

Exploring the Barriers Related to the Healthcare System and Healthcare Professionals in Implementing Quality Intravenous Chemotherapy: A Qualitative Study

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Abstract

Purpose: This study aimed to explore barriers related to the healthcare system (HCS) and healthcare providers (HCPs) in implementing quality intravenous (IV) chemotherapy (CT) from the perspectives of cancer patients, family caregivers, and healthcare professionals.

Methods: Using an explanatory descriptive qualitative method, this study was conducted in 2019. Forty-one participants (6 patients, 5 family caregivers, 12 oncologists, and 18 nurses) were selected through purposive sampling. In-depth semi-structured interviews were conducted to collect the data, which were analyzed using qualitative content analysis. Lincoln and Guba's criteria of rigor were employed to ensure the trustworthiness of the study.

Results: Data analysis showed two categories, each with three subcategories: Barriers related to HCPs that contains "educational and communication barriers", "failure to establish trust" and "unskilled healthcare professionals"; Barriers related to the HCS, which consists of "inadequate physical and care infrastructures to provide services", "lack of support in the disease trajectory from diagnosis to rehabilitation" and "mismanagement of CT wards/procedures".

Conclusion: The identification and removal of the barriers related to HCPs and HCS from routine care are crucial. Education of and communication with cancer patients and their family caregivers are two important pillars in the quality of intravenous chemotherapy (IV CT) and this education and communication should be based on individualized care and tailored to the unique needs of each patient.

1. Introduction

Cancer is an important public health concern globally. It is the second most frequent cause of death all over the world (1). It is expected the global cancer burden with a 47% rise from 2020, to be 28.4 million cases in 2040 (2). CT is one of the main methods of cancer treatment (3). Most cancer patients undergo IV CT, although there is a shift to use oral CT more (4). Nevertheless, most oncologists prefer IV CT drugs, because they can be certain of the administration of the accurate dosage of medications (5). IV CT increases survival rate (6). However, besides this privilege, it affects adherence to treatment and quality of life of patients and becomes a factor in the refusal of patients to complete the treatment course because of its side effects (3). Adherence to IV CT is assured as long as cancer patients keep their appointments for each scheduled CT cycle (7). Adherence is a complicated and multi-faceted issue that is related to many factors that affect the drug use behaviors of patients (8). Therefore, non-adherence with long-term pharmaceutical treatments is the main concern in chronic diseases (9). In the present study, the term IV CT quality means timely CT without changing the appropriate dose.

The emphasis on IV CT administration in outpatient centers requires patient adherence and acceptance to refer. So, it is important to pay attention to factors related to the quality of IV CT. In a study by Lyman, dose reduction and treatment delay were observed in all CT regimens (10). One-third of the patients who need adjuvant CT due to colon cancer start their treatments later than the time recommended by national

guidelines (11). Twenty percent of all patients received CT dose reductions greater than or equal to 15%, and the dose delay was greater than or equal to 7 days (12). The failure to continue CT and delays in treatment are common (13). Since the proper administration of medications is considered as key to the success of the treatment (14), suboptimal doses of CT are associated with reduced survival and with treatment outcomes below the desired level (9, 15, 16). Poor adherence of the patient with the prescribed medicines and other aspects of the medical treatment can inversely affect treatment outcomes in many chronic diseases (4, 17). It has been observed that, for various reasons, some patients have failed to continue with CT and therefore treatment has been unsuccessful (5), which is a significant problem for those involved in global and public health (17).

On the one hand, the factors associated with the delays are not clear (16). Many patients are reluctant to express their concerns and doubts about their medications because they are worried about displeasing the HCPs (18). On the other hand, we need better methods and more open and honest discussions about drugs and adherence are needed to overcome this problem (18). How can HCPs help patients by involving them in the decision-making process about the prescription and administration of drugs, so that they can make more informed decisions? How can the HCPs support patients in adhering to the prescribed medications (18)? Since healthcare providers are expected to play an important role in increasing adherence, designing and implementing interventions to influence what they do seems like a reasonable approach (20). The identification of the factors related to and affecting adherence to IV CT is highly valuable in improving clinical practice (19). Studies should be conducted on the role of structural, HCP, and patient factors in CT delay to identify potential interventions (20). Understanding the potential barriers and factors that affect patient's adherence would help HCPs develop strategies to enhance/improve patients' adherence (21).

