

Practice Patterns for Oral Chemotherapy at Different Cancer Centers in Riyadh, Saudi Arabia: A Multicenter Observational Study

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The present study was aimed to explore the current practices related to oral chemotherapy prescription, dispensing, monitoring and patient education. The novelty of this study was based in utilizing most recent data for retrieving relevant outcomes. A cross-sectional design was employed to recruit 161 pharmacists, physicians, and nurses. A survey questionnaire was implemented to examine prescribing practices, coordinating and monitoring adherence, safety monitoring, and education of patients regarding oral chemotherapy. Descriptive statistics and Chi-square analysis were used to present data through Statistical Package of Social Sciences software. A majority of the healthcare providers (79 %) received training on the safe handling of oral chemotherapy, while 74 % were trained by their organization regarding patient education. While 68 % of hospitals used self-designed papers as resources to guide patient education, 51 % used drug pamphlets and 16 % used personalized treatment calendars. Almost 94 % of hospitals applied double checks for calculated doses as additional safety technique; while, other hospitals (34 %) used barcode scanning. The future planning and implementation of oral chemotherapy needs proper educational and training for the healthcare workers. In addition, health care workers should follow guidelines for quality assurance of their prescriptions.

Key words: Cancer, healthcare, oral chemotherapy, observation

The use of oral chemotherapy is increasing in practice as it offers patients with non-invasive option of treatment, ease of administration, and gives them a feel of control over their medications^[1]. However, these medications carry a high risk for the patients and their caregivers by compromising patient safety and contributing to medication errors, especially if they are intended for self-administration in case of long-term therapy. Patients' autonomy is increased through oral administration as it reduces the number of visits at the hospital during long-term treatments^[2]. Potential problems associated with oral drugs include, lack of information on management of treatment and lack of improvement in patient's adherence^[3]. As compared to the intravenous chemotherapy administration, levels of safety and monitoring for oral chemotherapy administration are less vigorous^[4].

Healthcare professionals play a major role in promoting optimal practices, in reducing challenges related to the use of oral chemotherapy^[5]. These professionals ensure that patients receive a comprehensive education and

monitoring to obtain ultimate benefit and to achieve therapeutic outcomes. Patient education regarding oral chemotherapy administration, the advantages and safety concerns of this treatment throughout the course of treatment is therefore necessary for managing symptoms and improve adherence. In fact, it has been stated clearly that patients should be contacted within the first week of starting oral chemotherapy and later they need to visit weekly for few weeks^[5]. This is achieved by implementing strategies that can enhance adherence and minimize errors related to oral chemotherapy and involve patients on decisions to determine whether they are able to comply with their treatment plan or not. In addition, patients are provided with educational material and counselling sessions to make sure they understand about their disease and medications.

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Taken together, it is clearly important to implement guidelines that help in providing a well-developed practice to address issues and have optimal comprehensive patient care. It is also important to compare prescribing practices of oral chemotherapy and the level of recollection of adverse events associated with oral administration. Latest comprehensive data on patient practice patterns of oral chemotherapy are lacking from Saudi Arabia. Indeed, 2 studies from multiple centers. Mekdad and Al Sayed^[6], Ibrahim *et al.*^[7] have reported that educating pharmacists and safe handling of oral chemotherapeutic agents are directly associated with safer procedure. As both of these studies have used data till 2014; the novelty of this study was based in utilizing recent most data for retrieving relevant outcomes. Therefore, the present study aims to identify the current practice related to the oral chemotherapy prescription, dispensing, monitoring, and patient education.

A cross-sectional, multicenter, and observational study was carried out between June 2016 to February 2017 at different public hospitals including; King Khalid University Hospital, Prince Sultan Military Medical City and King Fahad Medical City in Riyadh, Saudi Arabia. The study included oncologists, pharmacists and nurses who have been prescribing oral chemotherapy. A sample size of 383 participants was initially included to represent the study's population through computer generated randomization without stratification. The sample size calculation correspond to 5-10 % accuracy that is related to recollection of the adverse events that might occur during oral chemotherapy. The survey was developed on the basis of the studies conducted by Conde-Estévez *et al.*^[8] and Weingart *et al.*^[4]. It comprised of 4 items that helped in examining the prescribing practices, coordinating and monitoring adherence, safety monitoring, and education of patients regarding oral chemotherapy. Once the survey was distributed, participants were followed up to collect the surveys.

The questionnaire was distributed at different hospitals after taking the approval and the IRB from the hospitals assigned. A total of 160 questionnaires were returned back with complete information with response rate of 42 %. Descriptive statistics (frequency and percentages) were used for presenting the characteristics of respondents. Inferential analysis was used for exploring the association between prescription practices and severe adverse events. Analysis was carried out using Statistical Package of Social Sciences.

