

JOURNAL OF
**ONCOLOGY
PHARMACY
PRACTICE**

Volume 29 • Issue 3S • June 2023 (Supplement)

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Selected abstracts presented at the Canadian Association of Pharmacy in Oncology
(CAPHO) Conference 2023 taking place from April 13 to 16 both virtually
and in person in Toronto, Ontario.

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Official Publication of the International
Society of Oncology Pharmacy Practitioners

CAPHO  Canadian Association
of Pharmacy in Oncology

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journals.sagepub.com/home/opp
ISSN: 1078-1552

journals.sagepub.com/home/opp
ISSN: 1078-1552



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Journal of Oncology Pharmacy Practice is a peer-reviewed scholarly journal dedicated to educating health professionals about providing pharmaceutical care to patients with cancer and is the official publication of the International Society for Oncology Pharmacy Practitioners (ISOPP).

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Contents

Selected abstracts presented at the Canadian Association of Pharmacy in Oncology (CAPHO) Conference 2023 taking place from April 13 to 16 both virtually and in person in Toronto, Ontario.

Administration	1
Pharmacy Practice (non-research based)	3
Research – Clinical	6
Research – Non-clinical.....	13

CAPhO Conference 2023 Abstract Book

J Oncol Pharm Practice
 2023, Vol. 29(3S) 1–16
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sagepub.com/journals-permissions
 DOI: 10.1177/10781552231162139
journals.sagepub.com/home/opp



Administration

10

Prospective DPYD Genotyping to Guide 5-Fluorouracil and Capecitabine Treatment in Ontario: An Evidence-informed Approach to DPD Deficiency Recommendations

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Objective: Pharmacogenomic testing will soon be available in Ontario for candidates of fluoropyrimidine treatment. Guidance was developed to aid the implementation of prospective testing, and promote evidence-informed best practices for genotype-guided dosing in cancer patients with dihydropyrimidine dehydrogenase (DPD) deficiency.

Design: A current state assessment was conducted to identify routine practices in Ontario, and a province where testing is standard of care (Quebec). Best available evidence and guidelines from prominent jurisdictions were reviewed. Evidence-informed recommendations and accompanying patient information were developed. An external panel of 16 subject matter experts, including medical oncologists, pathologists, geneticists, pharmacists and nurses reviewed the materials and informed the final content.

Results: Practical and patient-focused clinical guidance around DPD deficiency was created. Definitions, clinically relevant genetic variants, dosing guidance and implementation strategies for testing in clinical practice are described. The patient education tool provides information on DPD deficiency and testing, what to expect after testing and potential side effects to look out for, using health literacy best practices.

Conclusions: An evidence-informed approach and expertise from experienced oncology clinicians resulted in practical guidance to aid incorporation of DPYD testing into routine clinical practice. This guidance can

help facilitate safe, standardized treatment of fluoropyrimidines in patients with DPD deficiency in Ontario

16

Development of an Educational Framework for Oncology Pharmacy within Planetary Health

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Context and Objective: According to the World Health Organization, climate change is the biggest public health crisis of our time. Healthcare systems have a very high emissions burden, and healthcare providers have been involved in both reducing healthcare emissions, and protecting patient care from climate hazards.

Recent publications have also demonstrated the impact of climate change to both oncology and pharmacy separately, discussing potential opportunities for both oncologists and non-specialized pharmacists separately to work within climate mitigation (within the reduction of emissions) and adaptation (the protection of reduce emissions as well as protect patient health. In addition, outside of climate change, research has also shown the impact of cancer and chemotherapy to planetary health, with potential impacts of environmental health to cancers themselves.

Design: A literature review of opportunities for planetary health engagement within oncology pharmacy was completed, with the intent of creating an educational program focused on oncology pharmacy opportunities within climate mitigation and adaptation.

Results: An outline curriculum for the educational program was completed with the above literature review, focusing on the following:

- (a) an overview of climate change and its impact to health and oncology
- (b) an overview of the health system impacts to climate change, including a review of high-emission medications and oncology procurement

- (c) a review of chemotherapy with the impact to planetary health, including potential impacts to cancers themselves
- (d) a review of lung, skin and gastrointestinal cancers from an environmental health perspective
- (e) an environmental perspective to deprescribing
- (f) an overview of medication and chemotherapy considerations during heat waves
- (g) introduction to disaster planning related to oncology pharmacy environments.

Conclusion: Oncology pharmacists are at the front line of the climate change crisis and there is an opportunity for climate-specific training to be provided within oncology pharmacy continuous education.

24

Resource Impact of Nirmatrelvir/ritonavir (Paxlovid®) Prescriptions at a Tertiary Outpatient Cancer Centre

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Introduction: Oncology patients are thought to be at high risk of drug-drug interactions with Paxlovid® requiring pharmacist intervention. Our objective was to examine the resource impact of Paxlovid® prescriptions.

Methods: Workload data for patients prescribed Paxlovid® at a Tertiary Outpatient Cancer Centre over an 18-week period (Apr-Aug 2022) was prospectively collected. The time dedicated to dispensing was recorded and reported as a median. Rate of dispensing and billing for pharmaceutical opinions (POs) were extracted through retrospective chart review. The resulting cost and revenue were estimated based on hospital financial information.

Results: A total of 122 Paxlovid® prescriptions were identified. The most time intensive step was the assessment of drug interactions (15 minutes, n=59 range: 0-100), averaging one (n=107, range: 0-5) drug interaction per prescription. Fifty-nine percent of prescriptions were dispensed through our pharmacy. Of the prescriptions dispensed, 62% were eligible to be billed as a PO, but only 55% of those eligible were billed. Despite the revenue generated, there was an average net loss of \$36.16 dollars per prescription.

Conclusion: The Paxlovid® program was not revenue-neutral, the time-intensive nature of the assessments and frequency of drug interactions demonstrates a need for continuing support of clinical oncology pharmacy services.

30

Implications of conditional regulatory approval on public spending of hospital-administered cancer drugs

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Background: Health Canada's Notice of Compliance with Conditions (NOC/c) policy facilitates early access to promising new drugs before there is definitive evidence of clinical benefit. For publicly funded hospital-administered cancer drugs in Ontario, we determined the proportion with NOC/c status and associated drug costs.

