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Comparative Analysis of Drug Registration and Regulation: FDA vs. GCC Approaches for Ensuring Safety and Efficacy-A Narrative Review

Comparison of Drug Registration Process: FDA vs. GCC.

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Abstract:

The increasing complexity of global pharmaceutical regulations presents significant challenges for drug development and market access across different jurisdictions. The Food and Drug administration (FDA) oversees all aspects related to new drug registration. The criteria for evaluating the efficacy and toxicity of a new drug are critical and require a prolonged duration of approximately 15 years. When comparing the evaluation method of FDA with the Gulf cooperation council (GCC), it is evident that the intellectual framework underlying these regulatory bodies differs significantly, making integration a challenging task. Despite this, the priority of both regulatory channels is to pledge the safety and efficacy of the candidate drug. GCC conducts all the evaluations considering the International Conference on Harmonization (ICH). Furthermore, marketing and financial strategies are keenly reviewed to improve access to effective treatments at reasonable costs and maintain foreground healthcare system. This study aims to identify and evaluate the differences and similarities in the approaches employed by FDA and GCC during registration and regulation processes of a new drug to ensure its safety and efficacy, and to provide insights into the strengths and weaknesses of each regulatory framework. This comparative analysis of FDA and GCC regulatory frameworks addresses a critical need in global pharmaceutical development. Understanding these distinct approaches to drug approval has immediate practical implications for pharmaceutical companies seeking market access across regions, while offering insights for regulatory harmonization efforts. The findings directly support improved efficiency in drug development pathways and enhanced global public health outcomes through more streamlined regulatory processes.

Key words: GCC (Gulf Cooperation Council), FDA (Food and Drug Administration), ICH guidelines (International Conference on Harmonization), safety and efficacy, new drug approval, regulatory frameworks.

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INTRODUCTION

The pharmaceutical industry is globally recognized for its stringent regulatory framework, a comprehensive system of laws, regulations, guidelines, and procedures that govern drug development, manufacturing, marketing, and post-approval monitoring—wherein governments establish a multitude of rules and regulations aimed at protecting public health and safety [1]. The regulatory bodies are dedicated to producing pharmaceutical drugs in alignment with the regulatory frameworks of their respective countries. Before the global sanction of any pharmaceutical drug; it is subjected to mandatory, imperative scrutiny to secure regulatory clearance prior to its marketing and utility [2]. These regulations certify that drugs are safe, effective and have transcendent quality. However, they can vary significantly from one region to another due to multiple factors such as genetic diversity and environmental conditions. GCC requires minimum 12 months stability data, whereas FDA accepts 6 months of accelerated stability data. Similarly, FDA registration typically takes 2-3 business days, while GCC registration can extend to 24-36 months. In terms of language requirements, the GCC mandates bilingual labeling (Arabic and English), while FDA requires only English

These variations significantly impact pharmaceutical companies' regulatory strategies and market access timelines

Each country maintains its distinct set of regulations encompassing innovation, manufacturing, drug testing, marketing practices, and post-market studies [1]. These rules apply to both domestically manufactured drugs as well as imported drugs [3]. This review delves into the essential insightful comparative analysis of the regulatory requirements governing the registration of pharmaceutical drugs in the Gulf Cooperation Council (GCC) region and the United States of America (USA).

The globally accredited regulatory authority Food and Drug Administration (FDA) authorizes various renowned pharmaceutical companies worldwide. The regulatory structure of the FDA is universally recognised due to its comprehensive and deliberate approach that encompasses all the principles of good manufacturing practice, safety assurance, efficacy and has complete validation and documentation according to pharmacopoeia (such as the United States Pharmacopeia or USP), which include established specifications for drug substance purity, identity, strength, quality, and testing methodologies that ensure consistent product quality and safety across batches. However, over the past few decades, there has been significant progress in GCC [4]. As a result of the regulatory control of GCC, the region's healthcare facilities and pharmaceutical businesses have noticeably flourished. In May 1999, the Gulf Central Committee for Drug Registration (GCC-DR) was established with the goal of performing the functions of a regional regulatory body that controls the registration and management of pharmaceutical products in the Gulf region [5]. The GCC-DR serves as a platform for regulatory agencies in member countries to coordinate and aims to achieve standardization of drug registration requirements across the region [6]. This harmonization seeks to streamline the process for pharmaceutical companies pursuing market access in multiple GCC countries, thereby making; the region a more desirable location for drug manufacturers [4].

In an era of global pharmaceutical expansion, this comparative analysis addresses a critical knowledge gap between the established FDA framework and the evolving GCC regulatory environment. With the GCC pharmaceutical market projected to reach US$12 billion by 2028, pharmaceutical companies face substantial financial consequences from regulatory delays and compliance challenges across different systems. This review provides actionable insights into regulatory principles, requirements, and approval processes in both regions, potentially expediting drug development, reducing market entry timelines, and improving medication accessibility while ensuring regulatory compliance. This study aims to systematically compare the pharmaceutical drug registration frameworks of the GCC region and USA, identify critical regulatory differences, and provide evidence-based strategies for navigating both pathways effectively.

