

# National Survey of Pharmacy and Therapeutic Committees in Saudi Arabia: Scope, Structure and Responsibilities

**Yousef Ahmed Alomi**<sup>\*</sup> , General Administration of Pharmaceutical Care, Ministry of Health, Riyadh, Saudi Arabia.

**Sultan Mohammed Al-Jaralah**, Ambulatory Care Pharmacy, Oncology and Hematology Clinical Pharmacist, Pharmaceutical Care Department, Security Forces Hospital, Riyadh, SAUDI ARABIA.

**Rasha Abdelsalam Elshenawy**, Ministry of Health, Makkah, SAUDI ARABIA.

**Faiz A. Bahadig Rph**, Informatics Pharmacist, Pharmaceutical Care Department, King Abdulaziz Medical, City-WR-Jeddah, Ministry of National Guard, Saudi Arabia

## Correspondence:

**Dr. Yousef Ahmed Alomi**, The Former General Manager of General Administration of Pharmaceutical Care Former Head, National Clinical pharmacy and pharmacy practice, Former Head, Pharmacy R&D Administration, Ministry of Health, Riyadh, SAUDI ARABIA.

**Phone no:** +966 504417712

**E-mail:** yalomi@gmail.com

Received: 03-05-2019;

Accepted: 27-06-2019

Copyright: © the author(s), publisher and licensee International Journal of Pharmacology and Clinical Sciences. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

This is an open access article distributed under the terms of the Creative Commons Attribution-Non-Commercial-ShareAlike 4.0 License

## Access this article online



[www.ijpcs.net](http://www.ijpcs.net)

DOI:  
10.5530/ijpcs.2019.8.49

## ABSTRACT

**Objectives:** The Pharmacy and Therapeutics (PTC) committee, sometimes aptly named the Formulary Committee. PTC is charged with determining the hospital formulary, decisions are made about the inclusion or exclusion of new pharmacotherapeutic and diagnostic agents for inpatients and outpatients. This committee is typically composed of a multidisciplinary team of pharmacy, physician, nursing and hospital clinical and administrative leadership. The aim of the study was to explore the Therapeutic Committee at MOH hospitals in Saudi Arabia: scope, structure and responsibilities. **Methods:** It is a 4-month cross-sectional survey of National Survey of Pharmacy and Therapeutic Committee at MOH hospitals in Saudi Arabia. The survey consisted of 93 questions divided in two parts: the first part collects the demographic information, the second part contains questions on 4 domains: (1) scope, structure and responsibilities, that is including questions about the pharmacy and therapeutic committee membership, clear mission, vision and values of the pharmacy and therapeutic committee, the responsibilities of the PTC committee and the Sub-committees of Pharmacy and Therapeutic Committee, (2) formulary management system, (3) evaluation of drug formulary and decision-making, (4) committee meetings organization and management. The survey was distributed to the fifty-drug information centers at Ministry of Health hospitals. The survey was in an electronic format with analyzed scope, structure and responsibilities through the survey monkey system. **Results:** The total number responders were fifty drug information centers. Of those, 48 (96%) was Saudi and 2 (4%) was non-Saudi. There were 16 (32%) females and 34 (68%) were males. Most of the PTC committee members consisted of a chief of pharmacy department 45 (90%), medical director 41 (82%), physician medical 40 (80%) and head of drug information center 32 (64%). The highest score statements related to committee were the functions of PTC (3.78), objectives (3.61), mission (3.57), with least one was a vision (3.56) and values (3.5). The most responsibility scoring statement was distributed the addition and deletion (4.08), all the departments receive the copy of the revised formulary (4.04), drug evaluation and selection for the hospital was (3.9), drug policy development was (3.9), while the lowest scores were Holds educational programs within the hospital (3.25) and drug monitoring system was (3.57). Most of the subcommittee existed antibiotic committee 38 (76%), medication safety committee 38 (76%), followed by drug utilization committee 9 (18%) and therapeutic guidelines committee 9 (18%). **Conclusion:** One-third of hospital missed drug information center pharmacist as the member of PTC committee and the pharmacy qualifications of committee members need to improve. Update the committee system and close monitoring required for all MOH hospitals in Saudi Arabia.

