



Challenges of the pharmaceutical supply chain in a developing country: A qualitative study

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ABSTRACT

Background: Pharmaceutical supply chain has a critical role in the procurement of medications, Iranian health-care system encountered many challenges in this scope because of the national and international barriers. In this regard, this study aimed to determine challenges of the pharmaceutical supply chain in Shiraz, the largest southern metropolitan in Iran.

Materials and Methods: In this qualitative study, we included 32 experts through purposeful sampling method. Data gathered using a semi-structured interview and saturation level were achieved with these interviews. Thematic content analysis was used after data transcription. Related codes, subthemes, and themes were extracted applying MAXQDA 10. **Findings:** Seven main themes were achieved as the main challenges of Iranian pharmaceutical supply chain including pharmaceuticals financing, pharmaceutical information system, the pharmacists' role, educational challenges, pharmaceutical cheating, insurance and reimbursement, and other issues.

Conclusion: According to the results of the study, it is suggested that health-care policymakers need to strengthen the infrastructures in the area of pharmaceutical supply chain. These infrastructures include developing public health insurance, improving information systems and electronic prescriptions and increased collaboration with university-affiliated research centers.

Keywords: Challenge, Iran, pharmaceutical supply chain, qualitative study

INTRODUCTION

The ultimate goal of health-care systems is improving population health status.^[1] Pharmaceutical products considered as a strategic commodity in health systems, and availability of them is vital for the countries; otherwise, it may cause severe health, economic, and political crisis. Pharmaceutical supply chain management in governmental sectors especially in developing countries is an important determinant of increasing public access to the medications.^[2]

Pharmaceuticals providers divided into three layers, the first one is producers or importers, in the second layer there are a few distributors and wholesale customers in which providers can sell their productions to these customers, or stock them directly in warehouses. The final layer consists of three final categories of customers including pharmacies,

clinics and hospitals, and end users or patients.^[3] Unexpected demand, cold supply chain, and direct governmental supervision are the specific conditions of the pharmaceutical supply chain.^[4] The quality of supply chain management has a notable influence on the overall cost and quality of outcomes. The inevitable relationship between medications and health, the high social cost of pharmaceutical shortage, the necessity of high-quality health services, and the importance of correct pharmaceutical inventory management indicates importance of accurate planning and precise control system. Supply chain management optimizes this flow and reduces the costs caused by the intermediary loops.^[5]

Pharmaceuticals have a fundamental role in an appropriate health service performance. The majority of curative and preventive services are related to the medications. Access to the medication considered as a quality indicator of health services

by patients. Furthermore, the country's pharmaceutical system, which consists of production process, importing, dispensing, prescribing, and delivering medications to users and finally taking medications by patients, is considered as the most important health-care chains. The ultimate goal of this system is maintaining and promoting public health. Based on that, this system should be continuously evaluated and reformed to solve its potential problems and to open up new ways to reach its goals.^[6] Against these emphases on the importance of pharmaceutical supply chain, the present situation of the country encounters some inevitable national and international challenges. Iran is a country situated in the Middle East with about 80 million population; statistics show that about 90% of the population access to public insurance; however, the coverage of the insurance is very weak especially in the reimbursement of the pharmaceuticals.^[7] Along with these national challenges in Iranian supply chain that influences the people's access, in recent years, Iran encounters some economic-political sanctions that may affect the pharmaceutical market especially in the scope of importing brands, exporting domestic products, and financial exchanges.^[8]

In this regard, a study showed that a well-adapted pharmaceutical supply chain in Iran should improve some indicators the same as coordination, resource planning logistics management, knowledge and financial management, customer relationship management, and medical insurance system.^[9] Another study indicated that to improve pharmaceutical supply chain especially in the hospitals must emphasize on proper training to employees, using the fixed-rate shopping system, and providing facilities to patients are recommended.^[10]

According to what was said and due to the shortage of researchers in this field, this study aims to determine challenges in the pharmaceutical supply chain in Shiraz, as the largest metropolitan and the main referral system in health care in the Southeast of Iran using a qualitative approach. Results of this study would be beneficial for health-care managers and policymakers.