In the literature review, only two related studies were found (6, 13), in which the barriers related to the healthcare system and healthcare professionals in implementing quality IV CT have been addressed. In general, because the available knowledge and information on this problem are not sufficient, it became clear that it is important to carry out this study, and the descriptive-qualitative design was selected. The descriptive-qualitative approach is appropriate for research questions focusing on discovering the who, what, and where of events or experiences and on obtaining insights related to a poorly understood phenomenon from informants (22). Moreover, one of the implications of qualitative research is to gain information in areas where the body of knowledge is not sufficient.

In the present study, we intended to explore the barriers related to the HCS and HCPs in implementing quality IV CT. It was important to conduct this study because understanding these barriers can help health policymakers remove them. Given the importance of quality IV CT in increasing patient survival, this study was conducted to explore the barriers associated with HCPs and HCS in the implementation of quality IV CT from the perspective of nurses, oncologists, patients, and family caregivers.

2. Methods

2.1. Study design

The descriptive-qualitative (DQ) design method was used for this study. In this method, the results are a straightforward descriptive summary of the contents of the data that is organized in a logical way (23). These studies are less interpretive than other qualitative methods (24).

2.2. Participants

Participants from different settings were recruited by purposive sampling (Table 1). The participants were selected from the four groups of family caregivers, patients, oncologists, and nurses. For the patients, the inclusion criteria were age ≥ 18 years, having taken at least one course of IV CT, awareness of the diagnosis, and having no physical or cognitive impairments affecting their participation. Inclusion criteria for family caregivers were having a close caring relationship with the patient and no physical and cognitive impairments. The only inclusion criterion for oncologists and nurses was having at least 1 year of working experience in the oncology/CT wards.

Table 1
Participants' characteristics

Participants' characteristics	Mean age (Age range)	Gender	Cancer type	Relationship with the patient	Work experience (years)	City
Patients	51.2 (45–60)	Female: 3 Male: 3	Colorectal: 2 Esophageal: 1 Lung cancer: 1 Breast cancer: 2	-	-	2 Isfahan 1 Najafabad 2 Khorramabad 1 Shiraz
Family caregivers	30 (25–48)	Female: 4 Male: 1	-	Wife: 3 Daughter: 1 Son: 1	-	1 Tehran 2 Isfahan 1 Najafabad 1 Dezful
Oncologists	47.5 (36–60)	Female: 5 Male: 7	-	-	15.8 (3–26)	5 Isfahan 4 Tehran 1 Tabriz 1 Ahwaz 1 Sari
Nurses	36 (25–60)	Female: 12 Male: 6	-	-	15 (3–27)	4 Isfahan 1 Birjand 5 Tehran 3 Ahwaz 2 Mashhad 2 Khorramabad 1 Rasht

Table 2
Questions asked in the interviews

Questions	Participants
How come you did not continue the intravenous chemotherapy?	Patients
What experiences do you have of visiting the chemotherapy center?	
What are your experiences with regard to the personnel?	
Can you explain more?	
What caused the chemotherapy not to continue?	Family caregivers
What experiences do you have of visiting the chemotherapy center?	
What are your experiences with regard to the personnel?	
Can you explain more?	
What are your impressions on the barriers to successful and timely intravenous chemotherapy?	Doctors and nurses
What are your experiences with regard to the healthcare staff-related barriers to the implementation of intravenous chemotherapy?	
What experiences do you have about the health system-related barriers to the implementation of intravenous chemotherapy?	
Can you explain more?	