Approach: All drug-indication pairs listed as of the 2021/22 fiscal year on the New Drug Funding Program (NDFP) and High Cost Therapy Funding Program (HCTFP) were included. Regulatory status was sourced from Health Canada databases and drug costs were sourced from Ontario Health's databases.

Results: In 2021/22, a total of 131 drug-indication pairs were reimbursed by NDFP/HCTFP and spending exceeded \$700 million. In preliminary analyses, 19 drug-indications had a NOC/c at time of listing. For 12 drug-indications, NOC conditions were met in an average of 4.0 years (range, 1.3 -7.3 years). While they were conditionally approved, cumulative spending was approximately \$18 million. The seven drug-indications that still have a NOC/c have been listed on the formulary for an average of 1.9 years (range, 0.1-6.2 years) and over \$25 million has been spent to date.

Interpretation: Given the robust pipeline of new cancer medications and budget pressures faced by public payers, confirmatory trials should be completed expeditiously.

39

Resource Impact of Administration Of Non Publicly Funded Drugs at A Tertiary Cancer Centre

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Objective: Examine the resource impact of administering non publicly funded drugs accessed through pharma patient support programs as experienced at a tertiary cancer centre with resource challenges.

Design: Non publicly funded drugs being administered at the Odette Cancer Centre were tracked via systemic reports from our Oncology Patient Information System (OPIS). Doses, number of new patients and chair time impact were analyzed over a 12 month period. Impact from non publicly funded drugs were separated from publicly funded drugs in multi drug regimens.

Results: Despite restrictions and diverting majority of single agent treatments accessed through patient support programs to private infusion (utilizing our Framework for Administration of IV Special Drug Access Program Treatments) our centre still administered 22 different non publicly funded drugs involving 125 patients and utilizing an average of 32 hours of chair time per month.

Conclusion: Impact of administering non publicly funded drugs is not insignificant and can affect ability to administer publicly funded treatments if not carefully managed. Monitoring of non publicly funded treatments being administered can help to assess downstream impact for when treatments become publicly funded.

Pharmacy Practice (non-research based)

15

Topical Chloromethine In cutaneous t-cell Lymphoma (TACTiLe): analysis of real-world evidence at BC Cancer centers

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Objective: Provide real-world data on the effectiveness and adverse drug effects (ADEs) of topical chloromethine/mechlorethamine/nitrogen mustard (tNM) for mycosis fungoides cutaneous T-cell lymphoma (MF-CTCL) patients treated at BC Cancer regional centers.

Design: Retrospective descriptive chart analysis of patients who initiated their first treatment (1 T) of tNM from a BC Cancer regional center between 1 January 2000 to 31 December 2004. Data cut-off was 30 June 2022.

Results: Seventy-two patients were identified within the treatment initiation period. Fifty-eight patients (81.0% \leq T2N0M0B0) met eligibility and were analyzed for treatment course outcomes. Median progression-free survival was 47.8 months, and median overall survival was 98.0 months. Median time to 1 T discontinuation was 15.9 months. Thirty-two patients (55.2%) achieved remission/disease stability after 1 T with a median treatment completion duration of 19.2 months. Thirty-two patients (55.2%) experienced an ADE, with 8.6% experiencing systemic symptoms. 1 T ADEs led to 13.8% of patients discontinuing treatment and 25.9% requiring dose reductions. 70% of 1 T ADEs were dermatitis/skin irritation.

Conclusion: Most BC Cancer patients achieved MF-CTCL remission and although ADEs were common, tNM seemed tolerable by most patients. These results support the use of tNM in this population and can guide treatment and funding decisions for policy-makers.

17

Development and Implementation of a New Pharmacy Oncology Clinic in Halifax, Nova Scotia

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Objective: Pharmacists provide direct patient care in outpatient oncology in a variety of settings across Canada and can have important impacts on patient care. Although the Standards of Practice for Oncology Pharmacy in Canada indicate that the oncology pharmacist should provide medication education to all patients with cancer, few medical oncology outpatients in the Nova Scotia Health Central Zone receive education by a pharmacist. Patient education of oncology medications needs to be optimized as gaps exist.

Design: A pharmacy oncology clinic was developed and implemented in Nova Scotia. Pharmacists provided education and follow-up to patients with neo/adjuvant breast cancer receiving intravenous cancer therapy at the Victoria General hospital. Clinical pharmacy services provided were documented.

Results: There were 328 patient encounters between November 2021 and December 2022. Pharmacists identified 157 drug-therapy problems and made 180 clinical interventions. The most commonly identified drug-therapy problems

were ‘adverse drug event’, ‘needs additional therapy’ and ‘drug interaction’. The top intervention was ‘counsel patient’. Toxicity management most commonly involved nausea/vomiting.

Conclusion: A pharmacist-led oncology clinic focused on patient education and toxicity management has allowed more Nova Scotia patients with cancer to receive oncology medication education by a pharmacist and has enhanced the quality of patient care.

18

Developing an ambulatory oncology antimicrobial stewardship program: A scoping review

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Objective/Purpose: An informal survey indicated that an ambulatory oncology antimicrobial stewardship (AMS) program does not currently exist in Canada. Our goal was to identify strategies to plan and implement AMS activities for an ambulatory oncology setting.

Design: We did a scoping review of ambulatory AMS-related peer-reviewed studies found on Pubmed. We conducted a qualitative framework analysis of the text in the included articles.

Results: We identified 56 articles for full-text review. Only 2 articles applied to an oncology setting. The 56 articles described many activities and approaches.

We identified several themes related to planning AMS activities: 1) understand the context of the care setting, 2) involve stakeholders to gain buy-in and ensure activities’ feasibility, 3) consider upfront and ongoing resource needs when choosing activities, and 4) determine the sustainability of a program’s activities and their benefits. When implementing AMS activities, continued stakeholder engagement and the iterative refinement of activities were often attributed to the activities’ success.

Conclusion: Given the specific context of an ambulatory oncology setting, we need to tailor AMS program activities to meet local practice needs throughout the planning, implementing and evaluation process. Our first steps involve assessing local baseline prescribing patterns and identifying appropriate stakeholders.

22

Implementation of an Allergy Clinic for Cancer and Hematology Patients: A Collaboration between Clinical Immunology and Pharmacy

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Objective: Numerous protocols exist in the literature for re-challenge or desensitization of various anticancer drugs. Determining optimal management of patients’ subsequent treatments after a drug reaction is further enhanced by involvement of specialists in Allergy/Clinical Immunology.

