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RESEARCH ARTICLE

Medicine formulary writing for hospitals: A systematic review on development, approval, dissemination, and review

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Essential medicine list
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Abstract

Background: A hospital formulary is a guiding manual developed to enhance the rational prescribing of medicines based on the local prevalence of diseases and hospital settings. This systematic review aimed to identify and evaluate the existing literature on hospital formulary development and management to ensure the availability of safe, cost-effective, quality, and efficacious medicines that all practitioners must use. **Methods:** A qualitative evidence and experience synthesis approach was chosen to create evidence on the development and use of hospital formulary. PubMed was the database used to search for similar reviews using Boolean operators. **Results:** Out of 1,347 potentially relevant literature and abstracts identified and screened, 25 publications were used in developing the hospital formulary. The hospital formulary should be developed and reviewed after using the current STG/NEMLIT to use updated medicine lists and indications. Medicines selected for the model are "*medicines of choice*." The development of hospital formularies should be based on a comprehensive and transparent process that involves a multidisciplinary team of experts, a clear selection criterion, a reliable and updated source of information, and a regular evaluation of the clinical and economic outcomes. **Conclusion:** Hospital formularies promote the rational, safe use of medicines to improve the quality and efficiency of healthcare.

Introduction

A hospital formulary is a continually updated manual of available medications and related information approved for use in the healthcare system by authorised prescribers, pharmacists, nurses, and other health personnel (Management Sciences for Health, 2001; Management Sciences for Health & World Health Organisation, 2007). This manual guides the effective, safe, economical, and appropriate use of medications (Kanai *et al.,* 2022). A hospital formulary represents the clinical judgment resulting from a review of the clinical evidence of physicians, pharmacists, and other clinicians in diagnosing, preventing, or treating disease and promoting health. A formulary manual is a document that describes medicines available for use in hospitals and clinics. It also provides medicine information on dosage, strength, formulation, indications, pharmacokinetics, pharmacodynamics, contraindications, precaution, caution, and dilution. Moreover, a formulary system is a periodic evaluation and selection of medicines for use in hospital settings, maintaining the formulary and providing information in a suitable manual or list of medicines and medical supplies (Management Sciences for Health, 2001). A hospital formulary includes but is not limited to a list of medications and medication-associated products or devices. It also contains medication-use policies, important supplementary drug information, decision-

support tools, and organisational guidelines (Ciccarello *et al.,* 2021).

Open hospital formulary is the least structured, least rigorous, most subjective, and with the most remarkable ease of listing; no systematic evaluation occurs for a medicine authorised or selected, only considering if approved by the pharmaceutical regulatory authority. This type of formulary contains a list of drugs by therapeutic class, alphabetic brand name, and alphabetic generic name. Also, open hospital formulary does not contribute to or clarify the therapeutic nature of medicines (Parrish, 2018). A closed hospital formulary is an active, objective review with a limited number of medicines; it classifies medicines based on therapeutic class. A closed hospital formulary is systematically developed by the hospital medicines and therapeutics committee (HMTC) (Parrish, 2018) and is the most preferred formulary type for hospitals.

A formulary system is an ongoing process through which a healthcare organisation establishes policies regarding the use of drugs, therapies, and drug-related products, including medication delivery devices. It identifies those that are most medically appropriate, safe, and cost-effective to serve best the health interests of a given patient population (Kanai *et al.,* 2022). Formulary systems are used in various settings, including hospitals, acute care facilities, home care settings, and long-term care facilities, as well as by payers such as insurance companies and managed care organisations. Many organisations have policy statements on using formularies (Ciccarello *et al.,* 2021).

Formulary Management Principles is a periodically revised list of medicines that reflect the current judgment of the medical staff on the use of approved medicines. It utilises the medical and pharmacy staff to evaluate, appraise, and select from the numerous available medicines that are the most efficacious, safest, of adequate quality, and reasonably priced (Management Sciences for Health, 2001).

To ensure access to safe, quality, efficacious, and cost-effective medicines, the WHO released the first model of hospital formulary in 2002, which contained a comprehensive list of 325 generic drugs in the WHO Model List of Essential Medicines. Essential Medicines Lists (EML) are medicines that satisfy the priority healthcare needs of the population (World Health Organisation, 2019; World Health Organisation, 2017a). They are selected due to disease prevalence and evidence of efficacy, safety, quality, and comparative cost-effectiveness (Purgato & Barbui, 2012; WHO Technical Report Series, 2020). The EML is intended to be available within the context of functioning health systems at all times in adequate amounts, in the appropriate dosage forms, with assured quality and sufficient information, and at an affordable price for the individual and the community (WHO Technical Report Series, 2020; Slamang *et al.,* 2022). Understanding this concept, the hospital formularies, essential medicines, and formulary systems are the tools for the HMTC to improve the selection, rational medicine use, procurement, and inventory management programs of medicines and medical devices in hospital settings. These tools provide the guiding principles of core functions of HMTC in hospitals, from dispensaries to tertiary hospitals (Ministry of Health, 2020).

In 1995, the WHO, through the Expert Committee on the Use of Essential Medicines, recommended the development of a Model Formulary that would complement the WHO Model List of Essential Medicines (Jenei *et al.,* 2022). The WHO Model Formulary is a valuable resource for countries wishing to develop their national formulary, and it was first published in August 2002 (World Health Organisation, 2010). The formularies can be national or state and controlled by national drug/medicines authorities. This type of formulary contains all registered medicines and other medical supplies in a country. It is not easy to adopt and implement such a type of formulary at the health facility level since it may contain medicines that are not essential and branded. In addition, it may include medicines and medical supplies that may not reflect the hospital level, disease prevalence, and prescriber levels.