**Keywords:** National, Ministry of Health, Saudi Arabia, Scope, Structure, Responsibilities.

## INTRODUCTION

In every hospital, medications and medical supplies are critical to the delivery of services. However, according to the WHO, the availability of the drugs in the hospital depends not only on good supplies but also on their efficient management of medication. One of the most critical approaches has been to improve medication management and use in various health settings. In a hospital setting, Hospital Pharmacy and Therapeutics Committees "PTC Committee" is a practical approach in ensuring that medicines are used in a safe, appropriate and cost-effective manner.<sup>[1,2]</sup> The Pharmacy and Therapeutics Committee (PTC), sometimes aptly named the Formulary Committee. Formularies have been used by a broad spectrum of organizations in the USA.<sup>[3]</sup> PTC used to determine the hospital for-

mulary and addition and deletion of new pharmacotherapeutic and diagnostic agents for the hospital. This committee typically consists of a multidisciplinary team of pharmacy, physician, nursing and hospital clinical and administrative leadership.<sup>[1,2]</sup>

Several studies had been done around the world discussed the scope and activities of PTC.<sup>[4]</sup> For instant; The Structure and procedures of the pharmacy and therapeutics committees in Spanish hospitals reveals that PTC Committees have looked like a structure and function with multidisciplinary professional composition. They addition or deletion drugs is similar in different types of hospital.<sup>[5]</sup> In the study of the Structure and activities of hospital drug committees in Germany. At 53.2% of drug committees, a phar-

macist holds the position of chairman, followed by medical specialists (32%); clinical pharmacologists hold this position in only 7.7% of the general hospitals. The number of members in between 5-40 with a median 12.<sup>[6]</sup> In the local study of the characteristics of the Pharmacy and Therapeutic Committees in Saudi Hospitals, reveals that of 30 hospital pharmacies, 23 (76.6%) pharmacy managers responded. The average total number of the PTC committee members is (13.5) and dominated by physicians (6.9), pharmacists (2.7) and nurses (1.4) and the pharmacist coordinated all surveyed committee.<sup>[7]</sup>

In the Ministry of Health of Saudi Arabia, the PTC well established before than 30 years ago with peripheral regional PTCs. They had a systemic way of formulary system and addition and deletion medication from the MOH drug formulary.<sup>[8,9]</sup> Besides, the PTC has proven to be effective in improving prescribing, dispensing and resource allocation and management, according to the Saudi Central Board for Accreditation of Healthcare Institutions "CBAHI" Standards; as the hospital establishes a multidisciplinary team of the pharmacy and therapeutics committee for oversight of the hospital formulary and medication use.<sup>[10]</sup> However, in practice, the central or regional PTCs scopes, structure and responsibilities should be the same and there is very few excised studies based of the best knowledge to explore those parameters in local country or Gulf and Arab countries.<sup>[7]</sup> This study aims to assess the Therapeutic Committee at MOH hospitals in the Kingdom of Saudi Arabia: Scope, structure and responsibilities.

## METHODS

It is a 4-month cross-sectional survey of National Survey of Pharmacy and Therapeutics Committee at MOH hospitals in Saudi Arabia. The survey consisted of 93 questions divided in two parts: The first part collects the demographic information, the second part contains questions on 4 domains: (1) scope, structure and responsibilities, that is including questions about the pharmacy and therapeutic committee membership, clear mission, vision and values of the pharmacy and therapeutic committee, the responsibilities of the PTC committee and the Sub-committees of Pharmacy and Therapeutic Committee, (2) formulary management system, (3) evaluation of drug formulary and decision-making, (4) committee meetings organization and management. The survey drives from previous literature and local regulation and American Society of Health-System Pharmacists (ASHP) standards of PTC and Formulary system.<sup>[1,2,8,9,11,12]</sup> All Pharmacoeconomics or review investigates of PTC

