Drug Shortages in Jordan: A Cross-Sectional National Survey

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ABSTRACT

This study was conducted to understand the extent of drug shortages in Jordanian MOH hospitals and collects more evidence of the size and health care effect of shortages. A validated questionnaire was distributed to physicians and pharmacists in MOH main hospitals and drug stores in all twelve Jordanian governorates. Overall, a total of 357 respondents completed the survey, yielding a response rate of 66.4%. The majority of the respondents were males (68%) and mean age of all respondents was 38.97 years. About two thirds (64.7%) of them were pharmacists and more than half (54.06%) were from the central province hospitals. More than half of respondents had trouble locating medications either during last week (54.06%) or last six months (56%) and the mean time spent dealing with shortages ranged from 23 minutes to more than one hour. Pharmacists spent more time (minutes = 78.5, ±214) dealing with shortages. About half of participants had either never (n = 56, 15.69%) or rarely (n = 131, 36.69%) received advance notice of shortages. About two thirds of respondents (n = 232, 64.98%) reported that patients were stressed, confused and felt angry; and experienced loss of trust in the medication and the pharmacists due to shortages (n = 221, 61.9%). Majority of respondents indicated an increase in their work load (n = 264, 73.95%) because of shortages. Implementing ICT such as electronic medical records was 'number one' strategy while implementing out of pocket payment by patients was 'number last' strategy according to respondents' responses. In conclusion, drug shortages in Jordan are real and time consuming.

Keywords: Drug, Shortage, Hospitals, Jordan.

1. INTRODUCTION

Drug shortage is defined as a supply issue that affects how the pharmacy prepares or dispenses a drug or influences patient care when prescribers must use an alternative agent. Shortages are common and occur frequently in daily health care practice.[1] It poses a great challenge to pharmacists and affects their practices. Shortages also cause widespread frustration among practitioners and is a time consuming problem. In addition to inconvenience and financial impact, shortages affects patients' health outcomes.[2-5]

Drug shortages happen due to several factors: raw and bulk material unavailability; manufacturing difficulties and regulatory issues; voluntary recalls; change in product formulation or manufacturer; manufacturers' production and economic decisions; industry consolidations; restricted drugs distribution and allocation; inventory practices; unexpected increases in demand and shifts in clinical practice; nontraditional distributors; natural disasters and communication.[6] Countries like USA, Canada and 36 European countries[2,3,5] conducted surveys to better understand the

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extent of drug shortages and provided evidence of drug shortages.

Table 1. Demographics of Survey Respondents

Variable	N = 357
Institution type, no. (%)	
Hospital	330 (92.44)
Drugs store	27 (7.56)
Mean ±S.D. age, yr	38.97 ±14.36
Gender, no. (%)	
Male	243 (68)
Female	114 (32)
Specialty, no. (%)	
Pharmacist	231 (64.7)
Physicians	102 (28.6)
Not specified	24 (6.7)
Geographic Region, no. (%)	
North	131 (36.7)
Center	193 (54.06)
South	33 (9.24)

Jordan has an area of 88,778 square kilometers, and divided into three provinces. Jordan has a population of around 6.607 million people.[7] Jordan is an upper middle-income country with a GDP of $35.83 billion.[8] The health system in Jordan is a complex mixture of several private and public programs. The public sector represented by the ministry of health was established in late 1950. It offers preventative treatment, health control services and public health insurance. Royal Medical Services (RMS) provides health care services to the members of the Jordanian Armed Forces, security personnel and their families. The private sector provides high technological capacity and quality of services and holds a large number of the country's medical expertise. The United Nations Relief and Works Agency (UNRWA) agency runs 24 primary health care centers, serving more than 1.9 million of Palestinian refugees in Jordan. Public health expenditure as percent of GDP was 8 in 2014, and expenditures on drugs reached 9.22% of total public health expenditures.[9] Jordan is considered a pioneer among the countries in the Arab world in terms of the pharmaceutical industry. The pharmaceutical industry is the second largest exporting industry in Jordan, representing more than 8% of the country's total exports. The pharmaceutical exports extended to more than 60 countries worldwide, including the US and the EU, due to its high quality, excellent reputation and affordable prices. It became an export-driven sector, where 75% of the local pharmaceutical products are manufactured for exporting purposes.[10] To our knowledge, there are no previous surveys that were conducted to explore and document the extent of drug shortages in Jordanian MOH hospitals. The objective of this study was to understand the extent of drug shortages in Jordanian MOH hospitals and collects more evidence of the size and health care effect of shortages.