Hospital-based formulary development ensures medicines are selected based on NEMLIT and Nation Treatment Guidelines. For example, in Tanzania, selecting medicines to develop a hospital formulary based on STG/NEMLIT has been emphasised to adhere to the WHO and National Essential Medicines phenomenon. The selection of medicines in developing the Hospital formulary from NEMLIT ensures the availability of approved, safe, quality, cost-effective, and efficacious medicines that all practitioners must use. It provides drug therapy at an affordable overall cost, reduced inventory costs, and a consistent supply of medicines (Jenei *et al.,* 2022; Kanai *et al.,* 2022). The hospital formulary enables easy health insurance reimbursement. It eliminates rejections of refunds, which has always been the case for the facilities that prescribe medicines without adhering to hospital formulary or STG/NEMLIT (Ministry of Health, 2021; Kanai *et al.,* 2022). Given that health system resources are limited and pharmaceutical expenditure covers a high percentage of the hospital budget, the hospital formulary can be a handy and effective tool for improving the accessibility and affordability of medicines to the community. Therefore, the hospital

can ensure good prescribing practices and more efficient use of pharmacotherapeutic resources (Vázquez-Mourelle *et al.,* 2019).

Hospital formularies were initially developed as a collection of commonly prescribed medicines, mainly for reference purposes. With time, they were improved to include more elaborative details on the increasing number and diversity of medicines (Khan, 2002). Despite the many advantageous roles of hospital formularies, there is still limited research on how these formularies are developed, implemented, and reviewed; on top of that, there might be a compromised healthcare system if a hospital formulary is not optimally developed, organised, administered and reviewed (Shashikala *et al.,* 2013).

Many countries lack consensus guidelines on writing hospital formularies based on the hospital level. The WHO Model Formulary was published in 2008, and the model was envisioned as a valuable tool to supplement the WHO Model List of Essential Medicines. It could be a practical resource for countries establishing national formularies (WHO Model Formulary, 2008). However, since it was first published, the Who Model Formulary has never been updated to suit the changing healthcare needs; it also lacks some critical information, such as general information on drugs and information on contrast media. Furthermore, it is hard to adopt and is practically more applicable in the first world.

In Tanzania, the first national hospital formulary was published in 1994 to be used nationwide. However, it did not consider local disease patterns, diagnostic services availability, hospital level, specialised services availability, and prescribing and dispensing levels.

There is a need for more studies to explore how hospital formularies can be written, developed, and used to achieve their critical role in promoting high-quality and evidence-based prescribing and reducing variations in patient treatment levels. This review aims to guide hospitals in developing and reviewing hospital formularies to ensure the availability and accessibility of safe, efficacious, quality, and cost-effective medicines and medical supplies.

Methods

Study design

A qualitative evidence and experience synthesis approach was chosen to generate data on the development and use of hospital formulary. A systematic review protocol was drafted and updated throughout the study. This systematic review was reported per the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline (checklist).

Search strategies

The search strategy comprised the following terms: ("*Hospital formulary*" or "*Hospital formulary development*" or "*Hospital formulary review*" or "*Hospital formulary*" or "*Hospital formulary system*" or "*hospital medicines and therapeutics committee*" or "*HMTC*," "*Essential Medicines list*" or "*essential medicines*" or ''*EML*''.) PubMed was used to search similar literature for reviews using the Boolean operator's search strategy. Most of the literature obtained and used in writing this review was grey literature, with less evidence from published peer-reviewed papers. Studies, guidelines, and protocols focused on developing and writing hospital formularies at the hospital and country levels were included. Reviews, procedures, and protocols in languages other than English were excluded.

Data extraction and analysis

Three reviewers extracted evidence from the database and individual literature based on the inclusion criteria of searching (Table I). The findings extracted were based on the development and use of hospital formulary. Other reviewers compiled evidence after the literature and evidence validity check in developing the systematic review article. As shown in Figure 1, findings from selected literature were analysed, authenticated, and compiled individually by all reviewers. Data were organised based on the primary objective of providing hands-on skills in developing and using hospital formulary.

Table I: Inclusion and exclusion criteria

Criteria	Inclusion	Exclusion
Literature search time	January 2018- April 2023	
Language of literatures	English	Non-English literatures
Type of literature	Primary and Grey Qualitative literatures local, regional and global evidence	Primary and Grey quantitative literatures local, regional and Global evidence
Systematic review focus	Literature that discussed the development and use of hospital formularies, National and Global Essential Medicine lists, formularies, treatment guidelines	Literature not related to the development and use of hospital formularies, National and Global Essential Medicine lists, formularies, and treatment guidelines.

Findings

A total of 1,347 potentially relevant literature for title and abstract screening were identified (Figure 1). Screening based on the full texts resulted in the final inclusion of 25 publications. The 25 kinds of literature from national, regional, and global evidence were included in this systematic review. About 13 grey literature from Institutions, the United Republic of Tanzania, and the World Health Organisation were used to extract evidence and technical know-how for developing and using hospital formularies. The 12 primary kinds of literature from countries with global representation were used to synthesise primary evidence, practice, development, and hospital formularies. Figure 1 presents the summary of the reviewed literature.