This review aims to highlight fundamental regulatory principles, submission requirements, timelines, and approval processes in both regions, providing insights into the unique challenges and opportunities encountered by pharmaceutical companies during their efforts to obtain market authorization. A comprehensive review of these regulatory frameworks may expedite the procedural steps of drug development, thus reducing the time required for market entry.

METHODS

In this narrative review, an extensive literature review was conducted to delve deeper into the drug registration and regulation processes of the FDA and GCC. By systematically examining various published sources [4,5,7-10], a comprehensive comparison between the procedures of these two regulatory authorities was presented. The analysis focused on identifying key similarities and differences in their approaches to ensuring drug safety and efficacy (Table 1).

Table 1: Overview of Regulatory Authorities in USA and GCC Region

Regulatory Authority	USA (FDA)	GCC Region (GCC-DR)
Role and Responsibilities	Ensures safety and efficacy.	Facilitates regional harmonization.
	Conducts pre-market evaluations.	Coordinates technical evaluations.
	Post-market surveillance.	Licensing of companies.
		Post-market surveillance.

GCC-DR= Gulf Cooperation Council - Drug Regulation, FDA= Food and Drug Administration.

1. Regulatory Framework in the USA

FDA is the preeminent regulatory body responsible for ensuring the efficacy and safety of pharmaceutical medications, medical supplies, food products, and cosmetics [11] The FDA's influence extends globally, establishing it as a benchmark for pharmaceutical regulation. As of 2023, the FDA has formal agreements with regulatory authorities in over 40 countries and maintains international offices in key regions including Europe, Asia, Latin America, and the Middle East [12]. Approximately 40% of finished drugs and 80% of active pharmaceutical ingredients marketed in the US are manufactured abroad, underscoring the FDA's extensive international oversight responsibilities [13]. The FDA's regulatory decisions often influence global pharmaceutical markets, with many countries adopting or referencing FDA standards in their own regulatory frameworks. Additionally, the FDA actively participates in international harmonization efforts through organizations like the International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use (ICH), helping to establish unified global standards for drug development and approval [14]. This worldwide impact positions the FDA as not only a national regulatory body but also as a significant driver of global pharmaceutical regulation and quality standards. The organisation was established in 1906 to pledge that a wide range of consumer goods, such as food, pharmaceuticals, and cosmetics and guarantee that they are safe and effective for the purposes for which they are intended and have a reasonable therapeutic window with minimal toxic effects [14]. To attain this objective, the FDA has implemented a comprehensive regulatory approach that encompasses the validated pre-market product testing, post-market monitoring and surveillance, and stringent enforcement of manufacturing guidelines with essential follow ups and advisory visits to outlook the execution of the rules elicited in the regulations of the FDA. Drug approval is primarily the responsibility of the FDA's Centre for Drug Evaluation and Research (CDER) [15]. New medications and therapies in the USA are merely approved for sale after being thoroughly evaluated by a team of CDER specialists. Before an FDA-approved drug is presented to the

market, the pharmaceutical business must conduct extensive testing for safety and efficacy of the medicine including the pre-clinical trials [11].

1.1 *Discovery and Preclinical Research*

The drug development process initiates with the discovery stage, which results in a series of laboratory experiments to identify a chemical molecule with potential for therapeutic properties and a well-defined therapeutic window with median effective dose. Additional laboratory research via characterisation in accordance with evaluations prescribed in pharmacopeia including various in *vitro*, *in-vivo*, and *ex-vivo* experiments are conducted on the chosen chemical to gain a clear understanding of its pharmacokinetic characteristics and possible side effects or adverse effects besides its therapeutic effects on the body [16]. Subsequently, a pharmaceutical compound exhibiting potential therapeutic outcomes with minimum adverse effects will be proceeded for further evaluation in preclinical stage, where in vivo experiments are conducted on animal subjects. This stage incipiently adjudges the compound's safety profile and determines an initial dosage for subsequent human trials. When mandatory information has been delivered to the CDER, the FDA regulatory approval procedure begins [17]. The FDA decides whether to approve a new drug based on its safety, toxicity, and effectiveness after receiving independent evaluation and verification from the CDER. The complete medication development process, from discovery to approval for sale, typically takes approximately 12 to 15 years [18].