A total of 161 respondents completed the survey, with a response rate of 64 %. Approximately 81 % of participants were specialized in oncology practice with average years of experience from 3 to 5 y. Almost 51 % of the respondents used electronic ordering system for prescribing oral chemotherapy, followed by 45 % who used printed paper prescriptions specifically for chemotherapy. About 32 % of the respondents used paper order form, if there was a defect in the electronic system. A total of 96 % respondents have reported that pharmacists were the most influential health care professionals to dispense oral chemotherapy to the patients.

About 79 % health care providers received training on the safe handling of oral chemotherapy and 74 % were trained by their organization regarding patient education. In addition, patient education was performed in the hospital pharmacy (45 %), and medical wards (40 %), while 10 % of the participants received no education. The baseline characteristics of respondents including their hospital, years of experience, and their participation in educating patients about the use and safety of oral chemotherapy is presented in Table 1. Moreover, it has been assessed that 68 % of hospitals used specifically designed papers as resources to guide patient education, while 51 % used drug pamphlets, and 16 % used personalized treatment calendar.

Oral chemotherapy adherence was assessed in by dispensing exact number of doses (67 %), pill count (44 %), rates of prescription refill (31 %), drug levels in blood (20 %), and use of questionnaires (13 %). These factors were helpful in the assessment of the practice patterns used at different cancer centers for oral chemotherapy. Moreover, 94 % of hospitals applied double checks for calculated doses as additional safety technique; while, other hospitals (34 %) used barcode scanning. In addition, 17 % of patients reported serious adverse events and 18 % missing reports were identified during the past year.

A majority of the respondents with ≥ 5 y of experience received proper training regarding the administration of oral chemotherapy; similarly, there were 10 respondents, who had no experience, and did not received training (Table 2). The findings obtained through Chi-square analysis have shown a positive and significant association between years of experience and healthcare professionals who received training ($p=0.000$). In the hospitals, where proper education was provided, 21 missing reports have been indicated. Interestingly, 48 participants were not aware of the missing reports in

TABLE 1: BASELINE CHARACTERISTICS OF THE RESPONDENTS

Item	Measures	Percentage
Hospital name	King Khalid University Hospital	35
	Prince Sultan Military Medical City	36.25
	King Fahad Medical City	28.75
	0	11.87
Years of experience	1	5.63
	2	8.12
	3	13.12
	4	16.25
	5	45
	Percentage of preformed patient education	Physician
Pharmacists		55
Nurse practitioner		48
Clinical nurse		45
Physician assistant		34
Clinical pharmacist		27
Other (Health educator, do not know, nobody)		10

TABLE 2: CHI-SQUARE ANALYSIS: HEALTHCARE PROFESSIONALS WHO RECEIVED TRAINING VERSUS YEARS OF EXPERIENCE

No experience (%) <6 mo			6-12 mo	1-2 y	3-5 y	>5 y
No	n=10 27.86	n=3 11.92	n=1 3.75	n=4 10.66	n=7 15.59	n=4 8.97
Yes	n=5 13.33	n=6 20.88	n=11 31.97	n=14 28.70	n=18 30.27	n=56 58.00
Chi-square analysis						
Pearson Chi-square						29.164
DF						5
P-value						0.000
Likelihood ratio Chi-square						26.829
DF						5
P-value						0.000

their area due to lack of knowledge and awareness (Table 3). The findings have shown a positive and significant association between patient's education and senior near misses ($p=0.025$). A high percentage of health care providers who have been in oncology practice for more than five years were unaware of any reports of adverse event in past year. This indicates a lack of proper monitoring for the patients receiving oral chemotherapy (Table 4). The findings have shown a positive and significant association between patient's serious adverse events and years of experience ($p=0.051$). Participants received training on oral chemotherapy provided by pharmacy staff or outside. Training included: safety on handling and distribution, dispensing and disposal of chemotherapeutic agents, hazardous spill management, and administration courses. Training courses were instructive. Nursing staff frequently received training on oral chemotherapy compared to other healthcare professionals (Table 5). The findings have shown a positive and significant

association between training and type of healthcare provider ($p=0.000$).

The emergence of different modes of administering medicines has highlighted the importance of patient preference for administration. Oral chemotherapy is a preferred method of medication over intravenous injections because of patient convenience, ease of administration and perception of efficacy^[9]. However, oral chemotherapy is also associated with several challenges to the health care providers pertaining to treatment adherence, compliance to treatment schedule by patients and management of side effects^[6]. It is therefore vital to evaluate the current practices related to the oral chemotherapy prescription, dispensing, monitoring, and patient education.