2.3. Procedure

Data were collected from July to October 2019 using semi-structured in-depth interviews with 41 participants. The interviews were conducted in a calm and quiet environment like clinic office room / workplace / vacant patient room taking into account participants' convenience. The sampling was stopped when data saturation was achieved. All participants had completed the written informed consent form before interviews were conducted. The mean duration of the interviews was 30–90 minutes. Some of the codes were obtained from the researcher's field notes. A number of open-ended questions guided the researcher in gathering the information. The main question in this study was "What is your perception of the barriers to quality and timely implementation of IV CT?" Other questions were subsequently raised to attain more in-depth information. Some interview questions have been presented in Table 1.

Concurrently with data collection, data analysis was performed, too. The interviews were audio-recorded after the interviewee's agreement. At the end of each interview, the recorded statements of the participant were listened to repeatedly, and the statements were transcribed verbatim. In the present study, the second author (MS.M.) conducted face-to-face interviews with participants. She had interests in the research topic and transcribed the interviews verbatim. The first author (S.S.) analyzed the typed transcripts.

In the present study, the four criteria proposed by Lincoln and Guba (29), including credibility, confirmability, transferability, and dependability, were used to ensure the rigorousness of the study. To ensure credibility, the extracted codes were sent to the participants for confirmation. Their confirmation indicated the validity of the codes (member check). Additionally, the researcher sent the findings and extracted codes to be examined and validated by an expert on qualitative research (N.B.) (peer check). To improve confirmability, bracketing was used, and also the stages of the study and the decisions made during it were recorded and reported in detail so that other researchers can follow the audit trail if they so wish. More than one researcher was involved in the data analysis process to ensure dependability. In the present study, the second author (MS.M.) revised the coding process. We asked the external expert colleague (N.B.) to revise the coding and categorize. Transferability was made possible by selecting participants from various locations and with different demographic characteristics. In the present study, the participants were selected from different settings.

2.4. Data analysis

The content analysis approach proposed by Graneheim and Lundman was applied (25). Each transcript was studied several times to understand the experiences and impressions of the participants. In the transcripts, sentences containing significant or relevant information were underlined to highlight important statements. Then meaningful units were summarized in condensed form and the initial codes emerged. S.S. studied the initial codes thoroughly and classified them into subcategories based on their similarities in the concepts. Through this inductive procedure, similar subcategories were classified into the main categories. This coding process and the emergence of the main categories were reviewed and discussed by the second author (MS.M.) and by an experienced researcher (N.B.) with S.S. Finally, categories were determined as the expression of the implicit content of the transcripts.

All authors are faculty members of medical universities and have Ph.D./M.Sc. degrees in nursing/ English language education. The first/second authors are female and the third author is male. All of them are trained and experienced in the methodology of content analysis. The participants were included in the present study from the target population by purposive sampling. There was no previous relationship between the researchers and the participants. Only a relationship was established prior to the commencement of the study to introduce the researcher, to explain the reasons for doing the research, and to take the written informed consent of the participants.

3. Results

The participants in the present study included 41 individuals, namely 6 patients, 5 family caregivers, 18 nurses, and 12 oncologists (Table 1).

Data analysis led to the emergence of 200 codes and two main categories, each with three subcategories: 1. Barriers related to HCPs consisting of “Educational and communication barriers”, “Failure to establish trust”, and “Unskilled healthcare professionals”; 2. Barriers related to the HCS, which consists of “Inadequate physical and care infrastructures to provide services”, “Lack of support in the disease

trajectory from diagnosis to rehabilitation”, and “Mismanagement of CT wards/procedures”. All categories, subcategories, and examples of participants’ quotations are presented in Table 3.

Table 3
categories, subcategories and some participants' quotes.