Regulatory Process of USA

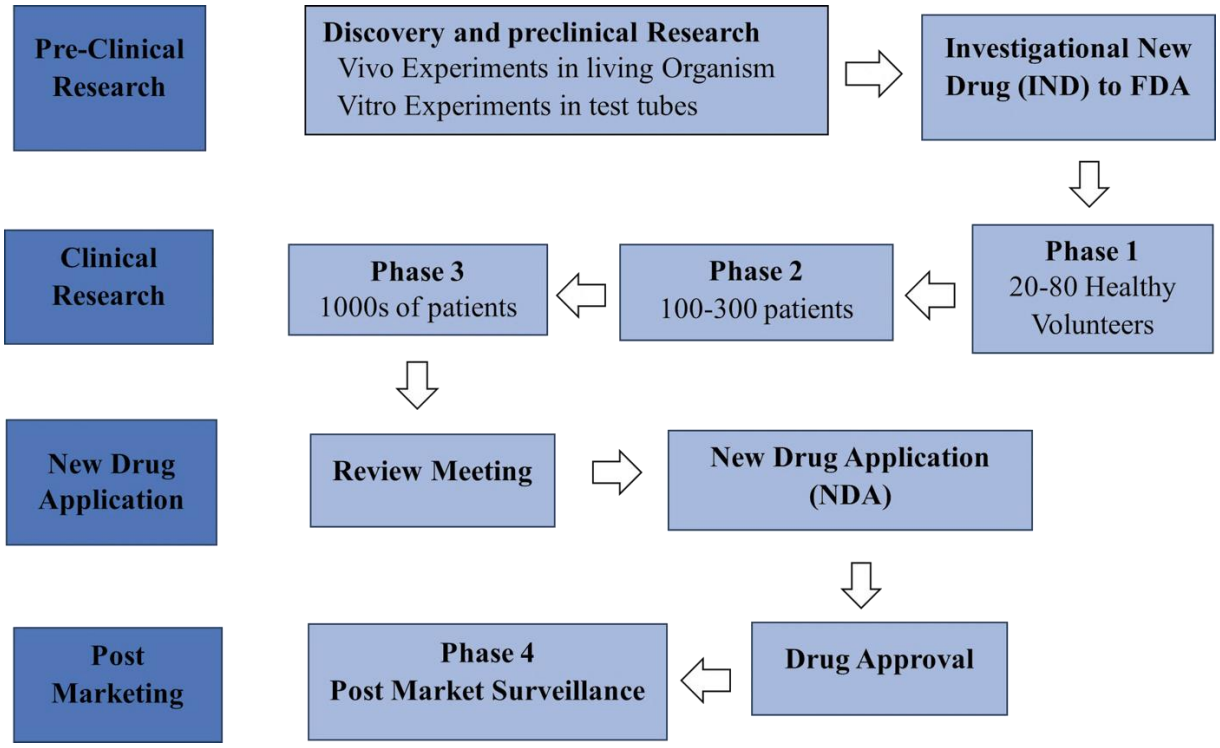


Figure 1: Regulatory Process of USA

An investigational new drug application (IND) is incumbent as the first step in the regulatory process for approval by the FDA. Figure 1 illustrates the direct involvement of the agency in the project capitulating IND application [16]. The IND application is a comprehensive document that delves into the chemistry, manufacturing, pharmacology, and toxicity of the medicine under scrutiny [19]. The primary role of IND application is to ensure the security and welfare of the research participants [17].

In the IND application, data from preclinical testing is organized into three primary sections:

- ***Toxicology and Pharmacology:*** This section furnishes information about the drug's impact on toxicity and its pharmacological effects when administered to animals. The aim is to verify the safe administration of the drug to humans, adhering to established safety parameters.
- ***Manufacturing Process:*** This section provides an overview of the drug's manufacturing process, enabling FDA to assess the manufacturer's ability to consistently produce uniform drug batches and the manufacturer is producing batches under quality control [20].
- ***Clinical Trial Results:*** The IND also encompasses the findings of any clinical trials conducted on the drug, providing crucial data for the comprehensive evaluation of the medication's potency, efficacy, and safety.

In addition, the IND describes the sponsorship company's plans for conducting additional human studies to assess the drug's safety and efficacy [21]. Notably, a clinical trial cannot commence until approval has been granted by FDA as well as ethics review commission has to give permit for trials [22].

1.2 Clinical Development

Clinical Development step immure 3 phases as given below:

Phase 1(Safety)

Phase I study or initial clinical trials are presided over human beings after the completion of the approval process. In this context, the candidate is subjected to testing on a group of 20 to 80 healthy individuals. The primary purpose of these tests is to determine whether the candidate exhibits the same behaviour within the human body as suggested by preclinical studies. The primary emphasis is once again on the safety profile, namely the toxicity of the chemical, but with a specific focus on its effects among human subjects. During the initial phase of experimentation, researchers investigate the determination of a tolerable dosage, the process of drug absorption, and the duration of its pharmacological activity inside the human body. The exclusion criteria for conducting phase I clinical trials include the exclusion of women of reproductive age or pregnant women. A phase I study typically requires around one year for completion [23].