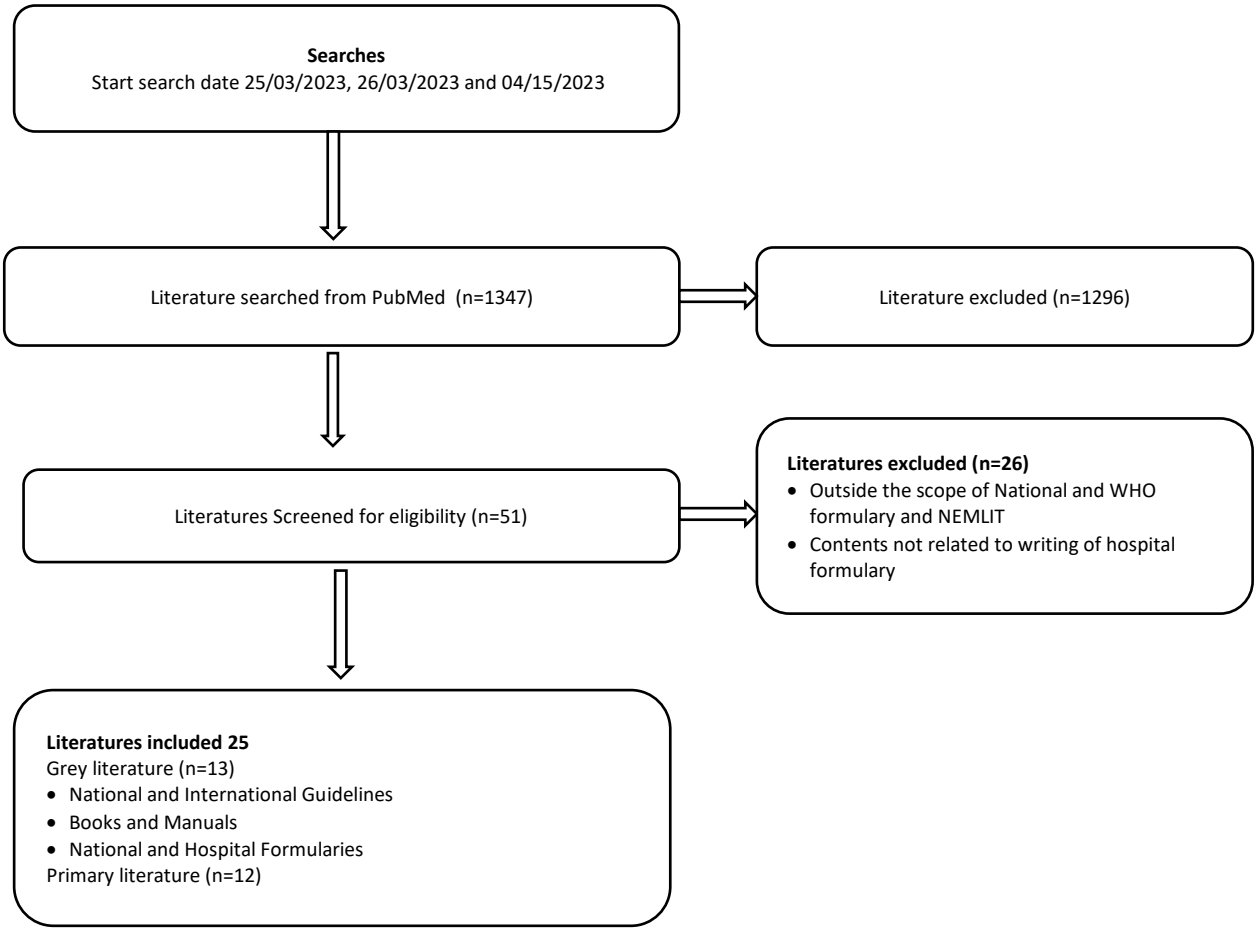

Figure 1: PRISMA flowchart for the systematic review

Discussion

Writing of hospital formulary

The HMTC organises and oversees hospital formulary development and implementation (Matlala *et al*., 2020; Ministry of Health, 2020). In Tanzania, according to MTC guidelines, the third specified role for the HMTC is the development and management of an institutional medicine list (Ministry of Health, 2020). The HMTC has to provide technical support in developing and reviewing hospital formulary by adapting or adopting the Standard Treatment Guideline (STG/NEMLIT) and antibiotics AWaRe categorisation (Ministry of Health, 2021). The HMTC will need to justify if there is a need for the inclusion of new medicines not listed in the current STG/NEMLIT and seek approval from the National Medicines and Therapeutic Committee (NMTC) (Ministry of Health, 2020). In addition, the HMTC oversees newly requested medicines and deletions, a systematic review of therapeutic classes of medicines, which are done by competent physicians, pharmacists, and other health practitioners, and a review of all activities to identify and resolve medicine

use problems in the implementation of a hospital formulary (Management Sciences for Health & World Health Organisation, 2007; Ministry of Health, 2020).

The HMTC secretariat, under the hospital's chief pharmacist, is responsible for scheduling time for the development or revision of the hospital formulary. Upon the need to develop a new formulary or revise an outgoing formulary, the HMTC will appoint the hospital formulary development team. This team will work on behalf of HMTC to develop an institutional medicine list, including the hospital formulary. The hospital formulary development team will be led by the hospital chief pharmacist, pharmacist in charge, hospital clinical pharmacist, or any experienced senior pharmaceutical personnel. The hospital formulary Development Team will be accountable for developing the hospital formulary work plan timetable, designing the hospital formulary template (simulated hospital formulary), preparing a list of essential medicines preferred from current STG/NEMLIT, preparing a list of hospital specialists, disease patterns, level of prescribers and the level of the hospital. Furthermore, the hospital formulary Development team has the role of appointing hospital formulary reviewers.