Some Participants' Quotes	Subcategories 1	Subcategories 2	Main categories
<p>“Patients may not have enough knowledge and because they do not know how, they cannot cope with the stress and may sometimes react to the stress and may not start the treatment at all.” (Oncologist 10)</p> <p>“Educational barriers are another contributing factor. If nurses do not have enough knowledge about how to educate their patients properly, patients may not follow up with treatments.” (Nurse 1)</p>	<p>Providing insufficient information and education to patients</p>	<p>Educational and communication barriers</p>	<p>Barriers related to healthcare professionals</p>
<p>“The patient encounters a series of unfamiliar complications that he does not know what to do about and gets confused. He refuses to continue the treatment. However, if he were informed and side effects were controlled and the patient was supported, it would not end like that!” (Oncologist 1, Patient 1)</p> <p>“Some information is given to the patient and the patient's family caregiver, which is useless to the patient and his family caregiver, and just causes fear and panic.” (Oncologist 2)</p>	<p>Lack of individualized patient education</p>		
<p>“I think that it is crucial for the doctor to be native to his place of practice, such that his home is located in the same city as his practice. His mother and his family should be there. This makes it easier for patients to have access to the doctor. ... Another point that I think is important is that the doctor is a native of the same area, understands the language of the patients well. This in itself is helpful. The cultural issues that exist, the differences that exist ... I sometimes have to ask the patient perhaps up to four times to find out whether he/she has abdominal pain, or to understand the request he/she has from me.” (Oncologist 9)</p>	<p>Non-native oncologists and the resulting communication problems</p>	<p>Failure to establish trust</p>	

Some Participants' Quotes	Subcategories 1	Subcategories 2	Main categories
<p>“Poor communication and insufficient education cause the patient to be caught off-guard when a complication or problem develops that he/she has not been informed about. As a result, the patient does not trust the healthcare staff any longer and quits treatment.” (Oncologist 11)</p> <p>“Crowded treatment centers, getting to work late, mistakes that may be made, negative attitudes of HCPs, errors and problems with their medications, ... these may cause patients to lose their trust in the treatment system.” (Nurse 1)</p> <p>“They told me I wouldn’t have hair loss, but after the fifth session, I experienced hair loss. I got fed up and said I won’t go for treatment. My spouse said you should finish your chemotherapy sessions. I said it made no difference. I will die in the end. So, why should I undergo chemotherapy?” (Patient 4)</p>	<p>Poor educational and communication attention</p>		
<p>“An internist had told a patient’s attendants and the patient himself/herself that his/her illness was terminal and treatment is pointless. The patient did not refer for treatment, and six months later returned with cerebral metastasis.” (Oncologist 9)</p> <p>“The diagnosis of my patient’s condition took almost three months.” (Family caregiver 1)</p>	<p>Providing Wrong information due to insufficient knowledge/patient education</p>		

Some Participants' Quotes	Subcategories 1	Subcategories 2	Main categories
<p>“This is a great problem that nurses do not have enough awareness, are not effective enough, or are not willing to take on responsibilities.” (Family caregiver 3)</p> <p>“Insufficient skills and unfamiliarity of nurses working in chemotherapy and oncology wards with the drugs are barriers to successful chemotherapy.” (Nurse 5).</p> <p>“Insufficient skills and unfamiliarity of nurses working in chemotherapy and oncology wards with the drugs are barriers to successful chemotherapy.” (Nurse 5).</p> <p>“Nursing Procedures are mainly conducted during the injection of chemotherapy drugs and most importantly involve sterile drug preparation. Since these patients are very susceptible to infection, this means that the drug should be prepared sterilely under a hood. It is very important to pay attention to the dosage and drug dissolution method, premedication drugs, and the drug solvent that are being used, and to ensure proper chemo port implantation, its operation, and the needed care during the injection. How to dissolve some drugs is also important. If we try to dissolve the drug quickly and give it strong shakes, since the contents of the drug are fragile, the drug becomes less effective. These events cause the patient not to get the desired result from his/her treatment.” (Nurse 1)</p>	<p>Inadequate technical skills of healthcare professionals</p>	<p>Unskilled healthcare professionals</p>	

