

# The Saudi Arabia Food and Drug Authority: An Evaluation of the Registration Process and Good Review Practices in Saudi Arabia in Comparison with Australia, Canada and Singapore

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## Abstract

**Objective** This study compares the current regulatory review process and good review practices at the Saudi Food and Drug Authority (SFDA) with those of regulatory agencies in Australia, Canada, and Singapore and identifies opportunities for developing the SFDA as a Regional Centre of Excellence.

**Methods** A questionnaire completed by the SFDA included data regarding the organisation, key milestones, review timelines, and good review practices of the agency. Similar information was obtained within the same time-frame (2014/2015) through the same standard questionnaire regarding the processes and practices for Health Canada, Singapore's Health Sciences Authority, and Australia's Therapeutic Goods Administration.

**Results** All four regulatory agencies have established target times for scientific assessment and regulatory review, examine dossier sections in parallel, and separate company response time from overall timing. Additionally, all four agencies have instituted good review practices including standard operating procedures, templates, dossier monitoring, and continuous improvement processes, and assign a high priority to transparency in their relationships with the public, healthcare professionals and industry. Of the four agencies, however, only the SFDA requires a Certificate of Pharmaceutical Product (CPP) at the time of the submission and pricing negotiations before final product approval.

**Conclusions** To assist the SFDA in its efforts to become a Regional Centre of Excellence, it is suggested that the agency explore a risk stratification approach to select dossiers for verification, abridged, or full reviews; use forms of certification other than the CPP; make pricing negotiations independent to the review process; and introduce a feedback process for the quality of the dossier.

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## Key Points

The Saudi Food and Drug Authority (SFDA), Health Canada, Singapore's Health Sciences Authority (HSA), and Australia's Therapeutic Goods Administration (TGA) have all established target times for scientific assessment and regulatory review, examine dossier sections in parallel, and separate company response time from overall timing.

The SFDA, Health Canada, the HSA, and the TGA have all instituted good review practices; however, only the SFDA requires a Certificate of Pharmaceutical Product (CPP) for review and completion of pricing negotiations before approval.

In its efforts to become a Regional Centre of Excellence, the SFDA could explore a risk stratification approach to select dossiers for verification, abridged, or full reviews; use forms of certification other than the CPP; make pricing negotiations independent to the review process; and introduce a feedback process for the quality of the dossier.

## 1 Introduction

Pharmaceutical regulatory authorities are challenged in their mandate to perform a transparent, timely review of pharmaceutical products for quality, safety, and efficacy. Their performance against that challenge should be regularly assessed against established international qualitative and quantitative benchmarks and identified best practices and procedures to allow agencies to evaluate their own performance, to provide a baseline against which the impact of change can be measured and to develop realistic improvement initiatives to ultimately ensure that patients in their jurisdictions have expeditious access to innovative, safe, and effective medicines.

In 2015, Alsager et al. [1] conducted a review of the performance of the Saudi Food and Drug Authority (SFDA) to identify areas in which the agency excelled as well as issues for improvement. The current assessment compares SFDA performance, processes, and procedures with those of three comparably sized, established international regulatory agencies.

### 1.1 Saudi Arabia: A Growing Pharmaceutical Market

The Kingdom of Saudi Arabia is one of the wealthiest in the Middle East and African region and its economy

continues to grow. From 2014 to 2015, healthcare spending increased 16 % in Saudi Arabia, rising from 103.2 billion (bn) Saudi Arabian riyals (SAR) [27.5 bn US dollars (USD)] to SAR 119.4 bn (USD 31.8 bn) [2]. Pharmaceutical spending increased 12 % in that same time period, climbing from SAR 28.4 bn (USD 7.6 bn) to SAR 31.8 bn (USD 8.5 bn). Some of these increases can be traced to a rapidly increasing population and the rising incidence and burden of respiratory diseases, diabetes, hypertension, and cancer [2].

In response to these conditions, the SFDA employs stringent price control policies to constrain public and private pharmaceutical costs and participates in the Gulf Cooperation Council (GCC) drug pricing plan, but it is expected that government support for private health insurance enrolment will act to increase overall pharmaceutical expenditures [3].

### 1.2 The Saudi Food and Drug Authority and the Gulf Cooperation Council

In 2009, the SFDA acquired responsibility for the regulation of pharmaceuticals from the Saudi Arabia Ministry of Health. Saudi Arabia is a member of the GCC, established in 1981 to develop unified policies, regulations, and laws among its member states, comprising Saudi Arabia, Kuwait, Bahrain, Qatar, United Arab Emirates, Oman, and Yemen [4]. The centralised procedure for pharmaceutical product registration within the GCC has facilitated the development of unified technical guidelines for the simultaneous registration of products in all member states; however, this process has increased the time required for registration for new products and used constrained regulatory resources in all GCC jurisdictions, including Saudi Arabia.