MATERIALS AND METHODS

This qualitative study conducted in Shiraz, capital of Fars Province, as one of the metropolises of Iran in the year 2015. The study population consisted of a network of pharmaceutical suppliers (e.g., importer, producers, and medication distribution companies) and some other suppliers at the retail level (e.g., hospital's pharmacies and other drugstores all around the city). To achieve a round view of the experts, all the stakeholders from different parts of the chain from retail market to the wholesale trades were considered as the study population.

In this study, to identify and access to participants, the purposeful sampling method was applied. In other words, participants selected and interviewed because they have had valuable experience in pharmaceutical supply chain management. These participants were included through snowball sampling in a way that each selected participant led to another expert in this area. Based on this, managers of Food and Drug Organization affiliated to the Shiraz University of Medical Sciences, pharmacy technician supervisor or managers of pharmaceutical distribution companies, managers

of pharmacies which located in the city and hospitals were interviewed. The importer and producer companies were excluded from the study because they are not located in Shiraz and due to the problem of accessing them. Those participants who did not interest to talk also excluded from the study.

Generalization is not the goal of most qualitative studies, unlike quantitative studies. Accordingly, the sample size in qualitative studies is not very big, and it has not focused on macro-level. In this basis, data saturation used for ensuring that adequate participants are interviewed to support the study,^[11] and data collection continued to the point that no new insights observed.

In this study, we had reached a point of saturation by conducting 32 interviews. Six meetings have held in Food and Drug Organization, six interviews were conducted with pharmacy technician supervisor or managers of pharmaceutical distribution companies, and the rest 20 interviews were carried out with managers of pharmacies.

Data were gathered using a semi-structured interview. In a semi-structured interview, questions have already formulated, but can be developed during the discussion based on the interviewees' responses. In this study, first, a semi-structured interview guide was prepared based on literature review and theories. Then, questions filtered by experts' opinion and their suggestion. Following that, the study permission license was taken from the Shiraz University of Medical Science, which allowed us to start the project. Then, participants were visited and informed about the study goals. After that, each participant approved to take part in the study, an appointment scheduled for interview. Choosing the place and time were based on participant interest. All interviews recorded with member's consent. Furthermore, interviewer took notes while taping. Interviews last on average 20–40 min.

During the interview, the interviewer got the opportunity to get all information from the interviewee by exploring a particular theme or probing. In this study, the interviewer wanted to find a comprehensive perspective on pharmaceutical supply chain challenges. In this case, interviewer tried to phrase questions in a way to provide detailed answers to reach the study goal. In qualitative research, interviewer requires some level of training and good communication skills, which leads to extracting the actual data from the interviewer. The actual data can add on the validity of the study. It is also suggested to redo the interview with participants regarding the information that they have already provided which leads to clarity and validity of the study.^[11,12]

To handle contradictions in the data, one researcher conducted interviews, another researcher did the coding and analysis immediately after each interview, and finally data coding revised by a third researcher.

This qualitative study was conducted through thematic content analysis. At first, interviewer clarified the topic and the aim of the study to the participant then assured that their personal information will remain confidential. In this study, codes, subthemes, and themes were extracted applying MAXQDA 10. Participants had the right to leave the study at each stage of the interview. The inclusion criteria were adequate scientific or executive experience in pharmaceutical

supply chain management and willingness to participate in the study.

This study was approved by the Ethical Committee of Shiraz University of Medical Sciences under the code IR.SUMS.REC.1395.S727.

RESULTS

Data analysis of this study leads to the extraction of seven main themes on challenges of pharmaceutical supply chain management including pharmaceuticals financing, pharmaceutical information system, the pharmacists' role, educational challenges, infraction and cheating in pharmaceutical scope, insurance and reimbursement, and other issues [Table 1].

Challenges in Pharmaceutical Financing

In this study, pharmaceutical financing considered as one of the important challenges. Some participants pointed to the lack of specific financial resources for pharmaceutical supplies. One of them stated:

"In the inpatient care, financial resources are allocated to the pharmaceutical sector based on governmental budget. In spite of allocating money to this sector, because of the nature of global budget instead of need-based budget or other performance based payments, the priority of pharmaceuticals are always situated after the other sectors the same as treatment procedures, surgeries,..." [P5].

Another participant mentioned a problem regarding the lack of transparency in financing pharmaceuticals:

"There are not clear and correct pharmaceutical financing, money dedicated to pharmaceutical supplies will charge for another purpose, so in the pharmaceutical chain, the greatest challenge would be attributed to the financial resources" [P3].