Phase 2 (Proof-of-Concept)

If phase I safety results are favourable, drug developers may request permission via recommended procedure to move on to phase II of clinical testing. During this phase, the candidate is typically evaluated in a cohort (specific experimental study design) of 100 to 300 individuals diagnosed with the specific condition that the candidate drug intends to treat [24]. In this context, it is mandatory to document the minimum and maximum dose of the medication to be used in the next phase of development is essential, as it permits the evaluation of both efficacy and safety. Furthermore, it helps to analyse the toxicity study of the drug. Phase II typically lasts for approximately two years.

Phase 3 (Regulatory Evidence)

Phase III of the research process is planned for the collection and analysis of regulatory evidence. This stage is designed to elucidate the mandatory data required for regulatory approval of the drug and to introduce any intervention to improve the results of the trial for market surveillance. This is the final phase for the assessment of a pharmaceutical product prior to

the submission of an application for market authorisation to regulatory bodies in the pharmaceutical industry [4]. A phase III study typically entails the recruitment of at least 1000 patients, a sample size reflected to be necessary to gather the information required to demonstrate the drug's safety and intended therapeutic efficacy [23]. In the phase III clinical study, researchers meticulously document and report any adverse events experienced by participants. This indicates that the drug must be administered to patients for prolonged periods to conduct a thorough evaluation of its related side effects or adverse effects. The negative effects observed at this stage are later documented in the final product's package leaflet. Phase III typically lasts between one to four years on average [25].

1.3 Market Approval and launching

There are several critical stages in the process of drug approval for IND. If all the three phases of clinical trials yield positive results, the next step is to submit an application for market approval. In the United States, this submission is referred to as the New Drug Application (NDA) or the Biologics License Application (BLA) [26]. This application comprises a substantial volume of documentation, consolidating all the data gathered during the initial discovery phase. The principal investigator advocates for approval before the FDA. It's worth mentioning that certain new pharmaceuticals are classified as novel molecular entities (NMEs), which means they contain active components that have not yet been approved by the FDA. The preparation of the application documentation typically spans several months, with an additional 6-10 months allocated for the regulatory authorities to review and process the application [14].

Upon receiving approval from regulatory authorities, the candidate drug, now officially recognised as a medicine, is prepared for market launch. This stage initiates negotiations on pricing between the principal investigator and potential buyers, which could be government agencies or insurance companies, contingent on the healthcare system in the state. The negotiation process for drug pricing varies significantly from one country to another. The FDA conducts price negotiations for pharmaceuticals between pharmaceutical companies and private insurance companies without involvement of government authorities. The cost of medicine is based on several factors [9].

1.4 Post Market Surveillance

In certain instances, regulatory authorities mandate follow-up phase IV studies after a drug has secured market approval. These studies involve the collection of data from real-world clinical practice, where patients are being treated with the new drug [5].

The primary objective of phase IV studies is to enhance and ensure pharmacovigilance. This phase evaluates whether the drug interacts with other substances such as other drugs or food and includes additional safety testing to identify precautionary measure that must be delivered to patient when the drug is prescribed [26]. This becomes particularly critical when the drug is intended for the treatment of complex medical conditions or pregnant women who were unlikely to be part of the earlier phase I-III studies. Additionally, phase IV studies are particularly relevant for drugs that are designed to treat rare conditions, often involve a limited number of patients during phase I-III [27]. In such cases, the upshots from the earlier clinical studies may have lower statistical certainty. Therefore, regulatory authorities request further confirmation of the drug's safety and efficacy via market surveillance in phase IV studies [18]. Drug approval process of USFDA has been discussed in table 2.

Table 2: Drug Approval Process by USFDA

Stage	Average Duration	Population Tested	Objective	Estimated Success Rate
Preclinical Research	4 to 7 years	Laboratory and Animals	Assess biological activity and safety	5 to 20 out of 5,000 to 10,000 compounds
Phase 1	1 year	20 to 80 Healthy Individuals	Safe dosage and metabolism	2 to 5 of above
Phase 2	2 years	100 to 300 Patients	Max/Min Dosage	2 to 5 of above
Phase 3	1-4 years	1000s of patients	Side Effects assessed and reported	2 to 5 of above
New Drug Application (NDA)	6-10 months	Unbiased Approval Process	1 Compound Selected	100%
Post Marketing	15	Entire User Population	Post-Marketing Surveillance	Variable

NDA= New Drug Application

2. Regulatory Framework in GCC Region

An important market for pharmaceutical exports and bilateral trade is emerging in the GCC, an international political and economic union that includes all the Persian Gulf's Arab governments except Iraq [16]. Since its founding, the council has significantly streamlined legislation. As a result of its efforts, the GCC Committee for Pharmaceutical Control and the GCC Group Purchasing of medications and medical supplies were established and became operational [28]. The pharmaceutical revenue market in the GCC is predicted to reach US$12 billion by 2028, with a compound annual growth rate (CAGR) of 5.83% between 2023 and 2028. Moreover, the revenue is forecasted to experience an annual growth rate (CAGR 2023-2027) of 8.92%, leading to a market volume of US$741.80 million by 2027 [29].