Table 2. Prevalence of drug shortages

Variable	Trouble while locating medications no. (%)	
	Last week	Last six months
Yes	193 (54.06%)	200 (56%)
No	143 (40.05%)	132 (37%)
Unknown	21 (5.89%)	25 (7%)
	Mean ±SD	
	Physicians	Pharmacists
Number of prescriptions associated with problems during the last week	10.57 ±33.78	18 ±49.8
Average time spent per shift (minutes)	23 ±45.43	78.5 ± 214

Table 3. Drugs in Short Supply Over the Past Several Months

Drug class	N = 318 n (%)	Examples of reported drugs within classes
Antibiotics	(19.18)	Amoxicillin; Amoxicillin + clavulanic acid; 3rd and fourth generation cephalosporins
Eye drops	44 (13.84)	…[a]
Antiplatelet drugs	41 (12.89)	clopidogrel
Antihypertensive drugs	39 (12.26)	β Blockers; Angiotensin II Receptor Blockers
I.V fluids	35 (11.01)	Normal saline; Lactated Ringers
Antiepileptic drugs	29 (9.13)	phenobarbital, phenytoin, and carbamazepine
Antidiabetics	19 (5.97)	metformin; glimepiride
Alpha blockers	18 (5.66)	tamsulosin tablet
Coagulation Factors	16 (5.03)	VII, IX and X
Thrombolytic drugs	16 (5.03)	streptokinase; tenecteplase

[a] Not reported.

METHODOLOGY

A survey was developed using previous surveys on drug shortages.[2,3,11] Authors of previous studies on drug shortages reviewed the survey and gave permission to use some elements of their surveys. The survey was then pilot tested by a number of pharmacists and physicians to review the clarity of questions and to provide any comments. Their revisions and comments were taken into consideration and made to improve question clarity and consistency of response. The study protocol was approved by Institutional Review Board, Jordan University of Science & Technology.

The developed survey consisted of five parts. The first part included questions on demographics. The second part assessed prevalence of drug shortages and contained questions on time spent on shortages; advance notice on shortages and sources of notice; and participants were given a special space to list most difficult drugs and drug classes to procure in the past six months. In the third part, the participants were asked whether their patients' health outcomes had been adversely affected and if they replied with yes, they were asked to respond to a list of fifteen statements on the impact of shortages on patients and on physicians and pharmacists. The responses for the third and the fourth parts were framed as a five-point Likert scale (rarely, frequently, always, never and not applicable). The last part included seventeen strategies that may help in reducing the number of shortages and participants were asked to respond using a five-point Likert scale (strongly agree, agree, neutral, disagree and strongly disagree). At the end of the survey, participants were invited to write any additional comments regarding shortages problem.

A trained master student visited main Ministry of Health (MOH) hospitals and drugs stores in all Jordanian governorates personally to distribute the survey forms. Survey forms were distributed to all physicians and pharmacists working in the study locations on the day of the survey after obtaining their verbal consent for participation and providing them with brief explanation of the study and its aims. After one week, a second visit was performed by the student to collect the survey forms. Data were collected in July & August 2013. Data were summarized, organized, and analyzed using Microsoft Exel® and SPSS®.

RESULTS

The survey was distributed to 533 participants in

thirteen hospitals and three MOH drugs stores. In total, 357 participants responded forming a response rate of 66.98 %. The majority of the respondents were males (68%) and were from hospitals (92.44%). The mean age of all respondents was 38.97 years. About two thirds (64.7%) of them were pharmacists and more than half of them (54.06%) were from the central province hospitals (Table 1).