Some Participants' Quotes	Subcategories 1	Subcategories 2	Main categories
<p>“Because they had not diagnosed the patient's problem, they immediately operated on him. When they opened his abdomen, they realized that he had cancer. After the operation and removing a segment of the colon, the surgeon said that he did not need chemotherapy.” (Family caregiver 1).</p> <p>“Lack of skills of healthcare providers in identifying patients who do not adhere to treatment [is another factor].” (Nurse 16)</p> <p>“Unfortunately, it is assumed that surgeons [involved in the treatment of cancer] are somewhat aware of the steps involved in chemotherapy. But they are not aware of all the steps. This is due to the lack of knowledge of our surgical colleagues. They do not know. They are not aware of the staging of the disease, and they give incorrect information to the patient and this causes the patient not to refer for chemotherapy or to refer too late.” (Patient 7, Oncologist 9)</p>	<p>Healthcare professionals' lack of practical knowledge</p>		
<p>“The main problem is lack of sufficient beds for hospitalization of patients undergoing chemotherapy, which sometimes leads to excessive waiting for hospitalization.” (Oncologist 1)</p>	<p>Inadequate number of hospital beds</p>	<p>Inadequate physical and care infrastructures to provide services</p>	<p>Barriers related to the health system</p>
<p>“To perform chemotherapy effectively, I have to have a clean and equipped ward. Also, the patient's chemotherapy is often delayed because we do not have an empty bed in the ward.” (Oncologist 9)</p>	<p>Lack of a clean and calming care environment to provide the desired care</p>		
<p>“Sometimes a medicine runs out and is not on the market, and it takes time to purchase it, which delays the next course of chemotherapy.” (Oncologist 11, Nurse 8)</p> <p>“Medications are often expensive, cannot be easily found, and some patients come for treatment late due to the costs and other problems.” (Family caregiver 5, Oncologist 4)</p>	<p>Drug shortages</p>		

Some Participants' Quotes	Subcategories 1	Subcategories 2	Main categories
<p>“Cancer treatment requires teamwork. A full team should be on hand for the treatment to go well and give good results. Unfortunately, we are alone. It’s only the patient and us. And we get tired and do not have enough time. There are many patients. There should be someone by our side who can train the patients and encourage them to carry on.” (Oncologist 8)</p> <p>“When two nurses perform chemotherapy on 20 patients at the same time due to lack of nursing manpower, mistakes are very likely to be made and the desired outcome may not be achieved.” (Nurse 3).</p>	<p>Inadequate numbers of chemotherapy nurses and specialists in the healthcare system/healthcare professional shortages</p>		
<p>“Because of the high workload, we cannot often educate the patient completely. In many cases, the patient may not receive the support he/she needs after chemotherapy, again partly due to the amount of work we have, partly due to other barriers/problems.” (Oncologist 4)</p>	<p>Lack of comprehensive support and follow-up for patients from diagnosis to rehabilitation</p>	<p>Lack of support in the disease trajectory from diagnosis to rehabilitation</p>	
<p>“In some patients, there may not be an agreement between the oncologist and the surgeon at the start of chemotherapy, and a multidisciplinary team is needed to treat the patient together.” (Oncologist 9)</p> <p>“Multidisciplinary teams are needed to guide patients during the treatment trajectory.” (Oncologist7)</p>	<p>Lack of multidisciplinary teams</p>		

Some Participants' Quotes	Subcategories 1	Subcategories 2	Main categories
<p>“We do not have academically trained chemotherapy nurses, and we have few experienced nurses working in the wards.” (Nurse 3, Oncologist 9)</p> <p>“Chemotherapy nursing management/supervision is poor.” (Nurse 14)</p> <p>“Chemotherapy is [sometimes] performed by untrained nurses or assistant nurses.” (Oncologist 9)</p> <p>“We do not have experienced nurses and a clinical pharmacist in the chemotherapy ward. Nurses are not skillful enough in venipuncture and this sometimes causes drugs to leak under the skin.” (Nurse 15)</p>	<p>Failure to employ expert healthcare professionals</p>	<p>Mismanagement of chemotherapy wards/procedures</p>	
<p>“The presence of inexperienced nurses working in the chemotherapy ward due to the transfer of experienced nurses from the ward or nurses quitting the job.” (Oncologist 11)</p> <p>“Working in oncology departments is not popular among nurses. So, nurses who are here have to work here, or they are nurses who have been excluded from other departments, or they have had problems in their work and they have been exiled and they work here.” (Nurse 14)</p>	<p>Compulsory employment of some nurses in chemotherapy wards</p>		
<p>“When two nurses perform chemotherapy on 20 patients at the same time due to lack of nursing manpower, mistakes are very likely to be made and the desired outcome may not be achieved.” (Nurse 3).</p> <p>“Nurses working in oncology departments in this system are not well supported and are not respected.” (Nurse 2)</p>	<p>Inadequate nursing staff and lack of suitable support for nurses working in chemotherapy wards by authorities</p>		