The hospital formulary reviewers comprise medical practitioners, pharmaceutical personnel, nurses, medical laboratory personnel, medical imaging personnel, physiotherapists, nutritionists, and all who participate in patient care. In hospitals with specialised medical services, specialists prefer to participate as hospital formulary reviewers for their areas of expertise. The chapters developed by the hospital formulary development team are divided among the reviewers based on their primary role in patient care and therapeutics. The team is responsible for reviewing pharmacotherapeutic bases for each medicine, covering dosage, strength, formulation, indications, pharmacokinetics, pharmacodynamics, contraindications, precautions, caution, and dilution. After reviewing the therapeutics bases in each chapter, a reviewer sends the reviewed chapters to the hospital formulary developing team for collection, correction, compilation, and primary authentication of the information provided. A concise review is done by looking at relevant information on dosage, strength, formulation, indications, pharmacokinetics, pharmacodynamics, contraindications, precaution, caution, and dilution (World Health Organisation, 2010).

The hospital formulary developing team is responsible for developing draft zero and sending it to a joint meeting of the hospital formulary developing team and hospital formulary reviewers. Each chapter is discussed systematically in line with peer-reviewed evidence on the validity of the information provided in each medicine. The Delphi methodology, which uses expert experience and opinions to decide on certain matters (McMillan *et al*., 2016), is applied when evidence is insufficient. Sources of information may include but are not limited to a summary of product characteristics, statutory information from the medical regulatory authorities, expert clinical and pharmaceutical advisers, international peer-reviewed medical works, comments from the pharmaceutical industry, Cochrane systematic reviews, health expert consensus guidelines, and medical textbooks (Lenney, 2015; Haslund-Krog *et al*., 2018).

Draft one of the hospital formulary is finalised by compiling all suggestions and findings from the developing team and reviewers. Afterwards, draft one hospital formulary is submitted and presented to HMTC for approval. In case additional information is provided by the HMTC, the hospital formulary developing team will compile all corrections and suggestions to make a final draft and get a second approval from the Hospital Management Team (HMT) or Executive Committee (EXCOM). The hospital formulary development team submits the final draft to the Hospital Board for approval and signing. The Hospital Board Chairperson signs the preferred final draft below the foreword. The medical officer in charge (MOI), executive director (ED), or managing director (MD) signs the acknowledgement statement. The final hospital formulary is then ready for launching and dissemination. The HMTC and hospital formulary development team are responsible for maintaining, following up on use, and reviewing another draft of the hospital formulary after the scheduled time agreed upon by the HMTC and acting as hospital formulary Editorial Board.

After implementing the hospital formulary, the developing team shall set the formulary maintenance process. The process depends on the following key components. Suppose there are any additions and deletions of medicines in the current formulary. In that case, it will concern any changes in current clinical guidelines and NEMLIT or prescriber experience or evidence after being presented to HMTC. Two, are any therapeutic medicine class reviews done by the hospital formulary developing team and then delivered to HMTC? Any changes made to the hospital formulary are desirable for HMTC approval to be valid. It is emphasised that routine medicine class reviews are performed after every review of the STG/NEMLIT to maintain the hospital formulary (Figure 2).