Table 4. Impact of drug shortages on patients and physicians and pharmacists

Impact on patients no. (%)					
	Never	**Rarely**	**Frequently**	**Always**	**Not applicable**
Patients have stopped taking the medications	40 (11.2)	125 (35.01)	100 (28.01)	32 (8.96)	60 (16.81)
Alternatives cause side effects	43 (12.04)	150 (42.02)	93 (26.05)	36 (10.08)	35 (9.8)
No alternative medications available	32 (8.96)	125 (35.01)	114 (31.93)	44 (12.32)	42 (11.76)
Patients adherence has been affected	29 (8.12)	89 (24.93)	136 (38.10)	50 (14.01)	53 (14.84)
Alternative drugs has been less effective	28 (7.84)	104 (29.13)	139 (38.94)	47 (13.17)	39 (10.92)
Patient lost trust in drugs and pharmacists	35 (9.8)	57 (15.97)	132 (36.97)	89 (24.93)	44 (12.32)
Patient is stressed, confused, angry and frustrated	29 (8.12)	57 (15.97)	111 (31.09)	121 (33.89)	39 (10.92)
Patient experienced adverse outcomes	46 (12.89)	139 (38.94)	86 (24.09)	61 (17.08)	25 (7)
Patients did not receive recommended treatment	43 (12.04)	118 (33.05)	121 (33.89)	46 (12.89)	29 (8.12)
Patient received less effective drug	29 (8.12)	100 (28.01)	136 (38.1)	57 (15.97)	35 (9.8)
Patient treatment was delayed	22 (6.16)	110 (30.81)	150 (42.02)	47 (13.17)	28 (7.84)
More waiting and hospital visits required	29 (8.12)	43 (12.04)	175 (49.02)	78 (21.85)	32 (8.96)
Increased cost to patient when alternative is not covered by insurance	25 (7)	79 (22.13)	121 (33.89)	100 (28.01)	32 (8.96)
Impact on physicians and pharmacists No. (%)					
Disruption in the continuity of care	31 (8.68)	85 (23.81)	119 (33.34)	95 (26.61)	27 (7.56)
Interference with practice freedom	20 (5.6)	68 (19.05)	125 (35.01)	120 (33.61)	24 (6.72)
Increase work burden	19 (5.32)	54 (15.13)	130 (36.41)	134 (37.54)	20 (5.6)
Frustration with MOH	68 (19.05)	100 (28.01)	88 (24.65)	45 (12.6)	56 (15.69)
Frustration with other specialties	60 (16.81)	107 (29.97)	102 (28.57)	43 (12.04)	45 (12.61)
Frustration with hospital leadership	53 (14.85)	96 (26.89)	111 (31.09)	47 (13.17)	50 (14)
Frustration with pharmacy department	30 (8.4)	109 (30.53)	131 (36.7)	48 (13.45)	39 (10.92)

Prevalence of drug shortages & time spent on shortages issues

More than half of respondents had trouble locating medications either during last week (54.06%) or last six months (56%) and the mean time spent dealing with shortages ranged from 23 minutes to more than one hour (Table 2). In addition to encountering higher number of prescriptions associted with shortages (18, ±49.8), pharmacists spent more time (78.5, ±214) dealing with shortages.

Advance notices on shortages

About half of participants had either never (n = 56, 15.69%) or rarely (n = 131, 36.69%) received advance notice of shortages. In addition, majority of respondents had either never (n = 113, 31.65%) or rarely (n = 137, 38.38%) received advance notice about the expected duration of shortages.