**Table 1: Demographic responder qualifications information**

| Gender                               | Response Count | Response Percent |
|--------------------------------------|----------------|------------------|
| Male                                 | 34             | 68.0%            |
| Female                               | 16             | 32%              |
| Answered question                    | 50             |                  |
| Skipped question                     | 0              |                  |
| Nationality                          | Response Count | Response Percent |
| Saudi                                | 48             | 96.0%            |
| Non- Saudi                           | 2              | 4.0%             |
| Answered question                    | 50             |                  |
| Skipped question                     | 0              |                  |
| Academic Qualification (s):          | Response Count | Response Percent |
| Diploma. Pharmacy                    | 2              | 4.00%            |
| Bsc. Pharmacy                        | 23             | 46.00%           |
| Master of Science                    | 10             | 20.00%           |
| Master Clinical Pharmacy             | 9              | 18.00%           |
| Doctor of Pharmacy                   | 10             | 20.00%           |
| Two years Residency (R1)             | 0              | 0.00%            |
| Three years Residency (R2)           | 0              | 0.00%            |
| Ph. D                                | 2              | 4.00%            |
| M.B.A.                               | 1              | 2.00%            |
| Other (please specify)               | 1              | 2.00%            |
| Answered question                    | 50             |                  |
| Skipped question                     | 0              |                  |
| Total years you worked as pharmacist | Response Count | Response Percent |
| > 1 year                             | 1              | 2.0%             |
| 1 – 3 years.                         | 4              | 8.0%             |
| 4-6 years.                           | 10             | 20.0%            |
| > 6 years.                           | 35             | 70.0%            |
| Answered question                    | 50             |                  |
| Skipped question                     | 0              |                  |
| Position in PTC committee            | Response Count | Response Percent |
| Chairman                             | 4              | 8.3%             |
| Vice-chairman                        | 15             | 31.3%            |
| Secretary                            | 6              | 12.5%            |
| Coordinator                          | 2              | 4.2%             |
| Assistant secretary                  | 2              | 4.2%             |
| Committee member                     | 21             | 43.8%            |
| Answered question                    | 48             |                  |
| Skipped question                     | 2              |                  |

| Years of Experiences as a PTC committee member | Response Count | Response Percent |
|--|----------------|------------------|
| > 1 year                                       | 10             | 20.0%            |
| 1 – 3 years.                                   | 17             | 34.0%            |
| 4-6 years.                                     | 15             | 30.0%            |
| > 6 years.                                     | 8              | 16.0%            |
| answered question                              | 50             |                  |
| skipped question                               | 0              |                  |

included the study and any comparative of PTC studies or perception excluded from the study. The 5-point Likert response scale system closed and ended questions used. The survey was distributed to fifty Drug Information Center at the Ministry of Health hospitals. All size capacity or type of specialty hospital was included in the study. The survey was in an electronic format and it analyzed scope, structure and responsibilities through survey monkey system.

## RESULTS

The total number responders were fifty drug information centers. Of those, 48 (96%) was Saudi and 2 (4%) was non-Saudi. There were 16 (32%) females and 34 (68%) were males. The most educational level of the responders were bachelor degree of pharmacy 23 (46%), followed by Pharm.D 10 (20%) and master of clinical pharmacy 9 (18%) with more than three experiences as pharmacist 45 (90%). The majority of responders were PTC member 21 (43.8%) and vice-chairman 15 (31.3%) with duration of 1-6 years (64%) in PTC membership (Table 1). The majority responders from the (100-299) bed hospitals 28 (56%) with accredited from CBAHI 33 (66%), Saudi commission of health specialties 15 (30%) and Joint commission USA 13 (26%) (Table 2). Most of the PTC committee members consisted of a chief of pharmacy department 45 (90%), Medical Director 41 (82%), physician medical 40 (80%) and head of drug information center 32 (64%) (Table 3). The highest score statements related to committee were the functions of PTC (3.78), objectives (3.61), mission (3.57), with least one was a vision (3.56) and values (3.5) (Table 4). The most responsibility scoring statement was distributed the addition and deletion (4.08), all the departments receive the copy of the revised formulary (4.04), drug evaluation and selection for the hospital was (3.9), drug policy development was (3.9), while the lowest scores were holds educational programs within the hospital (3.25) and drug monitoring system was (3.57) (Table 5). Most of the subcommittee existed antibiotic committee 38 (76%), medication safety committee 38 (76%), followed by drug utilization committee 9 (18%) and therapeutic guidelines committee 9 (18%) (Table 6).