On a global scale, pharmaceutical regulations are typically aligned with unique national legislation for each country. However, recent years have witnessed a concerted effort by regional organizations like the GCC which has established uniform norms and processes to refine and upgrade regulatory resources [30]. The primary goal of these initiatives is to enhance the efficiency of regulatory resources, facilitating comprehensive regional evaluation of pharmaceuticals. This effort ultimately aims to provide patients with timely access to high-quality medications while streamlining regulatory practices across the GCC.

2.1 Gulf Central Committee for Drug Registration

The Gulf Central Committee for Drug Registration (GCC-DR) was founded by the GCC in May 1999. The Executive Office for Health Ministers of the GCC is situated in Riyadh, Saudi Arabia. Every GCC state designates two delegates to the GCC-DR, composed of Yemen, a member of the Health Council, and the other six GCC states. The main goal of the GCC-DR is to encourage Gulf states to access safe and cost-effective drugs [6].

Among the responsibilities of GCC-DR are:

- To implement a centralized registration process for pharmaceutical products.

- To manage approval of pharmaceutical company registration prior to product registration.
- To conduct good Manufacturing Practices (GMP) inspections of pharmaceutical companies to ensure compliance.
- To review pharmaceutical product documentations, technical reports, and post-marketing surveillance reports.

2.1.1 Harmonisation Method

International Council for Harmonization (ICH) provides the guidelines on the technical requirements for pharmaceuticals intended for human use serving as the primary foundation for regional guidelines developed by the GCC-DR. Apart from these guidelines established by the ICH, various national or regional technical documents and international guidelines, like those issued by the World Health Organization (WHO), have also contributed to the harmonisation process.

After the completion of a draft on the guidelines, it is distributed to all member states for feedback. Concurrently, the draft document is available on the website to gather feedback from stakeholders. The working group scrutinises all the comments and feedback responses to make a final recommendation to the GCC-DR Steering Committee regarding the adoption of the guideline [31]. The General Director of the Executive Office submits the guideline to the Council of Ministers of Health (CMH) for ultimate approval once it has been approved by the GCC-DR Steering Committee as shown in the Figure 2.

Organizational chart of GCC

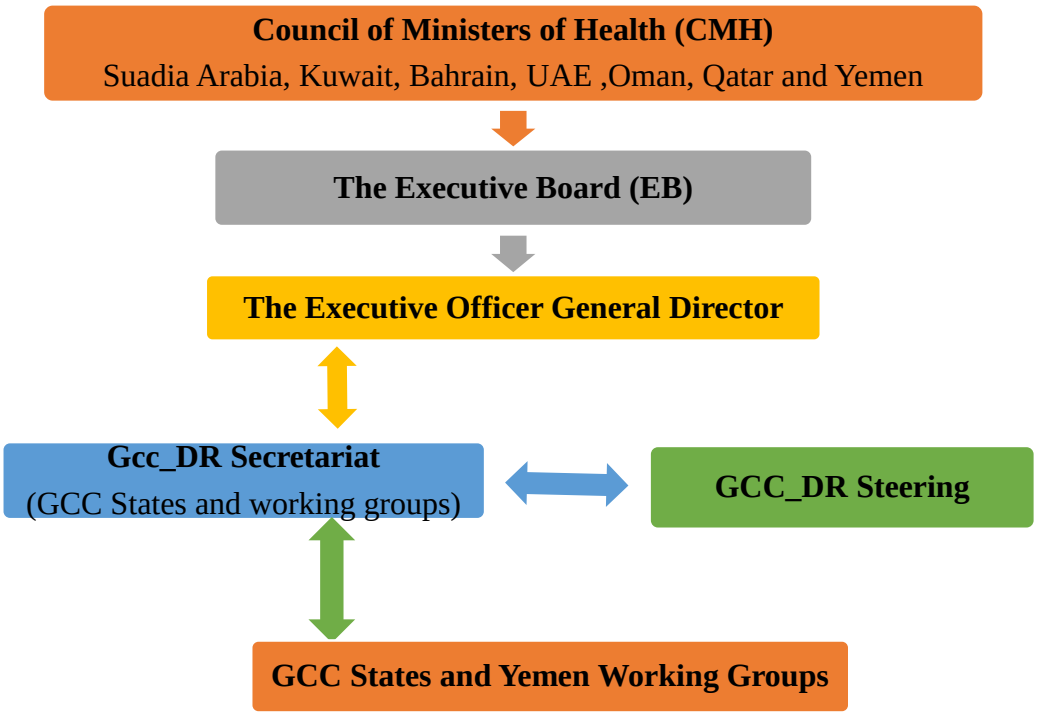


Figure 2: Organizational Chart

Members of the GCC-DR Steering Committee are delegated to monitor implementation in their respective nations. After each year, a meeting is held to evaluate the activities of GCC-DR. All the member states share a detailed report regarding

the pick and shovels while implementing regulations in their regions.