Table 5. Strategies that may contribute to reduce number of shortages

	no. (%)				
	Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
Speaking with JFDA[a] about drug shortage problems	14 (3.92)	43 (12.04)	110 (30.81)	129 (36.13)	61 (17.1)
Informing key hospitals or health system executives of drug shortage problems	6 (1.68)	20 (5.6)	80 (22.41)	176 (49.3)	75 (21.01)
Applying pharmacoeconomics have a role in minimizing drug shortage	9 (2.52)	11 (3.08)	88 (24.65)	172 (48.18)	77 (21.57)
Developing or modifying policies of MOH regarding medication availability	6 (1.68)	15 (4.2)	90 (25.21)	160 (44.82)	86 (24.09)
Providing in service education for medical staff on alternatives for medication in short supply	6 (1.68)	24 (6.72)	84 (23.53)	162 (45.38)	81 (22.69)
Implementing ICT such as electronic medical records	8 (2.24)	14 (3.92)	44 (12.32)	126 (35.29)	165 (46.22)
Establish contracts with suppliers to secure back-up sources of drugs	11 (3.08)	25 (7)	66 (18.49)	157 (43.98)	98 (27.45)
Pharmacy and therapeutic committee has a role in management of drugs in short supply	12 (3.36)	14 (3.92)	96 (26.89)	156 (43.7)	79 (22.13)
Fair drugs distribution systems according to the need of each hospital	10 (2.8)	16 (4.48)	48 (13.45)	159 (44.54)	124 (34.73)
Applying evidence based drugs can have a role in maintaining drugs availability	6 (1.68)	18 (5.04)	53 (14.85)	163 (45.66)	117 (32.77)
Regularly inform staff of drugs in short supply	8 (2.24)	15 (4.2)	55 (15.41)	170 (47.62)	109 (30.53)
Adding back-up inventory for critically important drugs categories	12 (3.36)	18 (5.04)	79 (22.13)	162 (45.38)	86 (24.09)
Out of pocket payment by patients	26 (7.28)	84 (23.53)	88 (24.65)	124 (34.74)	35 (9.8)
Allocating bigger budget to encounter drug shortages	9 (2.52)	30 (8.4)	61 (17.09)	164 (45.94)	93 (26.05)
Rational drugs prescribing	7 (1.96)	17 (4.76)	62 (17.37)	189 (52.94)	82 (22.97)
Implementation of restrictions for drugs use on shortage supply	10 (2.8)	28 (7.84)	65 (18.21)	191 (53.5)	63 (17.65)
Closely tracking inventory and moving stock	2 (0.56)	17 (4.76)	74 (20.73)	190 (53.22)	74 (20.73)

[a] JFDA: Jordan Food and Drug Administration.

Top ten drug shortages

Table 3 illustrates drugs and classes of drugs that respondents faced difficulty to prescribe or dispense over the past several months. The top three drugs reported by respondents were antibiotics (n = 61, 19.18%), eye drops (n = 44, 13.84%) and antiplatelet drugs (n = 41, 12.89%).

Impact of drug shortages

When participants were asked "Do you think your patients' health outcomes have been adversely affected?" About 42% of respondents replied with "yes" and 40% replied with "sometimes". Furthermore, about two thirds of respondents (n = 232, 64.98%) reported that patients are stressed, confused and felt angry; and experienced loss of trust in the medication and the pharmacists due to shortages (n = 221, 61.9%). Also, majority of respondents believed that the main cause for patient inconvenience was more waiting time and more hospital visits required

(n = 253, 70.87%). Majority of respondents indicated an increase in their work load (n = 264, 73.95%) and that their practice freedom was interfered because of shortages (n = 245, 68.62%). (Table 4)