**Table 2: Demographic hospital information**

| Number of beds at your hospital        | Response Count | Response Percent |
|--|----------------|------------------|
| < 50                                   | 4              | 8.0%             |
| 50-99                                  | 6              | 12.0%            |
| 100-199                                | 14             | 28.0%            |
| 200-299                                | 14             | 28.0%            |
| 300-399                                | 5              | 10.0%            |
| 400-499                                | 4              | 8.0%             |
| 500-599                                | 2              | 4.0%             |
| = or > 600                             | 0              | 0.0%             |
| Medical City                           | 1              | 2.0%             |
| Answered question                      | 50             |                  |
| Skipped question                       | 0              |                  |
| The hospital accreditation             | Response Count | Response Percent |
| CBAHI                                  | 33             | 66.0%            |
| Joint Commotion USA                    | 13             | 26.0%            |
| Canada                                 | 0              | 0.0%             |
| Saudi commission of health specialties | 15             | 30.0%            |
| Non accredited                         | 11             | 22.00%           |
| Answered question                      | 50             |                  |
| Skipped question                       | 0              |                  |

**Table 3: the Pharmacy and Therapeutic Committee consisted of the following members**

| Answer Options                         | Response Count | Response Percent |
|--|----------------|------------------|
| Director of hospital                   | 8              | 16.0%            |
| Deputy director of hospital            | 11             | 22.0%            |
| Physician Medical                      | 40             | 80.0%            |
| Physician Surgery                      | 30             | 60.0%            |
| Physician Pediatrics                   | 21             | 42.0%            |
| Medical director                       | 41             | 82.0%            |
| Chief of medical department            | 25             | 50.0%            |
| Chief of pharmacy department           | 45             | 90.0%            |
| Assistant chief of pharmacy department | 10             | 20.0%            |
| Chief of Inpatient pharmacy            | 10             | 20.0%            |
| Chief of Outpatient pharmacy           | 7              | 14.0%            |
| Chief of Drug information center       | 32             | 64.0%            |

|  |    |       |
|--|----|-------|
| Nursing Department Representative                | 26 | 52.0% |
| Clinical Pharmacist                              | 20 | 40.0% |
| Staff Pharmacist                                 | 10 | 20.0% |
| Chief of Medication safety officer               | 11 | 22.0% |
| Chief of Total Quality Management Pharmacy       | 22 | 44.0% |
| Chief of Pharmacy Informatics                    | 3  | 6.0%  |
| Director of Pharmacy Store                       | 15 | 30.0% |
| Hospital Total Quality Management Representative | 18 | 36.0% |
| Pharmacy Technician                              | 2  | 4.0%  |
| Medical store of hospital director               | 1  | 2.0%  |
| Chief of surgery                                 | 1  | 2.0%  |
| Chief ICU  | 1  | 2.0%  |
| Cardiologist                                     | 1  | 2.0%  |
| Chief of OB department                           | 2  | 4.0%  |
| Head of ER physician                             | 2  | 4.0%  |
| The director of nursing services.                | 1  | 2.0%  |
| Other  | 2  | 4.0%  |
| <b>answered question</b>                         |    | 50    |
| <b>skipped question</b>                          |    | 0     |