Design: Pharmacist-led initiatives as part of this new clinic were paramount to its launch and ongoing provision of patient care such as development of standardized desensitization protocols for anticancer agents commonly known for hypersensitivity risk, development of compounding protocols for allergy skin tests of anticancer agents, and pharmacist consultative services to the allergy clinic.

Results: Since clinic launch in Fall 2022, over 30 compounded sterile pharmacy preparations and 8 regimen order sets have been created for skin tests or desensitization protocols. This has improved efficiency of workflow, provided clarity and references that support quality preparations, and has enhanced pharmacists’ knowledge of management of drug-related reactions.

Conclusion: The efficiencies established with the implementation of this clinic have improved Pharmacy workflow and ensured quality, standardized sterile preparations that meet NAPRA standards. The inter-professional collaboration between allergists and hematology-oncology pharmacists could be a template for other clinical specialties with high incidences of drug reactions.

27

Patient perceptions of a ribociclib-associated ECG monitoring program performed by pharmacists at a Specialty Oncology Pharmacy

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Background: Ribociclib is a CDK4/6 Inhibitor indicated for the treatment of pre/perimenopausal or postmenopausal women with hormone receptor (HR)-positive, (HER2)-negative advanced or metastatic breast cancer. Recent evidence suggests potentially important clinical benefits including improved progression-free and overall survival with ribociclib therapy versus respective comparator treatments. Ribociclib may be associated with QTc prolongation and requires QTc monitoring during therapy.

Objective: Development of new Health Canada approved portable ECG devices may promote collaborative and interdisciplinary approaches to accessible ECG monitoring of oncology therapies in the community and represents an innovative professional service to be offered by pharmacists. This qualitative review describes patient perceptions associated with receiving ribociclib-associated ECG monitoring performed by oncology pharmacists within a specialty oncology pharmacy practice.

Methods: Oncology Pharmacists worked with Oncologists to collaboratively develop an ECG monitoring & communication pathway for use in an ambulatory pharmacy setting. ECGs were scheduled for day 0, 14 and 28 and dispensing of cycle 1 and 2 was dependent on clinically appropriate ECG readings. Pharmacists were trained on ECG monitoring using a portable, hand-held ECG device. Patients were surveyed about their experience and perception of this model of care.

Results: Patients were overall very responsive to having their ribociclib-associated ECGs performed at a pharmacy. The ECG appointments were coupled with detailed counselling sessions and helped to ensure ribociclib dispensing was safe and appropriate. Full qualitative patient responses are actively being assessed and will be available for the CAPHO Conference Poster Session

Conclusion: Performing planned ribociclib-associated ECGs at a pharmacy is feasible, well received by patients and may help to ensure ribociclib doses are safe and appropriate at the time of dispensing.

29

Partnering With Local Community Pharmacies to Improve Care Of Patients on Oral Anticancer Drugs - Feasible or Not?

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Purpose: Polypharmacy can contribute to adverse drug events, but is often unavoidable for patients prescribed oral anticancer drugs (OACDs). Purposeful collaboration with local community pharmacies that care for patients on OACDs can mitigate the risk. Here we describe our efforts to identify a core group of local community pharmacies for outreach and collaboration. The potential impact that OACDs pose on our patient's non-cancer medications are also characterized.

Design: This cross-sectional study evaluates patients 65 years or older prescribed OACDs between January to March 2021 at North York General Hospital. The primary objective is to identify the top 10 community pharmacies that provide care to this study population. Secondary objectives were to characterize the impact of prescribed OACDs on the patient's non-cancer medications.

Results: A total of 174 patients were identified. Their medications were, collectively, dispensed in 264 pharmacies. Thus, a "top-ten" list of pharmacies could not be identified for outreach activities. Potential, minor and moderate interactions were detected between OACD's and the patient's non-cancer medications.

Conclusions: Identifying local pharmacies for targeted engagement is impossible, given the breadth of pharmacies involved. Engaging the patient's pharmacy will require broader, regional approaches. The impact of OACDs on pre-existing drugs is a recognized concern.

33

Safety and Tolerability to Subcutaneous Rituximab and Daratumumab Following Implementation of a Local Premedication Regimen: A Single Center Experience

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Background: Subcutaneous rituximab and daratumumab were developed to shorten treatment duration without compromising safety and efficacy. After transitioning from intravenous to subcutaneous rituximab in 2020 and daratumumab in 2022, a self-administered, home-based, oral premedication regimen was implemented at our institution.

Objective: This study aims to evaluate the incidence of administration-related reactions to subcutaneous rituximab and daratumumab following the implementation of a self-administered premedication regimen at our institution.

Design: We conducted a descriptive, retrospective, observational, single-center study. Data were collected for 146 patients who received subcutaneous rituximab and 42 patients who received subcutaneous daratumumab at our institution.

Results: Patients on subcutaneous daratumumab received montelukast 10 mg and cetirizine 20 mg daily for 3 days, starting 2 days before scheduled administration, with acetaminophen 975 mg and dexamethasone \geq 10 mg 1 hour before administration. Administration-related reactions were reported in 3 patients, of which 1 was of grade 3. For patients on subcutaneous rituximab, acetaminophen 650 mg, diphenhydramine 50 mg or cetirizine \geq 20 mg and corticosteroid (\geq prednisone 50 mg equivalent) were taken 1 hour before rituximab injection. Administration-related reactions were reported in 6 patients, with 1 of grade 2.

Conclusion: Our local self-administered, home-based premedication regimen is effective, feasible and allows more sustainable outpatient administration planning.

Research – Clinical

5

Management of Drug Interaction Between Penicillin Antibiotics and Methotrexate in Patients Undergoing Chemotherapy: A Narrative Review

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Objective: Our objective for this research was to summarize the literature describing the potential mechanisms behind the drug interaction between penicillin antibiotics and methotrexate, as well management of this interaction in an oncological setting.

Methods: Literature was captured from PubMed, EMBASE, Scopus and Web of Science through September 2022. Titles and abstracts were screened by two independent reviewers, and disagreements were

resolved by consensus. Data extraction was performed by one reviewer.