Furthermore, in the pharmaceutical distribution area, participants pointed at failure to allocate provincial share of financial recourses as a challenge of pharmaceutical financing:

"In the distribution network, the allocated share should be preserved, for example, if Fars Province asked for intravenous immunoglobulin, through an appropriate monitoring system, other regions should be assured that they can access to their own share, but, unfortunately, there is no equity among all the provinces, in the way that those larger and more affluent regions or those nearer to powerful lobbies can absorb more financial recourses" [P18].

One of the participants stated that we have a problem in importing pharmaceutical supplies and told:

"We do not have a problem in providing medications except for importing pharmaceuticals which are not made in Iran specially at the time that we face with economic-political sanctions that limit the ability of transporting financial recourses or when we have not already imported enough pharmaceuticals which are due to lack of allocating enough money for import based on the policy of the government to support domestic production" [P1].

Challenges in Pharmaceutical Information System

In this study, participants pointed to the lack of an integrated information system to track pharmaceutical supplies path and medication. In this case, one of them stated:

"We have not yet had the mechanized system that can track the pharmaceutical supplies path starting from production or importing till the time that the end user received it for outpatient care" [P4].

Some of the participants addressed the hospital information technology deficits and lack of electronic prescription, which causes poor access to the patient information.

Another issue stated was the ordering method. While some companies have online ordering system, other corporations and pharmacies use the manual order system:

"Our ordering is manually and through telephone, and we do not use the online system at all. We usually use daily order based on our needs which lead to wasting our time with sale representatives" [P10].

Challenges Related to Pharmacists' Role

In this study, there was an emphasis on diminished pharmacists' role as a problem. Participants stated that pharmacists were not at their desired position which is defined for this field of study.

"Pharmaceutical services in inpatient care have not yet settled down. It means that the expected pharmacists' role in providing care to the patient has not yet recognized in our country and pharmacists' role in our country is just preparation and provision of medications which is the small part of the pharmaceutical service package" [P6].

Mistrust of both physicians and people toward pharmacist was also one of the challenges that the majority of participants addressed:

"People have not yet believed that pharmacist can also be helpful in many cases such as a physician. Physicians also do not trust pharmacist" [P11].

Lack of pharmaceutical consultancy services also stated as another problem.

"One of the significant challenges in pharmacies is that our pharmacists do not provide pharmaceutical consultancy which is caused trouble for people" [P2].

Challenges of Education in Pharmaceutical Field

Misalignment between pharmacy education and its working condition stated as another challenge.

"In my opinion, one of the challenges is that people who were educated and graduated as pharmacist were not suitable for pharmacy, industry, and even hospital. Hence, we have an issue in our system which solves by specializing the pharmacist education system. It should be clear whether the pharmacist is educated to work in pharmacy, hospital, or industry" [P1].

Table 1: Main themes and sub-themes related to challenges of pharmaceutical supply chain

Central theme	Secondary theme
Pharmaceutical financing	Lack of specific financial resources for pharmaceutical supplies in the governmental executive budgets Lack of transparency in financing pharmaceuticals Failure to comply with provincial quotas in the distribution system Pharmaceutical sanctions Pharmaceutical import problems and governmental support for domestic production
Pharmaceutical information system	Lack of an integrated system to track pharmaceutical supplies path Lack of electronic prescription Problems of the pharmaceutical ordering system
Pharmacists' role	Diminished pharmacists' role Mistrust of both physicians and people toward pharmacists Lack of pharmaceutical consultancy services
Education	Lack of training tailored to the work of pharmacists Lack of appropriate education for pharmacy technicians
Infraction and cheating in pharmaceutical scope	Medication smuggling in the pharmaceutical market Collusion between pharmaceutical companies, physicians, and pharmacists to gain more profit Asking physicians to prescribe certain medications by pharmacies Delivering medications which are close to their expiry date to the pharmacies by the distribution companies Focusing on special pharmaceutical brand-name by people and physicians Special offers rendered by companies to sell their medications
Insurance and reimbursement	Insufficient insurance coverage Delays in reimbursement by insurance Absence of public insurance Problems for reimbursement of pharmaceutical distribution companies
Other issues	The frequent attendance of sales representative to get orders Irregular increase in pharmaceutical companies and pharmacies Family physician plan and increasing level of patients' expectations

Lack of appropriate education for pharmacy technicians also noted as a challenge.