## DISCUSSION

The Ministry of health updated all health-care systems, administration and committee related issues based on MOH strategic plan 2010-2020.<sup>[13,14]</sup> The pharmacy and Therapeutic committee are new names after updating of old updating MOH drug formulary. The committee head by assistant minister, deputy for medical supply and logistic and membership of directors of medical supply general administration, Pharmaceutical Care general administration, national drug information center, a clinical pharmacist from the hospital, Pharmaceutical planning of medical supply, Pharmacoeconomic pharmacist, the meet on a monthly basis. During the period of membership as director of general administration of Pharmaceutical Care, the committee made significant reductions as follows, but not lim-

ited to, for instants; the committee updated and added more five hundred new line items. The committee updated primary care medical list, updated Cardiopulmonary Resuscitation (CPR) medication list for adults and pediatric. The committee added a ready-made, fixed standard concentration of some CPR medication. The committee supports the Implementation of the medicines safety program. Also, the updated some pharmacy services including intravenous admixture services at more thirty hospitals.<sup>[8,9]</sup> In the study, the authors utilized drug information center pharmacy because the PTC part of the drug information center duties and expected drug information pharmacists should be an active member of the PTC. The study finding should most of the drug information pharmacist were Saudi and that is expected because of the Saudization policy in KSA. Most drug information pharmacists had a bachelor's degree because of the new system of Pharm D in college of pharmacies.

The findings of the study showed the head of the pharmacy department, medical directors, medical physicians and drug information pharmacist most active members in the PTC similar to previous study.<sup>[7,15,16]</sup> That is expected because the old regulations of PTC which composed of those members while the medication safety officer or pharmacy informatics or critical care departments and emergency or nursing not commonly had members not part of the old regulation. The update regulation of PTC is required to activate the role of other essential pharmacy or medical departments. Despite the local standers of pharmacy accredited emphasized of PTC; still, some hospital did not have some primary elements of PTC, including vision or mission and objective and functions similar to the previous study.<sup>[7]</sup> That may lead to PTC not function well in practice and subsequent not accredited by local or international institutions. Besides, some functions of PTC not implemented, especially in the medication's safety and similar to what it should in the current study. The results should drug accepted or reject of drug hospital formulary the primary function while drug monitory or evaluation system and off labeled or therapeutic interchange not fully implemented and functioning well as most the hospital. That may lead several discrepancies in the medication safety and additional economic burden on the healthcare system at MOH institutions. The most subcommittee functioning in the surveyed hospital was antibiotics and medications, safety subcommittee, while one-quarter of the hospital had not any functioning subcommittee. According to the ASHP Guidelines on the pharmacy and therapeutics committee and the Formulary System. The PTC committee may find subcommittees that address specific therapeutic areas

**Table 4: Clear mission, vision, and values of the Pharmacy and Therapeutic Committee**

| Answer Options   | PTC is applying 100% of the elements | PTC is applying 75% of the elements | PTC is applying 50% of the elements | PTC is applying 25% of the elements | PTC is NOT applying the elements | Rating Average | Response Count |    |
|--|--------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|----------------------------------|----------------|----------------|----|
| The mission written, distributed to all Pharmacy and Therapeutic Committee members.                      | 14                                   | 15                                  | 13                                  | 1                                   | 7                                | 3.56           | 50             |    |
| Vision is written, distributed to all Pharmacy and Therapeutic Committee members.                        | 15                                   | 14                                  | 11                                  | 2                                   | 7                                | 3.57           | 49             |    |
| Values are written, distributed to all Pharmacy and Therapeutic Committee members.                       | 16                                   | 11                                  | 12                                  | 4                                   | 7                                | 3.50           | 50             |    |
| Objectives are written, distributed to all Pharmacy and Therapeutic Committee members.                   | 18                                   | 10                                  | 12                                  | 2                                   | 7                                | 3.61           | 49             |    |
| Functions are written, distributed to all Pharmacy and Therapeutic Committee members.                    | 18                                   | 14                                  | 10                                  | 5                                   | 3                                | 3.78           | 50             |    |
| Standard operation procedures are written, distributed to all Pharmacy and Therapeutic Committee members | 14                                   | 17                                  | 9                                   | 3                                   | 4                                | 3.72           | 47             |    |
| <i>answered question</i>   |                                      |                                     |                                     |                                     |                                  |                |                | 50 |
| <i>skipped question</i>  |                                      |                                     |                                     |                                     |                                  |                |                | 0  |