Results: The search identified eight case reports qualifying for data extraction. The predominant theory explaining the interaction is that penicillin antibiotics have a similar molecular structure to methotrexate, which causes it to compete for tubular secretion and reduces methotrexate elimination. The interaction was fatal in one case, but most others were successfully managed with leucovorin rescue therapy.

Conclusion: Given the widespread use of methotrexate and penicillin antibiotics, increased awareness surrounding the interaction (and its potentially fatal nature) is warranted. Increased monitoring, leucovorin and alkalinized intravenous fluids should be leveraged when the interaction has taken place. Future research should be focused on selection of antibiotic agents according to antimicrobial stewardship principles.

6

Clinical Efficacy of Standard Dose Lenalidomide (LSD) in Patients with Relapsed Multiple Myeloma (MM) After Low Dose Maintenance Lenalidomide (LM) Post-Autologous Stem Cell Transplant (ASCT) Using Real World Data (RWD)

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Background: Relapsed MM patients progressing on or after LM post-ASCT are usually assumed to respond to LSD, despite limited published supportive data.

Objective: To compare the efficacy of LSD in patients progressing after LM using RWD opposed to patients with distant or no prior lenalidomide exposure in pivotal trials.

Methods: A retrospective, chart review was completed using BC Cancer pharmacy billing data to identify cases. Response was assessed using International Myeloma Working Group criteria. Primary endpoint was progression-free survival (PFS). Secondary endpoints were time to progression (TPP), overall survival (OS) and overall response rates (ORR). PFS, TPP and OS were estimated using the Kaplan-Meier method.

Results: 29 MM patients were included, 69% male, median age 62 years, ISS stage (N=26) I 7.7%, II

69.2%, III 23.1%. Median: time from diagnosis 29 months, LM 19 months, follow-up 32 months. PFS was median 5.1 months, vs. 14.8-17.6 months in pivotal trials. Secondary outcomes were: median TPP 5.6 months, median OS 21.2 months and ORR 17.2%, vs. OS 39.6-51.8 months and ORR 66-76.4% in pivotal trials.

Conclusion: Our data suggests lower clinical efficacy of LSD in patients progressing on or after LM compared to patients with distant or no prior lenalidomide exposure.

8

Real-world adherence to toxicity management guidelines for immune-related adverse events

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Objective: Early immune-related adverse event (irAE) detection and management can prevent morbidity and mortality. The characterization of irAEs and the description of adherence to toxicity management guidelines is needed in Nova Scotia.

Design: A retrospective chart review was performed to characterize irAEs (by grade, organ, and likelihood) experienced by adult medical oncology patients from 2013-2020 in Nova Scotia Health-Central Zone who received nivolumab, ipilimumab, or nivolumab plus ipilimumab. Adherence to guidelines was determined.

Results: Of 129 charts reviewed, 67 patients (51.9%) experienced at least one irAE for a total of 98 irAEs and a fatality rate of 1.5%. Of these irAEs, 33.7% led to an emergency room visit. Patients were admitted to hospital and steroids were used in 24.5% and 35.7% of cases, respectively. In 17.3% of irAEs, immune checkpoint inhibitors (ICIs) were permanently discontinued. In 20.4% of irAEs, ICIs were held, and patients monitored, while in 18.4% ICIs were held until the irAE was Grade 0-1. Almost 47% of irAEs were managed according to guidelines, and 38.8% had no documented management.

Conclusion: Patients receiving immunotherapy frequently experience irAEs with half of irAEs having documented management adhering to guidelines. It is important that irAEs are documented and managed appropriately.

9

Descriptive Analysis of first-line non-small cell Lung cancer treatment with Pembrolizumab in tumors expressing PD-L1 $\geq 50\%$ in patients treated in five Québec's university teaching hospitals (DALP-First study)

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Background: Since July 2017, pembrolizumab is approved for first-line treatment of metastatic non-small cell lung cancer (NSCLC) in patients with a PD-L1 score $\geq 50\%$ in Québec.

Objectives: Assess the real-life use of pembrolizumab including progression-free survival (PFS), overall survival (OS) and immune-related adverse events (IRAE); compare outcomes between a fixed dose (200 mg) (FD) and a weight-based capped dose (2 mg/kg up to 200 mg) (WCD) given every 3 weeks.

Method: Medical records of patients who received pembrolizumab between November 1st 2017 and October 31st 2019 were reviewed and followed until February 29th 2020.

Results: A total of 279 patients were reviewed. Median PFS and OS were respectively 9.4 (95% CI, 6.6-11.2) and 17.3 months (95% CI, 12.9-not reached). IRAE causing delays or treatment discontinuation were seen in 34.4% of patients. Initiating treatment with FD (49 patients) or WCD (230 patients) does not appear to affect PFS, OS or incidence of IRAE. Using the WCD strategy saved approximately 5.8 million \$CA.

Conclusion: These findings support the safe and effective use of pembrolizumab in a real-world setting; PFS and OS are similar to previous studies. WCD does not have a negative impact on patient outcomes and is less costly.

11

Oral Cancer Awareness Among Community Pharmacists in Ontario, Canada: A Provincial Survey Interim Analysis

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Objective: With Ontario pharmacists eligible to prescribe for common ailments including oral thrush and cold sores, they are at an ideal position to detect early signs of oral cancer through differential diagnosis and improve patient prognosis. We aim to identify the level of knowledge of oral cancer among community pharmacists in Ontario, Canada and inform the development of educational resources.

Design: An anonymous survey gathered information on participant's demographics, knowledge and attitudes towards oral cancer, and need for further education. Community pharmacists in Ontario were recruited through email and social media platforms.

Results: While most participants were aware of the risk factors contributing to oral cancer, the majority identified that they were not confident in their ability to counsel patients on reducing these risk factors (44%; n = 33). Many also correctly identified common signs and symptoms of oral cancer yet lacked some knowledge on the timeline for referral (66%; n = 54). The survey demonstrated that a further education tool would increase pharmacists' knowledge and confidence in differentially diagnosing oral cancer from other oral ailments (92%; n = 76).

Conclusion: An educational tool on oral cancer signs and symptoms, differential diagnosis and risk factors would support community pharmacists in detecting early signs of oral cancer.

12

An Examination of Olaparib Dose Adjustments in Patients with Ovarian Cancer

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Background: Olaparib is a daily oral therapy which increases the time to disease relapse in patients with BRCA1/2 mutation positive ovarian cancer, following response to platinum-based chemotherapy.

