27%
Clinical Trials				
> 50% DPC	34%	31%	28%	21%
< 50% DPC	60%	27%	13%	0%
Practice-based Research				
> 50% DPC	0%	34%	24%	0%
< 50% DPC	53%	27%	7%	13%

DPC = direct patient care, DTP = drug therapy problem, NHP = natural health product, OTC = over the counter