"In our country, people just can be educated as a doctor of pharmacy; we do not have a technician or the bachelor of pharmacy. Hence, people who work in this area have not gotten a related education which leads to errors in the system. These errors may lead to death" [P26].

Challenges Related to Infraction and Cheating in Pharmaceutical Scope

Concerning the economic incentives of distribution companies, one of the participants mentioned:

"One of the most dangerous incentives for the pharmaceutical companies is financial incentives. Companies usually look for the ways to sell more medications to gain more profit" [P5].

One of the participants pointed to the medication smuggling in the domestic pharmaceutical market which is due to financial incentives.

"Medication smuggling exists due to its strong financial incentives; there is a problem that most of the pharmaceutical sellers and drugstores involved in medications smuggling which needs to be handled properly" [P7].

Providing medications which are close to their expiry date by distribution companies were also another challenge.

"We may receive the medications from the distribution company which is near to its expiry date; we should be aware of that, otherwise sending back the expired medications causes trouble for us" [P30].

Collusion between pharmaceutical companies, physician, and pharmacists to gain more profit also stated as a challenge:

"Unfortunately in pharmaceutical domain, some pharmaceutical companies create incentives for the number of doctors, pharmacists, and pharmacy technicians. We have problems with some physicians who got some revenue by referring patients to specific drugstores" [P4].

One of the participants pointed out to companies financial offers and stated:

“Some of the pharmaceutical distribution companies provide financial offers for pharmacies to sell their medications which are mostly close to their expiry date” [P25].

Paying more attention to special pharmaceutical brands by people and physicians due to cultural issue and financial incentives, stated as another challenge:

“Branding has the most important role in the pharmaceutical industry. Based on that, physicians and pharmacists both may spend money out of people’s pocket by prescribing brand medications” [P19].

The majority of participants emphasized the tendency of both physicians and patients to use the medications of the specific companies.

“Our customers do not accept all companies; they ask us to provide medications to companies which they want. Hence, most of the time, they use the particular medication of specific company” [P20].

Challenges of Insurance and Reimbursement

Insufficient insurance coverage stated as another challenge by participants. One of them noted:

“Insurance policy has some problems itself; for example, our insurance companies provide coverage for growth hormone medication which is expensive and unaffordable for a specific group of patients. The question comes up: What kinds of health-care problems will solve in return? Or, insurance companies provide coverage for the adult cold tablets which are cheap. At the same time, some cancer drugs which are vital for patients’ survival were not covered by insurance companies” [P16].

Delay in insurance reimbursement was another challenge stated by most of the participants. One of them stated:

“Failure in on time reimbursement locks up financial capital of companies and pharmacies in the insurance companies and causes some problems for medication supply chain” [P3].

Other Challenges

The frequent attendance of sale representatives to get orders was highlighted as a challenge:

“We often buy medications daily; it is possible that 20 sale representatives come here daily, but we cannot work with all of them. It is a result of irregular increase of pharmaceutical companies. We should try to manage this by selecting one who works in a better condition and more organized” [P12].

In family physician plan, some medications will be freely available by the prescription of family physician which result in some challenges and misinterpretation by people who use health services. In this regard, one participant noted:

“Our greatest problem was with patients. Family physician plan resulted in an increasing level of expectations in patients. For example, the patient does not expect to pay for a prescription with a small number of medications” [P21].

DISCUSSION

Pharmaceutical supply chain is a strategic domain in all health systems and determining its related challenges could be helpful for health-care managers and policymakers for promoting performance health-care system.

We classified challenges of the pharmaceutical supply chain into pharmaceuticals financing, pharmaceutical information system, the pharmacists’ role, educational challenges, pharmaceutical cheating, insurance and reimbursement, and other issues.

In line with the results of our study, findings of a study by Barati *et al.* in 2015 showed that critical challenges of pharmacies in Shiraz were related to pharmaceutical information system, depreciation of resources, shortage of clinical pharmacists, and a shortage of physical area.^[4] Study of Kamath *et al.* revealed four main types of risks in the pharmaceutical supply chain including regulatory risk, inventory risk, counterfeit risk, and financial risk.^[3] These findings also confirm results of our study.