2.1.2. Procedures and Guidelines

The GCC-DR harmonization process adheres to established standards and protocols. The procedures encompass several activities, such as topic selection and prioritisation, feedback gathering, approval and execution of guidelines, and assignment of roles and responsibilities to working groups, decision-making bodies, and the secretariat. Moreover, financial aspects are described. Additional procedures regulate the flow of documents and provide a comprehensive framework for the policies and procedures regulating each stage of the product and company registration processes [32].

2.2 Registration Process

The registration process comprises of two main methods: the Decentralized Procedure and the Centralized Procedure.

Decentralized Procedure

GCC does not have a fully decentralized procedure for pharmaceutical regulations. Each member country of the GCC has its own regulatory authority responsible for pharmaceutical regulations, including drug registration and approval [34]. However, the GCC states were making efforts to harmonise key areas of pharmaceutical legislation, making it easier for pharmaceutical items to be shipped across GCC states and guaranteeing a uniform standard of safety and efficacy for licensed pharmaceuticals. They have initiatives to establish a unified framework for drug registration and to harmonise particular aspects of the approval procedure (A).

Centralized Procedure

The centralized procedure for registering pharmaceutical drugs in the GCC region involves a coordinated approach for drug registration across the member states of the GCC [35]. The key steps involved in this centralized procedure are as follows:

2.3 Submission of Registration Application

The registration process commences with the submission of application for each manufacturing site that lacks accreditation by the GCC or GCC-DR. For each production line they demand to register, the applicant must simultaneously apply for product marketing authorisation [6]. Following the submission of these applications, the GCC office ensures that the acknowledgement complies with the regulations and guidelines that are specific to New Active Substances (NASs) and Existing Active Substances (EASs). This thorough procedure ensures that all essential actions are taken to begin pharmaceutical product registration in the GCC.

2.4 Product Dossier and Sample Submission

Product samples and a product dossier prepared in compliance with the GCC Common Technical Document (CTD) format guideline are delivered to the GCC-DR executive office. The GCC region requires the CTD format to be used for pharmaceutical registration. The CTD is a standardised document that has been developed by the ICH. The purpose of this system is to mitigate redundancy and optimise the translation process into several regional languages, hence facilitating the submission of a unified application for the registration of pharmaceutical products across numerous nations concurrently. The CTD framework for human drug application submission consists of five main modules also shown in Figure 3.

Framework of CTD

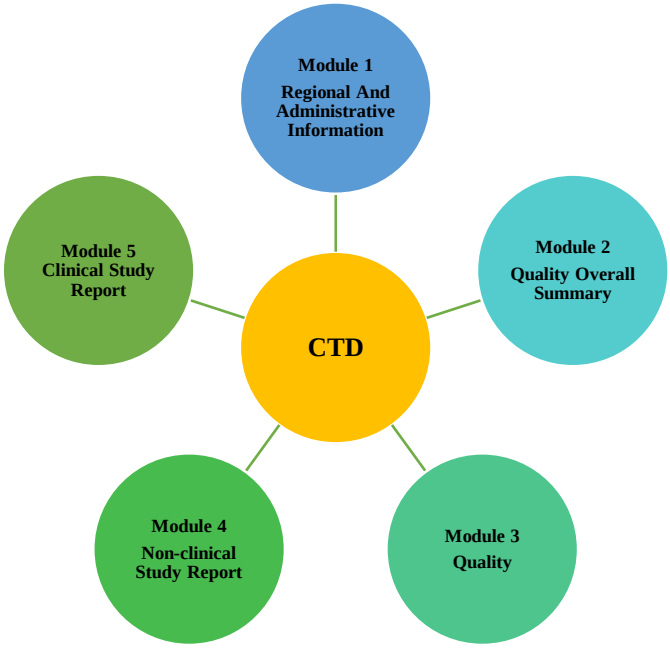


Figure 3: CTD Modules

Module 1 – Regional Administrative Details

Information specific to a given region that is pertinent to the dossier's submission is included in Module 1. The regulatory authorities in charge of that region have the ultimate control over the format and content of this module. Module 1 (regional information) of the CTD contains three more XML files for each region. These files contain links to the actual submission data as well as meta-data about the applicant, product, and submission dates.

***Module* 2 – Summaries**

Module 2 includes overviews and synopses of the three technical sections of the CTD: efficacy, safety, and quality. Each discipline's specific guidance document (Quality, Safety, and Efficacy) explains the format of these summaries.

Module 3 – Quality

Information relevant to the pharmaceutical substance and product's quality aspects can be found in Module 3. This includes information about the drug or biological substance and the product's chemistry, manufacturing process, and controls [33].