Some Participants' Quotes	Subcategories 1	Subcategories 2	Main categories
<p>“Insufficient nursing skills and/or failure to supervise and guide nurses during venous catheterization, which can lead to extravasation of chemotherapy drugs.” (Oncologist 9, Nurse 1)</p> <p>“This is a great problem that nurses do not have enough knowledge, are not effective enough, or are not willing to take on responsibilities.” (Nurse 13)</p>	<p>Failure to provide training to healthcare professionals and its consequences</p>		

3.1. Category 1: Barriers related to HCPs

The participants mentioned the presence of educational and communication barriers, so that lack of proper communication with the patient causes the patient's unfamiliarity and lack of knowledge about the complications of treatment, and the resulting uncertainty and fear of the unknown are not addressed by HCPs. Additionally, the failure to educate and inform the patient adequately causes confusion and non-adherence to treatment.

Because the lack of education or incomprehensibility of the information given to the patient and her/his family causes fear and panic and exacerbates their mental conditions, it can cause frustration and lack of follow-up with the treatment. One barrier to starting and continuing IV CT was the lack of individualized patient education, which means the “lack of specific education appropriate to the patient's individual condition.”

Participants experiences showed that inaccurate and un-individualized education might lead to the patients' distrust. Moreover, wrong information received from specialists other than oncologists undercuts the patient's morale, such that he/she does not refer for CT.

Participants stated that one of the issues that cause distrust in the patients is non-native oncologists and the resulting communication problems. If patients do not trust their HCPs and HCS and they are not acceptable to them, the CT process will fail.

The participants' experiences showed that lack of technical skills and practical knowledge are effective barriers to IV CT. The participants of the present study cited unawareness of surgeons of the stages of CT, improper administration of CT drugs, delays in diagnosis, and consequently patients' delayed referrals, lack of skills in identifying patients at risk of poor adherence to treatment, and lack of experienced nurses in the wards as barriers in starting and continuing the CT process.

3.2. Category 2: Barriers related to the HCS

The participants cited inadequate numbers of beds for the timely hospitalization of patients undergoing CT, long waits for their turns, lack of a clean and calming care environment to provide favorable care, lack

of desired treatment of the patient due to lack of a multidisciplinary team, absence or shortage of some CT drugs prescribed to patients, and inadequate numbers of qualified CT nurses and specialists in the HCS as the barriers to the quality implementation of CT.

Participants described the need for the continuous and ongoing support of cancer patients from diagnosis to rehabilitation, the absence of which would challenge the CT process. The participants pointed to the importance of post-CT support and health professionals' lack of time in educating patients undergoing CT. The high cost of drugs and the scarcity of drugs are other barriers to the effective implementation of quality CT.

Participants concluded that poor management/supervision of the CT process and CT wards, the inadequate number of oncological nurses, inadequate numbers of expert HCPs in health teams to provide quality care, failure to train HCPs and its consequences, involuntary employment of nurses in CT departments, and authorities' failure to support these nurses are factors contributing to lower quality of care during CT, and which act as barriers to the quality administration of IV CT.

The shortage of qualified HCPs in the health team to provide quality care is a barrier to the implementation of quality CT. Participants noted a lack of training courses for nurses and HCPs involved in the CT process and that this could reduce the quality of care. Inadequate training of nurses in essential work areas leads to deficiencies in their skills, for instance, in inserting an IV line and in administering IV drugs.