This study showed that pharmaceutical financing was a critical challenge which significantly increases individuals’ out of pocket payments. Findings of this study indicated that pharmaceutical financing challenges arise due to lack of specific financial resources for pharmaceutical supplies in the governmental executive budgets. Meanwhile, spending the pharmaceutical budget in other parts of the health system could worsen the condition. In this regard, it is clear that public health could be threatened by deficiency in pharmaceutical financing. Study of Lipworth *et al.*, consistent with our study, indicated that one of the most important pharmaceutical policy-making challenges was shortage of financial sources.^[13]

Based on the experts’ opinion in this study, one of the challenges in the pharmaceutical supply chain was focusing on the specific pharmaceutical brand by people and physicians due to cultural issues and financial incentives. According to the study of Mehralian *et al.*, purchasing power of patients was the most important factors in prescription of medications by physicians. In addition, advertisement and marketing had the last priority in physician loyalty to a particular brand.^[14] This finding is not consistent with our study. The disagreement could be explained by different sampling population so that participants of study of Mehralian *et al.* were physicians.

The majority of participants pointed to the lack of sufficient insurance coverage and stated that some medications have no insurance coverage. They also mentioned that the differences in premium levels between various insurance plans result in discrimination in access to medications. Based on these findings, the absence of public health insurance plan was a significant challenge. The public health insurance or compulsory insurance premium is not calculated according to health status but based on personal income. Study of Adelnia *et al.* showed that patients had low rate of willingness to pay for higher level of medication costs.^[15] In this regard, it should be noted that increased pharmaceutical costs could impose catastrophic health expenditure to the families.^[16,17]

Delayed insurance reimbursement was noted as one of the challenges in the pharmaceutical supply chain by most of the participants because it can lead to some difficulties

in purchasing medications and disrupt the pharmaceutical procurement chain. In line with our findings, result of study of Delkhosh *et al.* highlighted that pharmacies were encountered with financial problems and debts to distribution companies which were result of delayed insurance reimbursements.^[18]

Some participants pointed to the poor quality of Iranian medications. Considering that some imported medications were not covered or partially covered by insurances plans, thus many patients cannot afford them and this condition can threaten patients' health. Nevertheless, some officials declared that the national medications had the desirable quality and their effectiveness is approved.^[19]

Diminished pharmacists' role, patients and physicians mistrust toward them, and lack of consultancy services by the pharmacists also mentioned as other challenges. Study of Jahanbani *et al.* showed that failure in providing pharmacist's consultancy to health-care professionals and patients was a big problem in Iranian health system.^[10] It is highly recommended to integrate pharmacy consulting services into clinical settings^[20] and the role of pharmacists should be revised profoundly.^[21]

Collusion between pharmaceutical companies, pharmacies, and physicians to gain more profit was mentioned as another problem. Based on that, findings showed that pharmaceutical distribution companies provide a particular discount for pharmacies to gain a profit which causes an unsound competition between them. In this regard, some participants also referred to the increasing number of distribution companies and pharmacies, which if not accompanied by increased supervision could affect the efficiency of pharmaceutical supply chain.

This study revealed that another important problem in the pharmaceutical supply chain was the absence of electronic health records which hinder the transparency and tracking pharmaceutical chain. It is reported that using electronic pharmaceutical management system could reduce pharmaceutical management costs.^[20]

To generalize results of the study, conducting other studies in macro level or other cities is suggested. According to the results of the study, it is suggested that health-care policymakers need to strengthen the infrastructures in the area of pharmaceutical supply chain. These infrastructures include developing public health insurance, improving information systems, and electronic prescriptions and increased collaboration with university-affiliated research centers.

This study faced some limitations such as some of our participants were too busy for interviews, but researcher adjusted it with the continuous following up. The topic also perceived as a sensitive issue which causes most of the participants to be doubtful for participating in the study. However, the researcher tried to solve this problem by assuring them that all information would be reported anonymously and that confidentiality will be respected.

CONCLUSION

In Iran, all parts of the pharmaceutical supply chain have many unsolved problems which reduced accessibility to medications and eventually can affect public health. Among these parts,

financing, information system, education, role of pharmacists, reimbursement of pharmaceuticals, and cheating in the scope of medicines are considered to be noted by policymakers.

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DECLARATION OF CONFLICTING INTERESTS

The authors declared no potential conflicts of interest with respect to the study.

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