Objective: To assess real world prescribing patterns of olaparib against protocol dosing in the treatment of BRCA positive, platinum sensitive ovarian cancer.

Methods: Retrospective, multicenter chart review of patients dispensed olaparib for ovarian cancer at BC Cancer regional centers between October 2018 and September 2021.

Results: Dose reductions (n = 32) occurred (means 146.9 mg after 36.5 days of treatment) for nausea (26.9%), anemia (15.3%) and fatigue (13.5%). Prescribers recorded 188 unique adverse drug effects as mild (41.5%), moderate (39.9%), severe (15.4%) and extreme (2.7%). Forty treatment delays (n = 27) were recorded, averaging 19.1 days (due to nausea [20%] or anemia [20%]). Discontinuation (n = 29) occurred due to disease progression (n = 20) and adverse drug effects (n = 5).

Conclusions: Patients may benefit from a ready supply of antiemetics in the first two months of treatment to better manage nausea. Closer follow up by pharmacists may reduce treatment delays and facilitate dose reductions when necessary.

21

Real-World Responses to MET Inhibitors in MET exon 14 Skipping Mutation Positive Non-Small Cell Lung Cancer

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Objective: MET exon 14 skipping mutation in non-small cell lung cancer (NSCLC) is targetable with MET inhibitors crizotinib, capmatinib, tepotinib. This study sought to identify prescribing patterns and clinical outcomes with MET exon 14 targeted treatment in BC.

Design: A retrospective analysis of patients identified with MET exon 14 skipping who received any MET inhibitor through the BC Cancer between January 2016 and December 2021 was completed. Primary outcome: time to treatment discontinuation (TTD). Secondary outcome: overall survival (OS) defined as the start of any systemic therapy until the date of death or last follow-up, using Kaplan-Meier analysis.

Results: Out of 124 MET exon 14 skipping patients, 53 received systemic therapy, all received a MET inhibitor; crizotinib (42), capmatinib (5), tepotinib (4), multiple

MET inhibitors (2). 46 (87%) patients received a MET inhibitor as first-line treatment. Crizotinib/capmatinib/tepotinib median TTD: 3.74, 1.90, and 13.48 months and median OS: 7.31, 9.02, and 30.66 months respectively.

Conclusion: Only 43% of MET exon 14 skipping patients received targeted therapy. There are potential OS benefits of the newer targeted options but small sample size is a limitation. Additional patients with longer follow-up will inform decision making among targeted agents for NSCLC patients.

25

The lived experiences of women of childbearing potential with multiple myeloma enrolled in IMID controlled drug distribution programs: A qualitative quality of life study

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Background: Immunomodulatory drugs (IMiDs) have been revolutionary in MM treatment; however, they must be used with caution in females of childbearing potential (FCBP) due to high risk of teratogenic effects with fetal exposure. Consequently, IMiDs are only available through controlled distribution programs, with strict guidelines aimed at pregnancy prevention. There are no studies exploring the potential impact of these programs on quality of life and psychosocial wellbeing for FCBP living with MM.

Objective: This study aimed to qualitatively explore the lived experiences of FCBP living with MM and enrolled in an IMID controlled distribution program in Canada.

Design: Semi-structured interviews were conducted with 15 demographically diverse participants and data were interpreted using a thematic analysis approach.

Results: Key findings revealed that despite a general appreciation of the need for safety monitoring, participation in the program was perceived as “stressful”, “intrusive”, and for some, “condescending”. The program imposed practical disruptions to their daily lives, social and recreational activities, and weighed heavily on their psychological wellbeing – providing a monthly

reminder of their mortality, loss of fertility, and for some, loss of control. Participants emphasized that the approach to program delivery could be revised in ways that better reflect the unique experiences, challenges, and supportive care needs of young women living with MM. Recommendations for improvement were made and grounded in a more person-centered approach to program delivery.

Conclusions: The lived experiences of FCBP enrolled in IMID controlled distribution programs varied between study participants, but shared themes were identified including increased stress, a loss of autonomy, increased work, and emotional turmoil. It is imperative that those involved in program delivery (e.g., representatives for the controlled distribution program, pharmacists, and health care providers) are aware of the experiences of these women, and that our systems adapt to address their needs, which remain under-recognized.

26

Thrombosis education in cancer patients: a national, cross-sectional survey of pharmacist in oncology

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Cancer-associated thrombosis (CAT) remains the number one cause of death during chemotherapy. Thus, the management of CAT should be a priority in cancer patients. Contrarily, previous study demonstrates there was limited awareness of increased VTE risk among health care professionals and patients. One way to decrease the rate of CAT is to increase the awareness among health care professionals. Therefore, the study aims to elucidate the level of involvement of pharmacy professionals in VTE education in cancer patients and identify gaps in VTE patient education in Canada. Our study consists of a Likert-scale, web-based survey of 22 questions assessing the pharmacist’s involvement in VTE education in cancer patients. In total, 30 CaPHO members (Canadian Association of Pharmacy in Oncology) responded. 53% of the participants didn’t provide counsel to patients on recognition of DVT. Only 10% of participants reported patients are almost always referred to DVT counselling, while 90% of participants reported sometimes, infrequently, never and unsure. Forty percent of pharmacists reported they almost always perform medication review and anticoagulant counselling, while 60% of pharmacists reported fewer frequencies. Overall, our study showed a lack of pharmacy involvement in DVT counselling and greater involvement could potentially improve patient outcomes.

31

Systematic Review to Evaluate Impact of Melatonin Supplementation on Efficacy of Oxidizing Cytotoxic Anti-Cancer Therapy

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Background: To prevent compromising anticancer therapy (ACT) efficacy, pharmacists counsel patients starting oxidizing ACT to avoid melatonin. Conclusive evidence is lacking to determine if complementary and alternative medications (CAMs) with antioxidant properties interfere with pro-oxidizing ACTs.

Objective: This systematic review summarizes available data from RCTs to confirm that melatonin supplementation does not negatively impact the efficacy of oxidizing cytotoxic ACT.