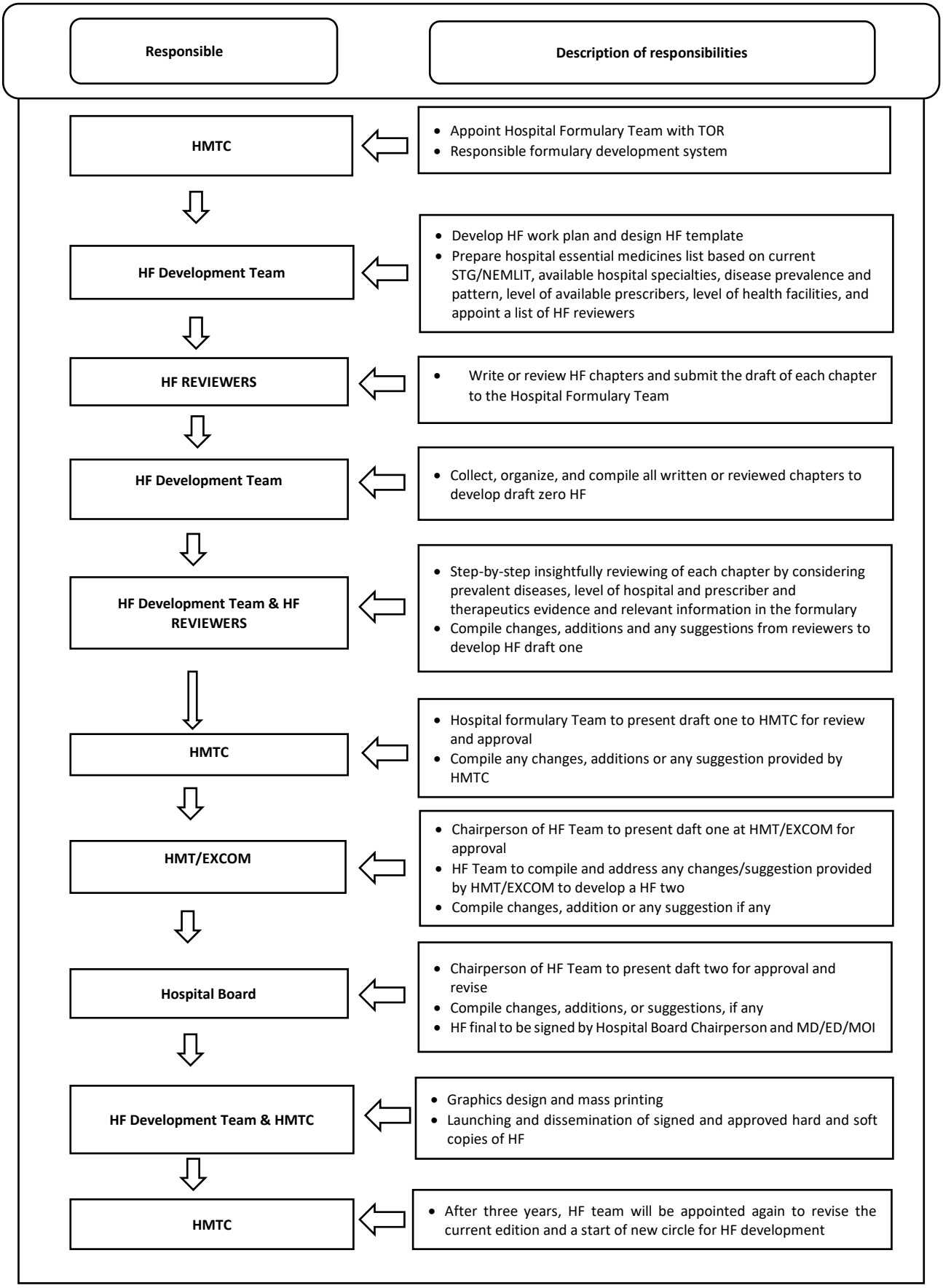

Figure 2: A systematic process of hospital formulary development

Ideally, the hospital formulary development team would meet monthly or every four months. Typically, an effective HMTC will provide the following at each session: act on newly requested medicines and deletions (in most cases, adding a new medicine should lead to the omission of a similar medicine on the formulary) and systematically review therapeutic groups or classes. A request to add a medicine to the formulary, which can be made only by a physician or pharmacist, is done by completing a "Request for Addition/Deletion" form, which the hospital formulary development team will develop. Information needed from the physician or pharmacist includes a list of specific pharmacological actions, information on why the medicine is superior/inferior to current formulary medicine, specific literature support for the use, and background on any financial support received from the supplier or other organisation.

Chapters and sections of hospital formulary

Preliminary information

This section contains the foreword, acknowledgement statement, table of contents, and list of tables, figures, and equations. It also includes a list of abbreviations and a statement on the formulary management principle.

General information

This section provides all information that will guide prescribers, nurses, pharmacists, and other health personnel and fosters rational prescribing, administering, dispensing, and using medicines. The general information is organised into subsections: a prescribers' guide, a dispensers' guide, and the hospital's essential medicine list. The prescribers' guide subsection offers information on prescribing for specific groups, including pediatric, geriatric, hepatic, and renal dysfunction patients, as well as pregnant women, lactation mothers and immunocompromised patients. It also focuses on ADR presentation, reporting and management, dose calculation, controlled medicine prescribing, and the rational prescribing of antibiotics, considering the AWaRe categorisation.

A guide to dispensers focuses on dose variation consideration, medicines that need therapeutic drugs monitoring (TDM), and assessment of medicines' effectiveness and toxicities of unique medicines that need TDM. In addition, the sub-section emphasises prescription dispensing and handling.

The last subsection relates to the hospital's essential medicine list. The selection of critical medicines in the hospital aligns with the current National Essential Medicines List (NEMLIT) (Management Sciences for Health & World Health Organisation, 2007). Other criteria for inclusion considers the availability of human resources, including specialists, and the frequency of prescribed medicines. It also accounts for the availability of diagnostic services and other infrastructures that influence or guide prescribing and the hospital's capacity to perform therapeutic drugs monitoring, especially for drugs with a narrow therapeutic index such as anticoagulants, antipsychotics, digoxin, and aminoglycosides (Management Sciences for Health & World Health Organisation, 2007).

Local disease patterns, specialisation, super-speciality services, and the availability of hospital antibiograms are also influential factors in selecting medicines for the hospital's essential medicines list, particularly when categorising antibiotics under Access, Watch, and Reserve (AWaRe) (Management Sciences for Health & World Health Organisation, 2007; Ministry of Health, 2021). When selecting medicines from the current NEMLIT, the HMTC must consider variabilities in generic names, strengths, formulations, and dosage forms. The hospital formulary is designed to have a limited number of medicines necessary for the institution's needs, while avoiding duplication of agents with therapeutic equivalence. Preferably, each medicine's Anatomical Therapeutic Chemical Classification (ATC) codes are included in the hospital formulary (World Health Organisation, 2010).

Therapeutic drug classes

This section comprises a subsection of therapeutic drug classes, as depicted in Appendix A, but is not limited to the suggested content. Each subsection provides preliminary general information, describing the general therapeutic characteristics of all products in the respective therapeutic groups. It also includes details on side effects, monitoring, and mechanism of action. The introduction at the beginning of each sub-therapeutic class does not hold specific medical information; the latter is available under each medicine in the respective chapter. This approach avoids the repetition of general information under each product and directs readers to the general introductory section for such information.