The results from the current study have demonstrated a wide range of prescription practices for monitoring patients receiving oral chemotherapy. Moreover, it has also presented the gaps within normal practice

TABLE 3: FREQUENCY OF PATIENTS' EDUCATION VERSUS SERIOUS NEAR MISSES

	No	Yes	Do not know
No	n=3 70.481 %	n=6 2.805 %	n=7 5.714 %
Yes	n=69 64.519 %	n=21 24.195 %	n=48 49.286 %
Chi-square analysis			
Pearson Chi-square		7.378	
DF		2	
P-value		0.025	
Likelihood Ratio Chi-square		7.262	
DF		2	
P-value		0.026	

TABLE 4: CHI-SQUARE ANALYSIS: SERIOUS ADVERSE EVENT VERSES YEARS OF EXPERIENCE

	No experience	<6 mo	6-12 mo	1 - 2 y	3 - 5 y	>5 y
No	n=4 6.635 %	n=1 3.981 %	n=7 5.750 %	n=9 9.288 %	n=12 11.500 %	n=36 31.846 %
Yes	n=1 2.788 %	n=1 1.673 %	n=2 2.417 %	n=3 3.904 %	n=4 4.833 %	n=18 13.385 %
Do not know	n=10 5.577 %	n=7 3.346 %	n=4 4.833 %	n=9 7.808 %	n=10 9.661 %	n=18 26.769 %
Chi-square analysis						
Pearson Chi-square					18.264	
DF					10	
P-value					0.051	
Likelihood Ration Chi-square					18.405	
DF					10	
P-value					0.049	

TABLE 5: FREQUENCY OF RECEIVED TRAINING VERSUS TYPE OF HEALTHCARE PROVIDER

	Pharmacists	Clinical pharmacists	Physician	Nurse
No	n=20 7.437 %	n=0 1.577 %	n=2 1.352 %	n=10 21.634 %
Yes	n=13 25.563 %	n=7 5.423 %	n=4 4.648 %	n=86 74.366 %
Chi-square analysis				
Pearson Chi-square				37.912
DF				3
P-value				0.000
Likelihood Ration Chi-square				35.497
DF				3
P-value				0.000

that allows to alleviate or decrease toxicity of oral chemotherapeutic drugs among patients. Interestingly, a study conducted by Weingart *et al.*^[10] demonstrated increased heterogeneity in prescribing practices and monitoring during the administration of oral chemotherapy. Only few of the practitioners in their study followed guidelines for quality assurance of their prescriptions; however, a majority of the respondents used electronic order entry systems. In addition, Weingart *et al.*^[10] demonstrated that a majority of the

respondents worked in such hospitals where monitoring programs and therapeutic education was provided to all the patients receiving oral chemotherapy. However, these results are not consistent with our study as insufficient monitoring for the patients receiving oral chemotherapy could be identified.

It should be emphasized that although the methods for monitoring improves adherence, they may not be reliable. The present study has shown that oral chemotherapy adherence was assessed majorly by dispensing exact

number of doses, and very less by using specific questionnaires. In the current study, heterogeneity in the prescribing practices of oral chemotherapy was not associated with the type of hospital and the oncologist, who specified the dosage. This has become possible due to the development of new educational tools that improved the overall practices about prescribing and monitoring the administered dosage.

There is a misconception about the reduction in risk to oral chemotherapy and that it is safe to handle as compared to other approaches. A high demand for improving the knowledge and practice among the health care professionals about safe handling of the oral chemotherapy drugs was reported by Al Goraini *et al.*^[11]. Safety can be ensured through the implementation of different educational and awareness programs^[12]. A study conducted by Ahmad *et al.*^[13] showed that there was lack of variable practices and formal policies concerning oral chemotherapy among majority of the regions across the world. The use of oral chemotherapy is therefore risky due to safety concerns for the patient as well as the healthcare worker; although, the use of these drugs has provided benefit to the patients with malignant disease^[14]. Consistent with the above studies, the present research has suggested significant challenges linked with the implementation of oral chemotherapy services.

A similar study conducted by Roop and Wu^[15] explained the current nursing practices that are prevalent for the safety of patients taking oral chemotherapy by conducting survey of the oncology nurses in outpatient setting. The results demonstrated that there is a need of systematic reliable policies and practices for increasing patient's education because majority of the prevailing practices possessed erratic procedures and inadequate interdisciplinary communication. Another study conducted by Zerillo *et al.*^[16] conducted exploratory analysis of national practice-level data for assessing the baseline performance in oral chemotherapy management. The results depicted that there was a feasibility in the collection of oral chemotherapy test with greater variability as compared with monitoring of the toxicity levels.