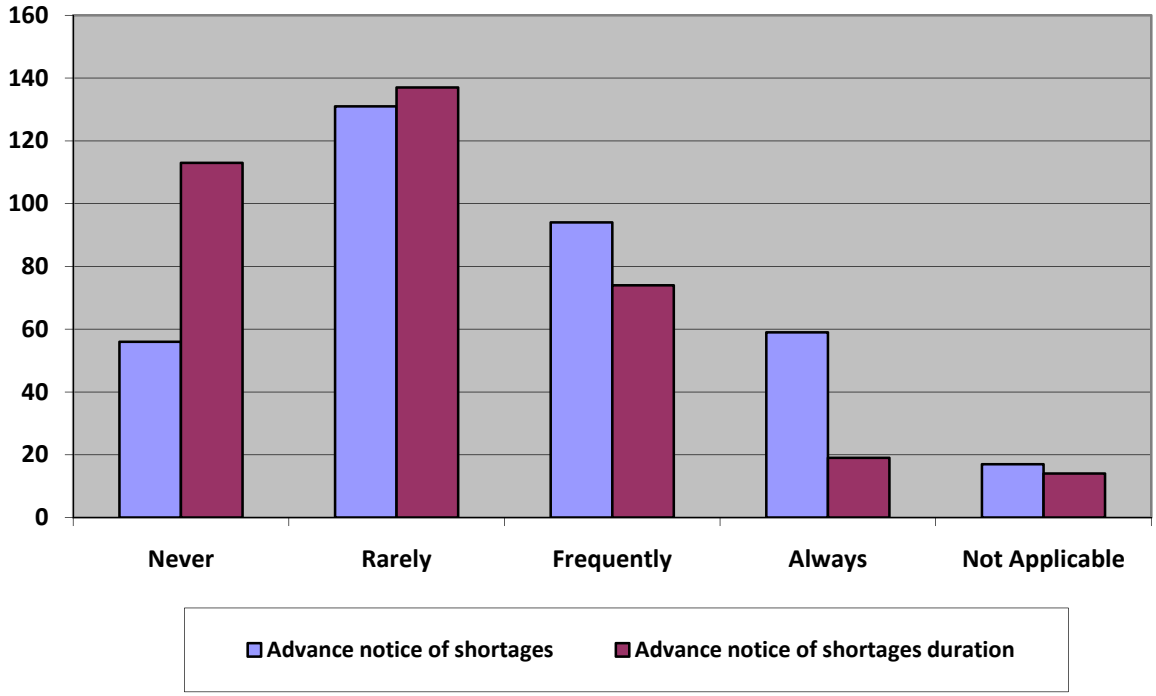

Figure 1. Receiving advance notice of drug shortages and its expected duration

Proposed strategies that may contribute to reduce number of shortages

Regarding the strategies that may help in reducing the number of shortages, majority of respondents agreed on all strategies (Table 5). Implementing ICT such as electronic medical records was 'number one' strategy (n = 291, 81.51%) while implementing out of pocket payment by patients strategy was 'number last' strategy according to respondents' responses (n = 159, 44.54%).

DISCUSSION

In Jordan, the availability of drugs in MOH hospitals is an important issue because about half of the population use MOH facilities, and this percentage is higher in rural areas.[12] This study investigated the prevalence of drug shortages in MOH main hospitals. More than half of respondents experienced a problem while locating drugs. Shortages have increased during the past year. An average of 14 prescriptions (i.e., average of pharmacists and physicians together) were associated with problems within a week. Similarly, previous studies reported that at least one or more drug shortage happened in the past six months[3,5]; there was a trouble locating drugs to fill a prescription within a week; drug shortages increased over the past twelve months; and health care professionals spent significant amount of time dealing with shortages for each shift.[2,5] This study revealed that pharmacists spent more time dealing with shortages compared to physicians. This may be due to the role of pharmacists as drugs dispenser.

Advanced notifications about shortages could reduce the time spent by healthcare professionals dealing with shortages. Similar to other studies,[2,3] this study found that more than half of respondents either never or rarely received advanced notice about shortages. Receiving information on the expected time duration for shortages

could also reduce the time spent on dealing with shortages. In this study, majority of respondents either did not receive or rarely received information on the duration of shortages. Likewise, an American study found that more than half of respondents were either never or rarely notified about the expected duration of shortages.[3]

Similar to other studies,[2,3,5] almost all of respondents' hospitals experienced drug shortages across several treatment categories. Poor availability of certain drugs continue to be a main challenge in public health sector in Jordan.[13] Generally, shortages might happen due to many causes[5] such as: manufacturing problems; supply and demand issues; shortages in raw materials; and recalls.[14,15] Supply issue depends on a supply chain of raw material suppliers, manufacturers, wholesalers, distributors, pharmacy corporations, and individual pharmacists. Therefore, shortages will take place if there are disruptions in any part of that supply chain.[2]

The survey respondents expressed that patients might experience great suffering as a result of shortages, mainly affecting their health outcomes and convenience.[2-4,16] This survey suggests that patients are disrupted, their health outcomes are adversely affected and treatment was delayed. Shortages put patients under stress and make them feel confused and angry due to frequent changing in drugs. As a result, patients are losing trust in the drugs and in their healthcare providers because they have to look for alternative drugs. Subsequently, patients are losing trust in the public health care sector and their adherence to drugs has been affected. Data of this survey further indicate that patients might be financially impacted due to shortages with possibility of more hospital visits and the risk of out-of-pocket payments. As a result, the inability of some patients to buy their drugs from private sectors might affect their adherence.[17] Other studies also reported that physicians encountered shortages in their practices, reported increase in medication errors and noncompliance by the patients. This was due to the alternative drugs prescribed, changed brands, and inability to use evidence based drug.[3,18] In other studies, healthcare providers were concerned that patients went without their medication they prescribed because of incapability to pay for it.[19]

Like other studies,[2,3,5,14,20] this survey propose that shortages might impact physicians and pharmacists causing them to feel extensive frustration. It may also make them frustrated with hospitals leaderships and MOH in general. Their frustration could be due to increased workload because of shortages. The other sources of frustration appears to be increased work burden; interference with physicians' freedom in offering care to their patients; and disruption in continuity of care. Similar to other studies findings,[2,3] responses from this survey expressed that shortages in Jordan is a time consuming problem for physicians and pharmacists, adding on average more than one hour worth of effort to every pharmacist's shift and less than half hour to every physician's shift.