**Table 5: The responsibilities of the PTC committee.**

| Answer Options   | Always | Often | Sometimes | Rarely | Never | Rating Average | Response Count |    |
|--|--------|-------|-----------|--------|-------|----------------|----------------|----|
| Drug evaluation and selection for the hospital formulary                           | 20     | 12    | 13        | 3      | 2     | 3.90           | 50             |    |
| Drug policy development  | 21     | 10    | 14        | 3      | 2     | 3.90           | 50             |    |
| Drug monitoring system   | 15     | 13    | 10        | 7      | 4     | 3.57           | 49             |    |
| All the departments receive the copy of the revised formulary                      | 23     | 15    | 7         | 3      | 2     | 4.08           | 50             |    |
| The drug removal /addition forms distributed to all the clinics, wards by pharmacy | 21     | 14    | 10        | 3      | 1     | 4.04           | 49             |    |
| Holds educational programs within the hospital                                     | 8      | 13    | 16        | 11     | 2     | 3.28           | 50             |    |
| <i>answered question</i>   |        |       |           |        |       |                |                | 50 |
| <i>skipped question</i>  |        |       |           |        |       |                |                | 0  |

**Table 6: The Sub-committees of Pharmacy and Therapeutic Committee.**

| Answer Options                         | Response Count | Response Percent |
|--|----------------|------------------|
| Antibiotic Committee.                  | 38             | 76.0%            |
| Medication Safety Committee.           | 38             | 76.0%            |
| IV Therapy Committee                   | 5              | 10.0%            |
| Adults Nutrition Support Committee     | 0              | 0.0%             |
| Drug Utilization Committee             | 9              | 18.0%            |
| Pediatrics Nutrition Support Committee | 2              | 4.0%             |
| Therapeutic Guidelines Committee       | 9              | 18.0%            |
| Pain Management Committee              | 7              | 14.0%            |
| Anti-coagulation committee             | 8              | 16.0%            |
| Non                                    | 4              | 8.0%             |
| <i>answered question</i>               |                | 50               |
| <i>skipped question</i>                |                | 0                |

to be beneficial (e.g., antimicrobial, cancer chemotherapy, cardiovascular, adverse-drug-reaction, or biotechnology subcommittees). [1,2] Despite the antimicrobial stewardship and medication safety program established at MOH,<sup>[17,18]</sup> it seemed antibiotics or medications safety subcommittee not functioning well because the main scopes or functions not implemented well in practice. Besides, the drug utilization and therapeutic guidelines subcommittee was not active at more than eighty percent of the hospitals. Some very important subcommittee was not existed at most of the hospitals nutrition support committees for adults and pediatrics or pain management or anticoagulants subcommittee. Those necessary subcommittees were essential to run some national clinical and pharmacy practice programs at that are times.<sup>[19,20]</sup>

The scopes or functions and responsibilities of PTC was not active well at most of the hospitals. An education course about PTC is required for

all MOH hospitals and close monitoring of the implementation of the update PTC system is highly recommended at all MOH hospital in the Kingdom of Saudi Arabia.

## CONCLUSION

The scopes and functions of PTC at MOH hospitals are not adequately implemented. The PTC membership regulation is old and should be updated. The subcommittees of PTC were few and should expand in quantity and quality manner. Targeting of education and training of PTC members is required with an annual survey of PTC scopes and responsibilities is highly recommended in the Kingdom of Saudi Arabia.

## ACKNOWLEDGEMENT

None.

## CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

## ABBREVIATIONS

**WHO:** World Health Organization; **PTC:** Pharmacy and Therapeutic Committee; **USA:** United States of America; **MOH:** Ministry of Health; **ASHP:** American Society of Health-System Pharmacists; **DTC:** Drug and Therapeutics Committees; **CPR:** Cardiopulmonary Resuscitation; **CBAHI:** Saudi Central Board for Accreditation of Healthcare Institutions; **KSA:** Kingdom of Saudi Arabia.