For other pharmaceuticals, such as radiocontrast media, adverse drug reaction (ADR) monitoring should be emphasised as other general administration-related reactions. Dose calculations for paediatric products should be in a separate chapter to avoid potential errors when prescribing medicines for paediatrics (World Health Organisation, 2017b). Hospitals with

active compounding units should have a dedicated chapter for such products, with monographs and formulas describing each compounded product and standard operating procedures (SOPs) for guiding consistent procedures and ensuring the quality of the compounded product (Jackson & Lowey, 2010; Marriott *et al.,* 2010).

The suggested sections for different therapeutic classes of medicines (Appendix A) serve as a guiding example for hospital formulary development. However, hospitals have the flexibility to expand beyond these suggestions while being constrained to the current STG/NEMLIT issued by the Ministry of Health (MOH). If a hospital wishes to include medicines outside the STG/NEMLIT, the HMTC is required to submit evidence and seek approval from the NMTC.

Once the hospital has chosen medicines for hospital formulary development based on the service level and the availability of specialists as described above, all other products not selected should be omitted. The following are preferred chapters and sessions of the hospital formulary, but the list is not exhaustive (World Health Organisation, 2010; The Benjamin Mkapa Hospital formulary, 2021).

Recommendation

According to the Formulary Management Principles, a completed hospital formulary should conform to the following principles: the community's needs should reflect the selection and treatment of medicines for local diseases and condition patterns (Jenei *et al.,* 2022). Further, the medicines selected are "medicines of choice." The hospital formulary should have a limited number of drugs according to the health facility and prescribers' level, and duplication of agents with therapeutic equivalence should not occur.

All medicines should be written by generic names, and fixed-dose combination (FDC) medicines should be included and used only in specific conditions. Medicines in hospital formulary should have demonstrated efficacy, safety, quality, and cost-effectiveness (Saravdekar *et al.,* 2019; Kanai *et al.,* 2022). Finally, the hospital formulary must be consistent with current STG/NEMLIT, prescribing, and dispensing, and its use should be restricted to appropriate practitioners (Management Sciences for Health, 2001).

Non-formulary medicines may be included in the hospital formulary in limited amounts and for patients who require specialised treatments that cannot be offered by medicines in current STG/NEMLIT and should get prior approval of the HMTC and NMTC. Non-formulary medicines should be prescribed, dispensed, and administered by appropriate or authorised physicians, pharmacists, and nurses (Management Sciences for Health & World Health Organisation, 2007; Ministry of Health, 2020). Interestingly, some studies have reported that acceptance and prescription rates of non-formulary medicines were very low. Hence, the hospital formulary covers practically all the therapeutic needs (Barceló-Vidal *et al.,* 2021). The results from different studies describing the development and changes made in a hospital drug formulary towards more efficient medications have shown that the hospital formulary may lead to better use of pharmacotherapeutic resources in its health facility (Vázquez-Mourelle *et al.,* 2019).

Limitations

This review has some limitations primarily stemming from the types of literature included. it mainly relied on grey literature, with the majority exceeding a five-year timeframe, which may affect the validity of current information, e.g. in defining the "essential medicines list." Much of the literature was done globally and in Western countries, which may not reflect the use in regions like Sab-Saharan Africa and Asia. Some articles were not open access and needed funds to be purchased, potentially hindering the synthesis of vital information for this review. Literature in languages other than English, older than 2018, with quantitative data, and not within the MeSH terms used were excluded. This selective approach might result in the oversight of significant evidence, data, experiences, and skills crucial for a comprehensive understanding of hospital formulary development and use.

Conclusion

Hospital formularies are essential tools for promoting the rational and safe use of medicines and improving the quality and efficiency of the healthcare system. A completed hospital formulary should contain medicines based on the community's needs and treat locally identified diseases and conditions. The HMTC and the formulary system drive the entire healthcare system toward improved patient outcomes at reduced costs. Every step in the formulary system would result in a more efficient system that would better utilise scarce healthcare resources.

There are no standardised, evidence-based approaches for developing, approving, disseminating, and reviewing hospital formularies. This systematic review aimed to identify and evaluate the existing literature on these aspects of hospital formulary management.

The review concluded that the development of hospital formularies should be based on a comprehensive and transparent process that involves a multidisciplinary team of experts, clear selection criteria, reliable and updated sources of information, and routine assessments of the clinical and economic outcomes. Furthermore, the ratification of hospital formularies should be done by the HMTC or a comparable entity that embodies the interests and requirements of the hospital and patients. Moreover, the dissemination of hospital formularies should be done through various channels and formats that ensure the accessibility, availability, and usability of the formulary information for the intended users, such as prescribers, pharmacists, nurses, and other clinicians. On top of that, the review of hospital formularies should be done periodically and systematically to accommodate the changes in the evidence base, the clinical practice guidelines, the availability and cost of medicines, and the user feedback.

This review highlighted some of the challenges in hospital formulary development. These include a lack of thorough evaluative studies and a wide variation in the methodologies and outcomes employed. In addition, the results have limited applicability across various settings and contexts, and the impact of external elements such as pressure from the industry, political meddling, and resource constraints. As a result, there is a pressing need for more research to develop adaptable best practices and standards for hospital formulary management that can cater to diverse situations and requirements.