Participants considered disinterest in work and forced service of some nurses in oncology wards and the authorities' failure to provide support for nurses working in CT wards as barriers to successful CT. The forced employment of nurses in CT departments reduces the quality of care.

4. Discussion

The purpose of this study was to identify barriers related to HCPs and HCS in the implementation of quality and timely IV CT. In the present study, participants noted miscommunication between HCPs and patients, especially during patient education, and subsequently patients' distrust as barriers to the implementation of quality IV CT. Other studies confirm that one of the most important factors in the healthcare system that affects adherence is the relationship that care providers establish with patients (26). Findings from a study by Wu et al. showed that some patients reported that incidents of non-adherence occur due to inadequate training or unavailability of immediate medical guidance. One of the reasons for non-adherence includes physician-patient communication issues (27). According to Ghoshal et al., newly diagnosed cancer patients report more distressing symptoms, however, oncologists do not pay enough attention to them (28). Poor communication, lack of trust, and patient dissatisfaction and distrust in caregivers are also involved in poor adherence (21).

The purpose of education and proper communication with the patient is to empower patients in self-care and management of CT complications, which increases the patient's adaptation, tolerance, and

adherence to CT and results in more successful treatment. Therefore, if the education of and communication with the cancer patient are not carried out well, this can be a barrier to implementing quality and timely CT.

In the present study, non-native HCPs and the resulting communication problems and poor attention to communication and patient education and providing inaccurate and wrong information to patients and family caregivers caused a sense of distrust in the HCS and HCPs and prevented patient referral. Therefore, it may be a barrier to timely visits and quality of CT or the continuation of the CT process. Dean's study showed distrust in HCS is negatively related to treatment adherence, defined as the failure to initiate or complete physician-recommended adjuvant treatment after breast cancer (29). The barriers to adherence include physicians' failure to accurately explain the benefits and side effects of CT, lack of attention to costs, and poor communication regarding treatment (30).

Participants noted HCPs' lack of practical knowledge and skills and lack of communication skills and training as barriers to effective chemotherapy. Evidence suggests that health professionals have poor skills in accurately identifying non-adherent patients (31, 32). Sharour also showed that nurses' knowledge about chemotherapy management was insufficient, affecting the quality of care for patients with drug extravasation (33). A study by Salarvand et al. showed that nurses working in chemotherapy departments did not have sufficient skills in IV line insertion and control of drug extravasation. The same study showed that oncologists' skills in establishing communication and giving bad news to patients are essential when providing care to such patients (34). These mentioned cases can lead to a decline in the quality of care and lack of quality IV CT.

Some participants mentioned a lack of clean and calming care environments. In a study by Summerhayes, nurses and pharmacists expressed the need for sanitary rooms and space (35). A study by Salarvand et al. showed that the development and improvement of care and physical environment to provide services, the need to maintain personal and environmental hygiene during the course of chemotherapy by patients and their families, emphasis on a calming chemotherapy environment in terms of structure, personnel, and facilities, and the need to maintain the privacy and respect of the patients undergoing chemotherapy were among the care needs pointed out by oncologists that were lacking (34).

Participants in the present study cited drug shortages as a barrier to timely and successful CT. Studies have shown that drug shortages are common in the United States and have increased significantly over the past decade (36). Delays in treatment, disruption of treatment, lack of treatment options for certain cases, and replacement of drugs in less effective and harmful regimens can adversely affect the prognosis and outcomes (37). The shortage of injectable chemotherapy drugs puts the successful treatment of cancer patients at risk (38).

Participants cited insufficient numbers of nurses and chemotherapy HCPs in the care system as a barrier to quality CT. Wise has reported that the shortage of specialist oncological nurses in the chemotherapy department caused this ward to be closed down at a hospital (39). The shortage of HCPs leads to increased workload and pressure on other staff, which will hinder the quality of care during IV CT.

Participants stated a lack of follow-up and patient support from the time of diagnosis to rehabilitation as a barrier to quality CT. Other studies confirm that a lack of patient support in various aspects can lead to failure to show up for follow-up and treatment failure (40). In a study by Salarvand et al., oncologists mentioned that one of the priorities in caring for patients undergoing CT is the existence of comprehensive support for various aspects of the cancer disease trajectory from diagnosis to rehabilitation (34). This may be due to HCPs' unawareness of the needed support or lack of infrastructure to provide the support.