## ORCID ID

Yousef Ahmed  Alomi <https://orcid.org/0000-0003-1381-628X>

## REFERENCES

1. Tyler LS, Cole SW, May JR, Miliare M, Valentino MA, Vermeulen LC, *et al.* ASHP guidelines on the pharmacy and therapeutics committee and the formulary system. *Am J Heal Pharm.* 2008;65(13):1272-83.
2. Abazia DT, Anderson P, Azzopardi LM, Baker KR, Besier JL, Bootman JL, *et al.* ASHP statement on the pharmacy and therapeutics committee and the formulary system. *Am J Heal Pharm.* 2008;65(24):2384-6.
3. Perrone J, Nelson LS. Pharmacy and therapeutics committees: Leadership opportunities in medication safety for medical toxicologists. *J Med Toxicol.* 2011;7(2):99-102.
4. Durán-García E, Santos-Ramos B, Puigventos-Latorre F, Ortega A. Literature review on the structure and operation of pharmacy and therapeutics committees. *Int J Clin Pharm.* 2011;33(3):475-83.
5. Puigventós F, Santos-Ramos B, Ortega A, Durán-García E. Structure and procedures of the pharmacy and therapeutic committees in Spanish hospitals. *Pharm World Sci.* 2010;32(6):767-75.
6. Thümann PA, Harder S, Steioff A. Structure and activities of hospital drug committees in Germany. *Eur J Clin Pharmacol.* 1997;52(6):429-35.
7. Alkelya M, Alenezi MG, Alsultan MM, AlJeraisy M. The characteristics of pharmacy and therapeutic committees in Saudi hospitals. *Value Heal.* 2015;18(3):A74.
8. Alomi YA, Alghamdi SJ, Alattyh RA. National corporate pharmacy and therapeutic committee at the ministry of health, Saudi Arabia. *Pharmacol Toxicol Biomed Reports.* 2019;4(3):24-7.
9. Alomi YA, Alghamdi SJ, Alattyh RA. National drug formulary of the ministry of health in Saudi Arabia. *Pharmacol Toxicol Biomed Reports.* 2019;4(3):28-30.
10. Saudi Center Board for Accreditation for Healthcare Institutions (CBAHI). Medication Management (MM). In: National Hospital Standards. 2<sup>nd</sup> Edition. Saudi Central Board for Accreditation of Healthcare Institutions. 2016;194-211.
11. American Society of Health-System Pharmacists. Principles of a sound drug formulary system. *Best Pract Hosp Heal Syst Pharm.* 2000;182-5.
12. Mannebach MA, Ascione FJ, Gaitner CA, Bagozzi RP, Cohen IA, Ryan ML. Activities, functions and structure of pharmacy and therapeutics committees in large teaching hospitals. *Am J Heal Pharm.* 1999;56(7):622-8.
13. Alomi YA, Alghamdi SJ, Alattyh RA. Strategic plan of general administration of pharmaceutical care at ministry of health in Saudi Arabia 2012–2022. *J Pharm Pharm Sci.* 2015;1(13):1-8.
14. Alomi YA, Alghamdi SJ, Alattyh RA, Elshenawy RA. The evaluation of pharmacy strategic plan in past 2013-2016 and forecasting of new vision 2030 at ministry of health in Saudi Arabia. *J Pharm Pract Community Med.* 2018;4(2):93-101.
15. Durán-García E, Santos-Ramos B, Puigventos-Latorre F, Ortega A. Literature review on the structure and operation of pharmacy and therapeutics committees. *International Journal of Clinical Pharmacy.* 2011;33(3):475-83.
16. Umnuyapornlert A, Kitikannakorn N. Performance of pharmacy and therapeutics committees of public hospitals in rural Thailand. *Mahidol University Journal of Pharmaceutical Sciences.* 2014;41(1):11-8.
17. Alomi YA. National antimicrobial stewardship program in Saudi Arabia; initiative and the future. *Open Access J Surg.* 2017;4(5):1-7.
18. Alomi YA. National medication safety program at ministry of health in Saudi Arabia. *J Pharmacovigil.* 2015;3(5):e145.
19. Alomi YA. National pharmacy pain management program at ministry of health in Saudi Arabia. *J Pharmacol Clin Res.* 2017;3(2):1-7.
20. Alomi YA. A new guidelines on hospital pharmacy manpower in Saudi Arabia. *J Pharm Pract Community Med.* 2016;2(2):30-1.