Design: OVID MEDLINE, EMBASE, and PubMed databases were searched for articles on combined CAM-ACT treatment. Included RCTs compared OR or OS in cancer patients treated with oxidizing ACT+melatonin versus oxidizing ACT ± placebo. Search results were imported into Covidence for screening and data extraction. When outcome data was available in ≥3 studies, non-inferiority(NI) of melatonin supplementation was determined as a risk difference (RD)(±0.1 NI margin). Cochrane risk-of-bias tool was applied to included studies.

Results: Of 15 studies identified, 10 reported ACT OR rates (RDOR 0.16, 95% CI 0.11 to 0.21), 7 reported 1-year OS rates (RDmortality,1y -0.19, 95%CI -0.24 to -0.14), and 4 reported 2-year OS rates(RD mortality,2y -0.17, 95%CI -0.23 to -0.12). CIs did not cross NI margins for all outcomes analyzed. Potential moderate risk of bias was identified.

Impact: Findings suggest combination therapy of ACT + melatonin is non-inferior to ACT monotherapy regarding OR and OS outcomes.

32

Impact Of Vitamin C Supplementation On Oxidizing Cytotoxic Anti-Cancer Therapy: A Systematic Review

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Background: Our systematic review regarding melatonin supplementation's impact on oxidizing ACT efficacy found no negative effect on OR or OS; a similar review concerning vitamin C (VC) has not been conducted.

Objective: To summarize available RCT data via systematic review to confirm that VC supplementation does not negatively impact efficacy of oxidizing cytotoxic ACT.

Design: Hospital librarian created a search strategy to identify RCTs with the following characteristics in OVID MEDLINE, EMBASE, and PubMed databases: (1) cancer patient population, (2) experimental arm received oxidizing ACT+VC, (3) control arm received oxidizing ACT ± placebo, (4) OR and OS reported as outcomes. Covidence was used to screen and extract data. When outcome data was available in >3 studies, non-inferiority(NI) of VC supplementation was assessed as a risk difference (RD)(+0.10NI). Cochrane risk-of-bias tool was applied to included studies.

Results: Of the 5 RCTs identified, 3 reported OR data (RDOR 0.02, 95%CI -0.06 to 0.10) and 4 reported 1-year and 2-year OS (RDmortality,1y -0.07, 95%CI -0.13 to 0.00; RDmortality,2y -0.02, 95%CI -0.09 to 0.05). Analyzed outcomes' CI's target upper or lower bounds did not cross NI margin. Potential moderate risk of bias was identified.

Conclusions: Findings suggest combination therapy of ACT+VC is non-inferior to ACT monotherapy for OR and OS outcomes.

36

Changes in EGFR treatment landscape across a decade: Prescribing and dispensing rates at the Sunnybrook Odette Cancer Centre

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Background & Objective: 505 Sunnybrook Odette Cancer Centre (OCC) patients (average 6/month) were started on EGFR between 2012-01-01 to 2018-12-31 (8% osimertinib, 67% gefitinib, 13% afatinib, 13% erlotinib). This study describes EGFR prescription rates between 2018-01-01 to 2022-03-31.

Design: Data for EGFR dispensing events that occurred during the study period were extracted from the OCC Pharmacy Kroll database. Data was used to identify the total number of patients started on each EGFR, average number of patients started/month, total number of prescriptions processed, and average number of prescriptions processed/month. Changes in EGFR demand over time were explored with quarterly linear regression.

Results: 324 patients were started on an EGFR during the study period (average 6/month). Osimertinib was the most frequently prescribed (60% patients, average 4/month), followed by gefitinib (27% patients, average 2/month) and afatinib (12% patients, average 1/month). Quarterly osimertinib new start rate remained constant over time, but decreasing demand for other EGFR were found.

4162 EGFR prescriptions were processed (average 82/month); 3020 osimertinib (average 59/month), 668 gefitinib (average 13/month), and 426 afatinib (average 8/month). 20 additional osimertinib prescriptions were processed each quarter ($p < 0.001$), whereas decreasing trends were found for all other EGFR.

Conclusion: Osimertinib was the least frequently prescribed EGFR between 2012-2018 but dominated the treatment landscape between 2018-2022.

37

Prescribing and dispensing trends for olaparib and niraparib at the Sunnybrook Odette Cancer Centre: a 51 month observational report

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Objective: Describe prescribing and dispensing trends for poly(ADP-ribose) polymerase inhibitors (PARPI), olaparib and niraparib, at the Sunnybrook Odette Cancer Centre (OCC).

Design: Using the OCC Pharmacy Kroll database, data was obtained for dispensing events between 2018-01-01 and 2022-03-31. Total number of patients started on each PARPI, average number of patients started/month, total number of PARPI prescriptions processed, and average number of PARPI prescriptions processed/month were characterized. Linear regression was used to explore potential changes in quarterly rate of new patients and prescriptions processed during the study period.

Results: 1277 PARPI prescriptions were processed during the study period (average 25/month). Statistically significant increases in PARPI patient start rate (+2 additional/quarter, $p < 0.001$) and prescription processing rate (+13 additional/quarter, $p < 0.001$) were found. Niraparib had more patient starts overall (100 patients, average 2/month) and was the primary driver of quarterly growth (+1 patient/quarter, $p < 0.001$; +1 prescription processed/quarter, $p < 0.001$). Fewer patients started on olaparib (81 patients total, average 2/month), but more olaparib prescriptions were processed in total (838 prescriptions total, average 16/month)—likely due to differences in EAP formulary listing date and eligibility criteria between the 2 PARPI.

Conclusion: Niraparib and olaparib were the 10th and 14th most frequently prescribed OACMs at OCC. Niraparib demand has exceeded olaparib demand as access is not restricted to BRCA + status.

38

BRAFI and MEKI prescribing and dispensing trends at the Sunnybrook Odette Cancer Centre from January 2018 to March 2022

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Objective: To describe prescribing and dispensing trends for BRAFI (dabrafenib, encorafenib, vemurafenib) and MEKI (trametinib, binimetinib, cobimetinib) at the Sunnybrook Odette Cancer Centre (OCC).

Design: Data for dispensing events between 2018-01-01 and 2022-03-31 were extracted from the OCC Pharmacy Kroll database. Data was used to identify the following for each agent: total number of patients started, mean number of patients started/month, total number of prescriptions processed, average number of prescriptions processed/month, change in average number of new patients and prescriptions processed/quarter.