The present study demonstrated that one of the barriers to patients' adherence to IV chemotherapy was a lack of cooperation among HCPs and multidisciplinary teams. Carroll's study also showed that a lack of coordination among individuals involved in cancer care can be a cause of non-compliance and treatment failure (40). If there is no multidisciplinary treatment team in the care structure, this may be a barrier to quality care during CT.

Participants mentioned poor management, including failure to employ expert healthcare professionals, compulsory employment of some nurses in chemotherapy wards and its consequences, inadequate nursing staff and lack of suitable support for nurses working in CT wards by authorities and failure to provide training to healthcare professionals and its consequences as barriers to the quality and successful implementation of IV CT. In the study by Summerhayes, nurses and pharmacists working in oncology wards pointed to HCP shortages, increased workload and stress, increased waiting times, and a significant imbalance between CT workloads and HCPs capacity to initiate IV CT (35).

Participants pointed to the forced employment of some nurses in chemotherapy wards and inadequate support for nurses working in these wards by authorities. No study was found on the compulsory employment of nurses in oncology and CT wards and the support and respect they received. Toh found that nurses, who worked in sub-standard work units, often expressed dissatisfaction, stress, and burnout, which encouraged them to seek a new job out of oncology (41).

Participants reported a lack of training for HCPs and, consequently, inadequate knowledge and skills of HCPs regarding the management of IV CT. No completely relevant study was found on this topic. Findings from other studies confirm this. Two studies showed that the number of nurses who were trained in the safe administration of chemotherapy before starting work is small, most nurses receiving this training while working in a CT center. For this reason, nurses experience anxiety, irritability, and fear while performing chemotherapy due to a lack of prior training on the subject (42). Many nursing programs do not teach difficult communication skills such as giving bad news or answering difficult questions (Such as "Am I dying?") (43). In a study by Salarvand et al., oncologists stated that they had not been trained in the skills of communication with and in giving bad news (36). The fact is that many practical and theoretical skills, such as breaking bad news, the attention to patient assessment and its condition, are not taught adequately in educational curricula and retraining programs. This reduces the quality of CT care.

5. Conclusion

Identifying barriers related to HCPs, admission and hospitalization facilities for patients undergoing CT, as well as building trust and honest communication, providing support in various aspects of the quality implementation of IV CT and educating the patient and his family, designing effective treatment programs and providing effective follow-up with patients all play a role in improving the quality of CT and its outcomes. Education and communication with cancer patients and their family caregivers are two important pillars in the quality implementation of injectable chemotherapy, and this education and communication should be based on individualized care and tailored to the unique needs of each patient to support the patient during treatment. And more supportive interventions should be considered for patients who need it most.

Abbreviations

Intravenous (IV); Chemotherapy (CT); Intravenous chemotherapy (IV CT); Healthcare professionals (HCPs); Healthcare system (HCS).

Declarations

Ethics approval and consent to participate

Data collection was performed after the approval of the project in the research ethics committee. The ethics committee of the Lorestan University of Medical Sciences (LUMS) approved this study (approval code no. IR.LUMS.REC.1396.308). Then the consent of the officials of the relevant hospital centers and informed written consent from the participants were obtained. Additionally, participants were informed of the objectives and methods of the study, including the need to record interviews as well as their rights, including the confidentiality of information, anonymity, and the unconditional right to withdraw from the study.

Consent for publication: N/A

Competing interests: None declared.

Authors' contributions:

SS: Design of the study, analysis and interpretation of data, drafting the work and substantively revising the article. **Ms-M:** Conducting the interviews, transcription of the interviews, revising the coding process.

MA: Revising critically for important intellectual content and translating the article into the English language. The authors read and approved the final manuscript.

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Availability of data and materials

All datasets analyzed during this study are available from the corresponding author on reasonable request.

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