According to the responses of this survey, at least more than half of respondents agreed on all the proposed strategies which can be adopted to deal with or prevent shortages. In order to counteract shortages issue in MOH hospitals in Jordan, the law and regulations of compulsory health insurance (CHI) program, allow buying certain drugs from private pharmacies when neither they are available in MOH hospitals nor their alternatives. Besides, the pharmacists in charge are allowed to procure critical needed drugs to their hospitals. Such procurements are allowed when these drugs are not available in the main drugs stores, and only take place after the approval of Procurement and Supply Directorate (PSD).[21] In addition, the health system in Jordan allows PSD in stock out situations of critical drugs to conduct a monthly procurement stocks up to 20,000 JD to cover its need.[22] However, such regulations need time as system in MOH is highly centralized one. Consequently, these regulations led many private pharmacies to ask patients to pay directly for these drugs due to the long time needed for repayment by MOH.[19] This will again, make patients loosing trust in the health care system.

The American Society of Health-System Pharmacists (ASHP) and the Canadian Pharmacists Association (CPhA) had implied certain guidelines to encounter shortages.[6,23] Jordan lack national guidelines to assess the

impact of drug shortages and subsequent patient management and to help practitioners follow such guidelines whenever drug shortages are encountered. Such guidelines may be of great help to the Jordanian health care practitioners.

Results of this study should be interpreted carefully because there were number of limitations in this study. Firstly, although this study was conducted in the main MOH hospitals of all Jordanian governorates, it did not identify the correlation between the hospital geographic location, type of the hospital, and the impact of shortages on the health outcomes of patients, prevalence of shortages, and consequences of shortages on the health care providers. Secondly, the study included physicians and pharmacists only because of the belief that shortages affect mainly physicians and pharmacists practice. Thirdly, the study did not explore the policies and procedures that each institution adopted to deal with shortages, and what specific regulations that can be modified to encounter the problem in their work settings. Fourthly, the study presents public sector perspective and investigated shortages in MOH hospitals only but not in private hospitals or chain and independent pharmacies.

CONCLUSION

Drug shortages in Jordan are real, time consuming, and are having negative impacts on the health outcomes of patients and health care practice. Several proposed strategies may contribute to reduce drug shortages. All the important parties need to work together to ensure drugs availability.

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نقص الدواء في الأردن: دراسة مسحية وطنية مستعرضة

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[3] أستاذ مشارك، كلية الصيدلة، جامعة العلوم والتكنولوجيا الأردنية.

ملخص

أجريت هذه الدراسة لفهم مدى نقص الأدوية في مستشفيات وزارة الصحة الأردنية ولجمع المزيد من الأدلة على حجم النقص وتأثيره على الرعاية الصحية. وقد تم توزيع استبيان للأطباء والصيادلة في المستشفيات الرئيسية لوزارة الصحة ومستودعات الأدوية في كافة المحافظات الأردنية. أكمل تعبئة الاستبيان ما مجموعه 357 من الذين شملهم الاستطلاع، مما أسفر عن 66.4% كمعدل استجابة. لقد وجدت الدراسة أن حوالي 54.06٪ من المشاركين واجهوا صعوبة في ايجاد الأدوية خلال الأسبوع الماضي و56٪ خلال الأشهر الستة الماضية. وكان متوسط الوقت الذي يقتضي التعامل مع نقص الأدوية 23 (± 45.43) دقيقة للصيادلة و78.5 (± 214) دقيقة للأطباء. وبينت الدراسة وحسب أجوبة المشاركين أن نقص الأدوية قد يؤثر على نتائج المرضى الصحية وكذلك على الممارسة الطبية والصيدلانية. في الختام، أن نقص الأدوية في الأردن مشكلة حقيقية وتستهلك الوقت والجهد. وتشير أجوبة المستطلعين بقوة إلى التأثير السلبي لنقص الأدوية على النتائج الصحية للمرضى وعلى ممارسة الرعاية الصحية.

الكلمات الدالة: نقص، الأدوية، المستشفيات، الأردن.

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