Module 4 – Non-Clinical Study Reports

The pharmacological, pharmacokinetic, and toxicological aspects of the medication or biologic substance and product are covered in this module's information on the non-clinical evaluation. Usually, publications and study reports are used to convey this information.

Module 5 – Clinical Study Reports

The detailed clinical evaluation of the medication or biological product is covered in Module 5. Clinical Study Reports, along with relevant publications, are included in this module and provide an in-depth description of every clinical study that has been conducted [2,35].

2.5 Review for Submission Completeness

Both the clinical and technical boards must undergo a review process to determine the completion of the submitted dossier and samples. These committees deal with all aspects of product quality, safety, and efficacy.

Clinical Board

The main responsibility of the clinical board, which comprises experts from each member state, is to assess the clinical requirements for both new and existing active substances (NASs and EASs). This board prioritizes medication safety and efficacy, paying special attention to modules 4 and 5 of the authorized GCC CTD model.

Technical Review

The clinical assessment is followed by submission of the dossier to the member state technical review teams. Each review team conducts an independent review of the application. These technical review teams are responsible for inspecting and granting approval of the active pharmaceutical ingredients (APIs) and other substances used in the medicine, both within its formulation and the final product. Module 3 of the GCC CTD standard entails the technical aspects of medicine, as their keen concern.

Laboratory Tests

Mandatory e-CTD Format: Applications must be submitted electronically in the Common Technical Document (e-CTD) format via the GCC Electronic Gateway as of February 2019.

Several documents have been released by the Gulf Health Council (GHC) to assist applications with this procedure. Region-Specific Module 1 Preparation: The "GCC Module 1 Specification and the Baseline eCTD Submission Requirements" guideline, dated December 2018, must be completely adhered to by applicants when preparing Module 1 of their application.

Committee Decision

The executive office notifies the applicant of the Committee's decision. The Committee issues registration certificates for the company/site and the product in the case that the opinion is favourable.

Appeal Process

If they are dissatisfied with the decision made by the committee, the applicant has two months from the notification date to file an appeal.

3. Major Differences in Data Requirements for Registrations of Drug Product in USFDA and GCC Region

This section outlines the key differences in data requirements for the registration of drug products between the USFDA and the GCC region. For a detailed comparison, please refer to Table 3, which summarizes the registration requirements for pharmaceutical drugs in the USA and GCC.

Table 3: Registration Requirements for Pharmaceutical drugs in USA and GCC

Registration Requirements	USA	GCC
Site registration	Yes	Yes
Plant GMP approval	National, USFDA standards, global recognition	Regional, multiple authorities, variable standards

Stability requirements	Choose between 25°C ± 2°C/60% RH ± 5% RH or 30°C ± 2°C/65% RH ± 5% RH.	300± 20C, 65% ± 5% RH
Stability data	Minimum 6 months for accelerated stability data	Minimum 12 months
Stability zone	-	GCC countries comes under zone Iva.
Number of submission of batches	3 primary batches are required	3 pilot scale batches
Dossier Format	CTD with additional documents	ICH CTD
Registration Time	2-3 business days	24-36 months

GMP= good Manufacturing Practices, USFDA= United State Food and Drug Administration.
ICH= International Council for Harmonisation, CTD= Common Technical Document

3.1 Documents Required for Drug Products Registration by GCC and USFDA

In GCC, manufacturers should provide an application dossier which must have a copy of the letter of authorisation, a Certificate of Pharmaceutical Product, a Free Sale Certificate, evidence of GMP compliance, a product dossier, labelling samples, product samples, stability data, quality control test data, packaging and labelling specifications, a Pharmaceutical Product Registration Certificate, and a Power of Attorney.

In contrast, the USFDA registration process, with a focus on new drug applications (NDAs) and abbreviated new drug applications, requires the documentation of clinical data, Chemistry, Manufacturing, and Controls information, bioequivalence data for generics, comprehensive labelling information, user fees, GMP compliance, registration and listing, and if applicable, all inspection records. Additionally, Table 4 provides an overview of the general requirements for labelling in both region