Results: 185 patients were started on BRAFI (mean 4/month) and 195 patients were started on MEKI (mean 4/month). Dabrafenib (172 patients, mean 3/month) and trametinib (183 patients, mean 4/month) were the most frequently prescribed pair. Neither class demonstrated a statistically significant change in the quarterly rate of new starts.

1906 BRAFI prescriptions (mean 37/month) and 2234 MEKI prescriptions (mean 44/month) were processed. An additional +4 BRAFI prescriptions ($p < 0.05$) and an additional +6 MEKI ($p < 0.01$) prescriptions were processed each quarter. BRAFI and MEKI new starts-to-prescriptions processed ratios were approximately 1/10 and 1/11, respectively.

Conclusion: Dabrafenib + trametinib remains the most commonly prescribed BRAF + MEK pair.

The new starts-to-prescriptions processed ratios and high monthly prescription processing rates (37 and 44/month) suggest higher than average dispensary workload attributable to these agents.

40

Prescribing and dispensing trends for CDK4/6I at the Sunnybrook Odette Cancer Centre between January 2018 to March 2022

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Objective: To describe prescribing and dispensing trends for CDK4/6I (palbociclib, ribociclib, abemaciclib) at the Sunnybrook Odette Cancer Centre (OCC).

Design: Dispensing data for CDK4/6I were extracted from the OCC Pharmacy Kroll database (51 month study period: 2018-01-01 and 2022-03-31). The following metrics were determined for each agent: total number of patients started, total number prescriptions processed, mean number of new patient starts and prescriptions processed per month, and trend in the quarterly rate of new patient starts and prescriptions processed.

Results: Palbociclib was the most frequently prescribed and dispensed CDK4/6I (224 patients, average 4/month; 4891 prescriptions processed, average 96/month), but demand decreased across the study period (-0.6 new patients/quarter, $p < 0.01$). Fewer patients were started on ribociclib (55 patients, average 1/month; 596 prescriptions processed, average 12/month) and abemaciclib (9 patients, average <1/month); 39 prescriptions processed, average 1/month). Trend analyses suggest increasing demand for abemaciclib (+0.1 new patients/quarter, $p < 0.001$) and increasing Pharmacy workload related to CDK4/6I prescription processing across the study period (+9 additional CDK4/6I prescriptions processed/quarter, $p < 0.001$).

Conclusion: Breast cancer is one of the most common cancers; palbociclib was the second most frequently started oral anticancer agent the OCC over the past 4 years but demand is on the decline.

41

Prescribing and dispensing trends for modern androgen receptor axis-targeted agents at the Sunnybrook Odette Cancer Centre from January 2018 to March 2022

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Objective: Describe prescribing and dispensing trends for the following androgen receptor axis-targeted agents (ARATa) at the Sunnybrook Odette Cancer Centre (OCC): abiraterone, enzalutamide, darolutamide, and apalutamide.

Design: Data for dispensing events between 2018-01-01 and 2022-03-31 were extracted from the OCC Pharmacy Kroll database. Data was used to identify the total number of patients started on each ARATa, the mean number of patients started/month, the total number of ARATa prescriptions processed, and the mean number of prescriptions processed/month. Trends in the rate of new patient starts and number of prescription processed were explored using linear regression.

Results: Abiraterone was the most frequently initiated and processed oral anticancer medication (OACM) at the OCC (230 patients, mean 5/month; 2173 prescriptions, mean 29/month). Enzalutamide was the 7th most frequently started OACM (139 patients, mean 3/month; 1504 total prescriptions processed, mean 29/month). Far fewer patients were prescribed darolutamide and apalutamide (6-30 patients, mean 0-1/month; 71-316 total prescriptions, mean 1-6/month). Statistically significant increase in enzalutamide (+0.5 patients/quarter, $p = 0.05$) and darolutamide (+0.3 patients/quarter, $p < 0.01$) demand was found, and quarterly ARATa prescription processing rate exhibited a positive trend (+10 additional prescriptions processed/quarter, $p < 0.001$).

Conclusion: Abiraterone and enzalutamide are among the top 10 OACMs prescribed at the OCC. Demand for abiraterone has remained constant despite increases in enzalutamide and darolutamide access.

Research - Non-clinical

7

Prevalence and Patterns of Cannabis Use in Cancer Patients Receiving Systemic Anticancer Treatment at Sunnybrook Odette Cancer Centre: a Prospective Survey Study

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Objective: Determine the prevalence and patterns of medical cannabis (MC) use among cancer patients.

Design: Participants were adults ≥ 18 years of age, able to speak, read and understand English, receiving systemic anticancer treatment. Survey themes included: demographics, attitudes, prevalence/dosage forms, reasons for use, efficacy, concerns, access, support, and MC information. Statistical analysis was completed using descriptive statistics, bivariate analyses, and multi-variable models.

Results: The survey was completed by 234 patients (61% female). Mean age was 60.2 (SD \pm 13.3; range 22–89). The rate of MC use was 19% (95%CI 14%–24%). Of patients who had not used MC ($n = 190$), 35% were interested in trying MC and 72% would consider using MC if recommended by their oncologist/family doctor. Of patients who had used MC ($n = 44$), only 18% were being followed by a clinic/consult service. Age and sex were predictors of MC use. Patients treated for advanced/metastatic disease were significantly more likely to use MC than patients treated for early/non-metastatic disease ($p = 0.0007$).

Conclusion: Most cancer patients would trial MC. Disease status may predict decision to use. Few patients who use MC are followed by HCPs. We highlight the need for open dialogue between cancer patients and HCPs regarding MC use.

19

Stability and Compatibility of Oxaliplatin and Generic Medical Partners Inc. Leucovorin Formulation

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Objective: Oxaliplatin and leucovorin may be co-administered via Y-site if leucovorin does not contain trometamol and is diluted in 5% dextrose (D5 W). Generic Medical Partners Inc.'s (GMP) leucovorin formulation contains trometamol. The objective of the study was to evaluate the stability and compatibility of oxaliplatin and GMP-leucovorin when combined at concentrations typical for the FOLFOX regimen.

Design: At time 0, oxaliplatin was prepared in D5 W to concentrations of 0.2 and 0.7 mg/mL and GMP-leucovorin was prepared in D5 W to concentrations of 0.35 and 1.54 mg/mL. Equal volumes of each drug and concentration were mixed with each other to produce four concentration combinations. Physical inspection and concentrations were evaluated at time 0,30,60,90,120,150,180 min using a validated, stability indicating liquid chromatographic method with UV detection. Chemical stability was determined using the lower limit of the 95% confidence interval of the observed degradation rate and time to achieve 90% of the initial concentration.