The standard recommendations mainly include proper awareness of professionals and dealing cases by only experienced professionals. The exact role of associated professionals remains unknown as it has been declared that the charge of prescribing dose was shared with nurses or junior physician. The current practices of prescribing oral chemotherapy in the present study

differ from the standard recommendations of good prescribing practices and there is a need of encouraging a formal evaluation across different countries. There is an increased risk of serious errors associated with oral chemotherapy that include increased potential for toxicity, narrow therapeutic ranges, and the transfer of responsibility from healthcare professionals to patients and their families. Therefore, the study suggests that policies and procedures should be developed for ensuring effective interdisciplinary communication for the safeguard of the patients. There is also a need to employ preventive strategies such as providing time for patient's and family's education and having a dedicated oral oncology nurse.

The study results are limited because the survey design used in this study could have added to selection bias. Due to this, respondents were observed to be more concerned regarding the prescription of oral chemotherapy and adherence of patients to oral chemotherapy while answering the questionnaire. Moreover, the use of declarative approach tends to increase the risk of adverse events. Declarative approach is mainly comprehensive, and adheres to general perspectives; therefore, there is a need for specific guidelines in the implementation of oral chemotherapy for both healthcare practitioners and patients. Moreover, the small sample size considered in this study also limits the approach to investigate the relationship between study variables. Future studies need to be conducted for assessing the exact roles of these practitioners and the positive impact of oral chemotherapy management.

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REFERENCES

1. 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;22:777-83.
2. Mislang AR, Wildes TM, Kanesvaran R, Baldini C, Holmes HM, Nightingale G, *et al.* Adherence to oral cancer therapy in older adults: The International Society of Geriatric Oncology (SIOG) taskforce recommendations. *Cancer Treat Rev* 2017;57:58-66.
3. Bourmaud A, Pacaut C, Melis A, Tinquaut F, Magné N,

- Merrouche Y, *et al.* Is oral chemotherapy prescription safe for patients? A cross-sectional survey. *Ann Oncol* 2014;25:500-4.
4. Weingart SN, Flug J, Brouillard D, Morway L, Partridge A, Bartel S, *et al.* Oral chemotherapy safety practices at US cancer centres: questionnaire survey. *BMJ* 2007;334:407.
 5. Moore S. Facilitating oral chemotherapy treatment and compliance through patient/family-focused education. *Cancer Nurs* 2007;30:112-22.
 6. Mekdad SS, Al Sayed AD. Towards safety of oral anti-cancer agents, the need to educate our pharmacists. *Saudi Pharm J* 2017;25:136-40.
 7. Ibrahim N, Al Onazi M, Al Mutairi M. Safe handling of oral chemotherapeutic agents in clinical practice at Saudi hospitals. *J Infect Public Health* 2015;8:396-7.
 8. Conde-Estévez D, Salas E, Albanell J. Survey of oral chemotherapy safety and adherence practices of hospitals in Spain. *Int J Clin Pharm* 2013;35:1236-44.
 9. Eek D, Krohe M, Mazar I, Horsfield A, Pompilus F, Friebe R, *et al.* Patient-reported preferences for oral versus intravenous administration for the treatment of cancer: a review of the literature. *Patient Prefere Adherence* 2016;10:1609.
 10. Weingart SN, Li JW, Zhu J, Morway L, Stuver SO, Shulman LN, *et al.* US cancer center implementation of ASCO/ Oncology Nursing Society chemotherapy administration safety standards. *J Oncol Pract* 2011;8:7-12.
 11. Al Goraini Y, Bawazeer M, Kattan R, Al Ghamdi M. Common fall-related injuries in children at King Abdul Aziz Medical City, Riyadh–Kingdom of Saudi Arabia. *J Infect Public Health* 2015;8:396.
 12. Butt F, Ream E. Implementing oral chemotherapy services in community pharmacies: a qualitative study of chemotherapy nurses' and pharmacists' views. *Int J Pharm Pract* 2016;24:149-59.
 13. Ahmad N, Simanovski V, Hertz S, Klaric G, Kaizer L, Krzyzanowska MK. Oral chemotherapy practices at Ontario cancer centres. *J Oncol Pharm Pract* 2015;21:249-57.
 14. Hall HJ. Applying System-Theoretic Accident Model Process view to patient safety for treatment with oral chemotherapy and anti-cancer drugs [dissertation]. Massachusetts: Massachusetts Institute of Technology; 2017.
 15. Roop JC, Wu HS. Current practice patterns for oral chemotherapy: results of a national survey. *Oncol Nurs Forum* 2014;41(2):185-94.
 16. Zerillo JA, Pham TH, Kadlubek P, Severson JA, Mackler E, Jacobson JO, *et al.* Administration of oral chemotherapy: results from three rounds of the quality oncology practice initiative. *J Oncol Pract* 2015;11:e255-62.
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