Table 4: General requirements for Labelling

Labelling Requirement	GCC Requirements	USFDA Requirements
Drug name	Local language and possibly English, prominent	Proprietary or established name (generic for prescription)
Strength	Specified strength per dosage unit	Strength of active ingredients per dosage unit
Dosage form	Indication of dosage form (e.g., tablet, syrup)	Indication of dosage form (e.g., tablet, capsule)
Route of administration	Specified route of administration	Indication of the intended route of administration
Indications and usage	Information on approved uses	Information on approved uses
Warnings and precautions	Clear warnings, precautions, contraindications	Clear warnings, precautions, contraindications
Directions for use	Clear and concise usage directions	Clear and concise directions for use
Allergic reactions/harmful side effects	Information on side effects and contraindications	Information on adverse effects and contraindications
Inactive ingredients	List of inactive ingredients, excipients	List of inactive ingredients, excipients
Expiry date	Display of expiration date (shelf life)	Display of expiration date (shelf life)
Batch or lot number	Inclusion of batch/lot number for traceability	Inclusion of lot/batch number for traceability
Storage conditions	Recommended storage conditions	Recommended storage conditions
Manufacturer information	Manufacturer name and address	Manufacturer name and address
National drug code (NDC)	May not apply in the GCC	Inclusion of National Drug Code (NDC) if applicable
Barcodes	Barcodes for tracking and authentication	Barcodes for tracking and inventory control
Patient information	Package inserts with additional information	Patient information leaflets may be included
Regulatory authority	Specific to GCC countries	United States Food and Drug Administration (USFDA)

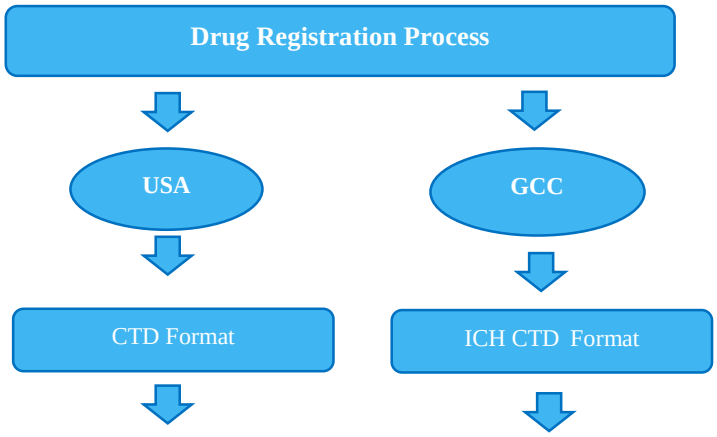
GCC= Gulf Central Committee, NCD=National drug code , USFDA= United States Food and Drug Administration,

4. Drug Approval Method of Analysis

In the regulatory processes of both the GCC and the USFDA, drug product specifications and methods of analysis play a crucial role in demonstrating the quality, safety, and efficacy of pharmaceutical products. They serve as a basis for evaluating product consistency and assuring compliance with established quality standards. Specific requirements may vary depending on the type of substance, regulatory pathway, and other

factors, but adherence to these standards is crucial for regulatory approval and public safety. During the regulatory submission procedure, manufacturers are expected to provide complete and accurate documentation related to these aspects [36]. The major objective of both methods is to ensure the safety and efficacy of all drugs which are getting registered in their record for authorisation. Figure 4 illustrates the scheme which differentiates the approval procedures via both channels of new drug registration and market authorisation. Comparing the FDA and GCC regulatory frameworks offers unique insights into how well-established and emerging regulatory systems approach pharmaceutical governance. This comparison illuminates the evolution of regulatory science across different geographical contexts, revealing how cultural, economic, and healthcare infrastructure differences shape regulatory priorities. While the FDA represents a mature system with decades of precedent and global influence, the GCC framework demonstrates how regional collaboration can create standardized approaches tailored to specific population needs. Understanding these parallel but distinct systems helps identify best practices that could inform global harmonization efforts while preserving necessary regional adaptations to ensure drug safety and efficacy across diverse populations."

Drug Approval Process Differences



Preclinical Research	Module 1 – Regional Administrative Details
New Drug Application	Module 2 – Summaries
Clinical Development	Module 3 – Quality
Market Approval and Launching	Module 4 – Non-Clinical Study Reports
Post Market Surveillance	Module 5 – Clinical Study Reports

Figure 4: Drug Approval Process Differences

CONCLUSION:

In a nutshell, obtaining global marketing approval and synchronizing product launches across various regions is a formidable and complex task due to diverse regulatory requirements. Manufacturers must conduct in-depth evaluation of market stipulation, financial considerations, target regions, and regulatory prerequisites while embarking on drug development initiatives to facilitate and upgrade healthcare systems. They should also establish a well-defined regulatory strategy which accounts for differences in patent duration, application possibilities, data prerequisites, and launch timelines across multiple regions. The imperative need for regulatory standardisation is underscored as it can mitigate redundancy in efforts and resource allocation. Furthermore, an individualized approach should be designed to examine specific markets that may yield regulatory improvements, thus ensuring the accessibility of secure and effective medicinal products, which remains the primary objective of drug registration.

CONFLICT OF INTERESTS

There are no conflicts of interest in relation to the research, authorship, and/or publication of this work.

AUTHORS CONTRIBUTION

MIS contributed to design the study and data collection. ZB played a key role in data analysis to data analysis, while ZB, AS and ML provided valuable assistance with manuscript writing. Finally, NWF was responsible for final drafting of the manuscript and overseeing the integration of all contributions.

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