Conflict of interest

The authors declare no conflict of interest.

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Appendix A: A layout of the hospital formulary with descriptions

Contents	Description
Foreword	Written by the Hospital Board Chairperson, signed with name and designation.
Acknowledgment	Written by the Medical Officer In-charge (MOI), Managing Director (MD), or Executive Director (ED) of a hospital or an institute and Signed by the MOI/ED with name and designation as Dr., Prof., etc. The text should sound general to address the effort of all key participants of the Hospital Formulary (HF); the list of names, designations, specializations, and units/sections of participants will be attached as an index at the end of HF in the table format.
Table of Contents	Insert automatic at the end of formulary development. How to insert: use Styles on the toolbar, select the heading of each section and sub-heading in each area, then go to reference/table of contents, and use automatic table one or table two. List of figures, equations, or tables: select a table and figure in the HF and go to reference/caption/choose figures or tables.
List of Tables	
List of Figures	
List of Equations	List all equations automatically (if the HF contains equations).
List of Abbreviations	All lists of abbreviations should be arranged alphabetically.
Formulary Management Principles	Short notices on the principles of formulary management principle development (Management Sciences for Health, 2001).

Contents	Description
General Information	Short notices: Chapter one is for supplementary notices/information to help prescribers, radiologists, laboratory scientists, nurses, and pharmacists in prescribing, administration of drugs, and dispensing. Pharmacists, prescribers, lab scientists, radiologists, nurses, and other health personnel should decide the contents of chapter one. The availability of specialties, lab services, imaging services, and particular medicines are vital points to consider for information to be included in chapter one (World Health Organisation, 2010; The Benjamin Mkapa Hospital Formulary, 2021)
Guide to Prescribing	Short notices on Medicines used in renal failure, Prescribing for the elderly, Rational prescribing techniques, and Principles of prescription writing.
Guide to dispensing	Short notices on Poison guidelines, Guidelines on dispensing quantities, Controlled medicine requirements, ADR reporting requirements, Dispensing guidelines, and therapeutics drugs monitoring (TDM).
Guide to medicines administration and use	Short notices on IV medicine administration guidelines.
The Hospital Essential Medicines List	Table of the core list of minimum medicine needs for a basic healthcare system, listing the most efficacious, safe, and cost–effective medicines for priority conditions. Priority conditions are selected based on current and estimated future public health relevance and potential for safe and cost-effective treatment (World Health Organisation, 2017a; Ministry of Health, 2021) The Anatomical Therapeutic Chemical Classification (ATC) codes of each medicine are preferred to be included (World Health Organisation, 2010). Adopt WHO, 2017 table format for the Hospital essential medicines list (World Health Organisation, 2017a)
Therapeutic Drug Classes	Brief information about each medicine (World Health Organisation, 2010; World Health Organisation, 2017a; The Benjamin Mkapa Hospital Formulary, 2021): Generic name (ATC code) Dosage and strengths Indications (use) Contraindications Precautions Side effects (adverse effects) Dosage schedule instructions and warnings Medicine, food, and lab interactions Others Pharmacokinetics Pharmacodynamics Storage Compatibility Antidote Each chapter provides preliminary general information describing the general therapeutic characteristics of all products in the respective therapeutic groups. Information such as general side effects, monitoring, and general mechanism of action: do not write a specific medicine's information; this will be written under each medicine in the chapter. The approach avoids the repetition of general information under each product.
1.0 Anaesthesia	
1.1 Prophylaxis of Acid Aspirations	
1.2 General Anaesthesia	
1.3 Inhalational Anaesthetics	
1.4 Volatile Liquid Anaesthetics	
1.5 Local Anaesthetics	
1.6 Pre-Operative Medications	
1.7 Post-Operative Medications	
2.0 Muscle Relaxants	
2.1 Neuromuscular Blocking Drugs	
2.2 Non-Depolarising Neuromuscular Blocking Drugs	
3.0 Analgesics, Antipyretics, Non-Steroidal Anti-Inflammatory Drugs, Medicines Used to Treat Gout, and Disease-Modifying Agents in Rheumatoid Disorders	

Contents	Description
3.1 Principles	
3.2 Non-Opioid Analgesics	
3.3 Opioid Analgesics	
3.4 Urological Pain	
3.5 Corticosteroids	
3.6 Corticosteroid Replacement Therapy	
3.7 Hyperuricaemia and Anti-gout	
3.8 Antiinflammatory/Antipruritis Topical Preparation	
4.0 Anti-Allergies and Medicines Used for Anaphylactic	
4.1 Allergic Emergencies	
5.0 Anticonvulsants/Antiepileptics	
5.1 Control of Epilepsy	
5.2 Withdrawal	
5.3 Pregnancy and Breastfeeding	
5.4 Driving	
5.5 Choice of Antiepileptic in the Management of Convulsive Disorders	
6.0 Medicines Used in Generalized Anxiety and Sleep Disorders	
7.0 Anti-Infective Medicines	
7.1 Anthelmintics	
7.2 Anti-Filarial/Anti-Trypanosomal	
7.3 Amoebicides	
7.4 Anti-Schistosomal	
7.5 Antibacterials	
8.0 Antiparkinsonism Medicines	
9.0 Systemic Alkaliser	
10. Haematinics, Anticoagulants, Fibrinolytic Medicines, Anti-Neutropenia (Recombinant Human G-CST)	
10.1 Haematinics	
10.2 Anticoagulants, Fibrinolytic Medicines, Anti-Neutropenia (Recombinant Human G-CST)	
11.0 Cardiovascular Medicines	
11.1 Anti-Anginal Medicines	
11.2 Antithrombotic Medicines	
11.3 Management of Hypotension	
11.4 Anti-Arrhythmic Medicines	
11.5 Medicines Used in Heart Failure	
12. 0Dermatological Preparations	
13.0 Gastrointestinal Medicines	
13.1 Antacids	
13.2 Proton Pump Inhibitors	
13.3 Prostaglandin Analogue	
13.4 Anti-Emetic Medicines	
13.5 Bowel Anti-Inflammatory Medicines	
13.6 Cathartic and Laxative Medicines	
13.7 Medicines Used in Diarrhoea	
13.8 Antispasmodics	
14.0 Cough Syrups and Antitussives	
15.0 Antimigraine Medicines	
15.1 Treatment of Acute Attack	
15.2 Prophylaxis	