Results: The analytic method separated oxaliplatin from its degradation products and leucovorin such that the concentration was measured specifically, accurately and reproducibly. Oxaliplatin retained $\geq 99\%$ of its initial concentration at 180 min for all solutions and no precipitates were observed.

Conclusion: Oxaliplatin is stable and compatible with GMP-leucovorin for 180 min.

20

Impact of Computerized Provider Order Entry on chemotherapy-related prescribing errors: An interrupted time-series study

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Introduction: Implementing a Computerized Provider Order Entry (CPOE) in an oncology clinic may reduce chemotherapy-related errors and increase patient safety. However, the extent of the benefits depends on the quality of the CPOE system. From December 2018 to November 2019, oncologists and pharmacists from a tertiary care university hospital oncology clinic in the province of Quebec, Canada, began using a newly developed CPOE software called ONCO-Expert. The primary objective of this study was to evaluate the impact of implementing this CPOE on prescribing errors.

Methods: In this retrospective quasi-experimental interrupted time series, new CPOE orders were compared to paper-based prescriptions surrounding the implementation of ONCO-Expert to assess the type and number of prescribing errors. The primary outcome was the difference in error rate per 100 prescriptions between the two phases. Secondary outcomes included error rates based on four categories of error and based on the severity of error.

Results: A total of 2600 chemotherapy prescriptions divided into two phases of 13 periods surrounding the implementation of ONCO-Expert were reviewed. There was a significant reduction in the mean number of errors of 91% (rate ratio [RR], 0.09; 95% confidence interval [CI], 0.07-0.11; $P < 0.0001$) with CPOE orders compared to the paper-based prescriptions. ONCO-Expert also allowed an 82% reduction of mean major errors (RR, 0.18; 95% CI, 0.12-0.26).

Conclusion: The implementation of a CPOE in an oncology setting showed a significant reduction in prescribing errors.

23

Impact of COVID-19 pandemic on cancer care delivery in Ontario

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Objectives: The COVID-19 pandemic has impacted oncology care for patients in Ontario, Canada across diagnostics, screening, treatment, follow-up and monitoring pillars. In this review, the effects of the pandemic on various stages of cancer care, and its implications on

current and future care were studied to better understand gaps in care and where Ontario is headed.

Methods: PubMed and EMBASE databases were searched. Inclusion criteria included peer-reviewed literatures, with more than one subtype of cancer, public hospital or institutional data, Ontario patient data and recent publication (2021 onwards). A total of four articles were selected.

Results: Ontario conducted fewer screening tests when the pandemic emerged, creating backlogs. There was a reduction in cancer care services, with less pronounced changes in systemic treatments, emergency examinations and associated procedures. To conduct follow-up visits virtually, consensus-based guidelines were developed. Both benefits and harms of virtual care were identified.

Conclusion: Further long-term studies are required to better understand the impact of virtual care on patients and their clinical outcomes. Looking ahead, Ontario is set to introduce permanent changes to its virtual care program, where general physicians will receive a pay cut for virtual patient visits, while specialists can continue practicing telemedicine for now.

28

Characteristics of Nirmatrelvir/Ritonavir (Paxlovid™) Recipients and Clinical Interventions by Oncology Pharmacists at a Tertiary Outpatient Cancer Centre

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Objective: Prescribing nirmatrelvir/ritonavir (Paxlovid™) involves clinical assessment by pharmacists, including (renal) dose adjustment and managing clinically significant drug-drug interactions (DDI). This study aimed to describe a population of outpatients ordered Paxlovid™ and document clinical interventions by cancer centre pharmacists.

Design: This was a single-centre retrospective analysis of Paxlovid™ requests from April 08-July 11, 2022. Demographic and clinical variables were recorded and clinically significant DDI were categorized according to action taken. Data was summarized using descriptive statistics.

Results: There were 85 patients ordered Paxlovid™ during the study period; hematological malignancies accounted for 48.2%. Sixty-two patients (72.9%) were receiving anticancer therapy, with 48.4% having therapy interruptions. Out of 75 Paxlovid™ orders included in the final analysis (7 were assessed in community, 3 ineligible for Paxlovid™), 57 were associated with clinically significant DDI (76.0%). There were 100 total DDI among the sample and the most common actions required were holding medication (n = 51), patient monitoring (n = 20), and reducing interacting medication dose (n = 12).

Conclusion: Clinically significant DDI were frequently observed in patients with cancer receiving Paxlovid™. Future research should evaluate the impact of DDI between Paxlovid™ and anti-cancer therapies and document clinical outcomes to contribute to development of Paxlovid™ resources for oncology clinicians.

34

Lenalidomide and pomalidomide prescribing trends at the Odette Cancer Centre, a large regional cancer centre in Ontario, Canada

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Objective: To describe prescribing and dispensing trends for lenalidomide and pomalidomide at the Sunnybrook Odette Cancer Centre (OCC).

Design: Dispensing data from 2018-01-01 to 2022-03-31 were extracted from the OCC Pharmacy Kroll database and used to describe the total number of patients started on each immunomodulator, the average number of patients started/month, the total number of prescriptions processed, and the average number of prescriptions processed/month. To determine quarterly trends in new patient starts and prescriptions processed, linear regression was performed in Excel.

Results: 174 patients were started on a target immunomodulator (average 3/month) and a total of 4959 prescriptions were processed (average 97 month) during they study period. 146 patients started lenalidomide (average 3/month) and 28 patients started pomalidomide (average 1/month). Patient start rates were constant across the study period, but approximately 5 additional immunomodulator prescriptions were processed each

quarter ($p < 0.01$), which was primarily driven by lenalidomide (4416 prescriptions, mean 87/month; +5 prescriptions/quarter, $p < 0.01$).

Conclusion: Lenalidomide is the 6th most frequently prescribed oral anticancer agent at the OCC. On

average, 87 lenalidomide prescriptions were processed each month. The growth in prescription processing rate (+5 additional prescriptions processed/quarter, $p < 0.01$) suggests that the lenalidomide-treatment discontinuation rate is slower than the lenalidomide-treatment starting rate.