Contents	Description
16.0Disinfectants and Antiseptics	
17.0Anti-Haemorrhoidal Medicines	
18.0Hormones, Other Endocrine Medicines, and Contraceptives	
18.1 Androgens	
18.2 Oestrogens	
18.3 Antidiabetics	
18.4 Hypertension Associated with Phaeochromocytoma	
18.5 Ovulation Inducer	
18.6 Anti-Hyperthyroidism	
18.7 Adrenal Hormones and Substitutes	
19.0Ophthalmological Preparation	
19.1 Antibiotic Preparations	
19.2 Antiviral Preparations	
19.3 Antifungal Preparations	
19.4 Combination Preparations	
19.5 Anti-Inflammatory Agents	
19.6 Miotics and Anti-Glaucoma Medicines, Mydriatics	
20.0Vaccines, Antitoxins, and Immunoglobulins	
21.0Muscle Relaxants (Peripheral Acting) and Cholinesterase Inhibitors	
22.0Obstetrics, Gynaecology, and Urinary Tract Disorders	
22.1 Obstetric Medicines	
22.2 Treatment of Vaginal and Vulva Conditions	
22.3 Medicines for Genito-Urinary Disorders	
23.0Psychotherapeutic Medicines	
23.1 Antimanics	
23.2 Tricyclic Anti-Depressants	
23.3 Anxiolytics	
24.0Medicines Acting on the Respiratory Tract	
24.1 Antiasthmatics and Medicines for Chronic Obstructive Pulmonary Disease	
24.2 Bronchodilators	
24.3 Antihistamines	
24.4 Corticosteroids	
24.5 Leukotriene Receptor Antagonists	
25.0Solutions Correcting Fluid, Electrolyte, and Acid-Base Disturbances	
25.1 Oral Rehydration Salts	
25.2 Parenteral Preparations	
26.0Vitamins, Minerals, and Enzymatic Preparations	
26.1 Vitamins and Minerals	
27.0Nasal Preparations	
28.0Antimalarial Medicines	
29.0Anti-Cancer/Antineoplastic Agents, Transplant Medicines, and Medicines Acting on Immunophilins	
29.1 Anticancer/Antineoplastic Agents	
29.2 Immunosuppressants	
29.3 Medicines Acting on Immunophilins	
29.4 Other Medicines	

Contents	Description
30.0Antivirals and Antiretrovirals	
30.1 Nucleoside Reverse Transcriptase Inhibitors (NRTIs)	
30.2 Non-nucleoside reverse Transcriptase Inhibitors (NNRTIs)	
30.3 Integrase Inhibitors	
30.4 Protease Inhibitors (PIs)	
30.5 Fixed Combination Antiretrovirals	
30.6 Medicines for Hepatitis C	
30.7 Herpes Virus Infections	
30.8 Interferons	
31.0Preparations for Ear and Oropharynx	
31.1 Ear Preparations	
31.2 Oropharyngeal Preparations	
31.3 Antituberculosis/Leprosy and Antileprotic Medicines	
32.0Cardiac Surgery Preparations	
33.0Management of Acute Poisoning	
33.1 Management of Poisoning with Specific Substances	
33.2 Cardiovascular and Haematological Agents	
33.3 Centrally Acting Agents	
33.4 Metals and Inorganic Compounds	
33.5 Pesticides	
33.6 Antidotes	
33.7 Specific Antidotes	
33.8 Opioid Antagonist	
34.0Lubricants	
35.0Fluid and Electrolytes	
36.0Medicine Dosages/Regimens for Children and Neonates	
36.1 Antimicrobials	
36.2 Malaria Prophylaxis	
36.3 Dosage Regimens for Neonates	
37.0Medicines for Osteoporosis	
38.0Raw Materials and compounding for pharmaceutical preparations	Develop monographic and SOPs for compounding specific pharmaceuticals based on the prescriber's prescription for paediatric, skin conditions and other medication conditions (Marriott *et al*., 2010; Jackson & Lowey, 2010).
39.0Contrast Media	Consult the radiologist and radio pharmacist for relevant information in this section.
39.1 Contrast Media	
39.2 Oral Contrast Media	
Annexes	Metric tables, ADR forms, Product quality report forms, Formulary request forms, Nonformulary request forms and Abbreviations, List of precautionary labels, and Medicine interaction tables (World Health Organisation, 2010).
Indexes	A comprehensive index of all items in the formulary manual is essential to facilitate use and improve efficiency (World Health Organisation, 2010).