### 1.3 Study Rationale

As the leading regulatory agency in the Gulf States, it is the long-term goal of the SFDA to become an international Centre of Regulatory Excellence and expedite patients' access to medicines in the region. This study aimed to compare current SFDA review timelines, processes, and procedures with those of three international, mid-sized regulatory agencies in order to identify areas of strength as well as those requiring further improvement to facilitate SFDA progress toward this goal.

## 2 Objectives

- Characterise the current regulatory review process used at the SFDA, identifying agency review models as well as key milestones and timelines.

- Ascertain good review practice requirements, implementation, and measurement by the SFDA, including those to ensure consistency, transparency, timeliness, and predictability of the review process.
- Compare the review processes and practices of the SFDA with those of the regulatory agencies in Canada, Singapore, and Australia to identify areas in which the SFDA excels as well as to suggest opportunities for improvement in order to ultimately enhance patients' access to new medicines.

### 3 Methods

The Centre for Innovation in Regulatory Science (CIRS) has developed a three-part standardised questionnaire, which was completed by SFDA personnel and used to determine agency regulatory review process and practices. This instrument was originally developed to gather information about the regulatory systems in jurisdictions with emerging pharmaceutical markets [5], and was subsequently used for a study of good review practices in the Asia Pacific Economic Cooperation (APEC) region [6].

The first part of the questionnaire established the organisation of the SFDA, including its structure, resources, and review models. Using regulatory process maps developed by CIRS through its work with regulatory agencies in mature and developing markets, the second part of the questionnaire identified SFDA review milestones and timelines for new active substances (NASs), where an NAS is defined as a chemical, biological, or radiopharmaceutical substance not previously authorised as a pharmaceutical product in the country being studied.

The third part of the questionnaire examined SFDA activities that contribute to the quality of the decision-making process and those good review practices that have been adopted at the agency to improve consistency, transparency, timeliness, and predictability in the regulatory review. The results of the questionnaire were evaluated by SFDA study participants for potential additions, amendments, or comments.

Similar questionnaires were also completed and validated within the same timeframe (2014/2015) by Health Canada, Singapore's Health Sciences Authority (HSA), and Australia's Therapeutic Goods Administration (TGA). In addition to enabling the compilation of important information about the structure, processes, and practices of international regulatory agencies, the use of the consistent format and standardised terminology of the questionnaire facilitates an accurate comparison among these organisations. Pharmaceutical company data for agency approval timing was obtained directly from pharmaceutical

companies by CIRS as part of its ongoing study to benchmark the approval times of global regulatory agencies.

A complete analysis of the questionnaire results for Saudi Arabia has been previously published by Alsager et al. [1]. This comparison primarily utilises the results from the second and third sections of the questionnaire for Saudi Arabia, Canada, Singapore, and Australia.

## 4 Results

### 4.1 Processes

The key features of the SFDA review process compared with that of Health Canada, the HSA, and the TGA are summarised in Fig. 1.

#### 4.1.1 Review Model

Three models used by regulators for the scientific review of a product have been identified by McAuslane et al. [5]. The type 1 model (the verification assessment model) avoids duplicating the assessment of a new product that is identical to one that has been approved elsewhere. This model requires prior recognition of an authorisation by two or more reference or competent benchmark authorities and incorporates a verification process to validate the status of a product and to ensure that the medicine to be marketed locally conforms to the authorised product. The type 2 model (the abridged assessment model) also requires that the product has been registered by at least one reference or competent benchmark authority and conserves resources by not re-assessing the full scientific supporting data. This model focuses on aspects that must be evaluated specifically for the local environment, and an abridged assessment is carried out in relation to the use of the product under local conditions, for example, focusing on aspects of quality such as stability, benefit–risk assessment for the local medical practice or culture, and patterns of disease. In the type 3A and 3B model (the full assessment model), the authority has suitable resources, including access to appropriate internal and external experts, to carry out a complete review and evaluation of the supporting scientific data. In type 3A reviews, quality, safety (pre-clinical), and efficacy (clinical) data are assessed in detail and there are requirements for pre-registration in another jurisdiction before an authorisation can be finalised. In type 3B reviews, a full, independent review of safety (pre-clinical) and efficacy (clinical) data is carried out and information from registrations in other jurisdictions (if any) is taken into consideration, but is not a prerequisite to filing or authorisation.

**Fig. 1** Summary comparison of key features of the pharmaceutical regulatory systems of Saudi Arabia, Canada, Singapore, and Australia. *NAS* new active substance

Marketing Authorisations	Saudi Arabia	Australia	Canada	Singapore
The Certificate of a Pharmaceutical Product (CPP) is required at the time of submission	✓	✗	✗	✗
Medical staff: More than 20% of the authority review staff are medically qualified	✗	✓	✗	✗
Review times: The authority sets targets for the time it spends on the scientific assessment of NAS applications	✓	✓	✓	✓
Approval times: The authority has a target for the overall time for the review and approval of an application	✓	✓	✓	✓
Questions to sponsors are batched at fixed points in the review procedure	✓	✓	✗	✓
Company response time: Recording procedures allow the company response time to be measured and differentiated in the overall processing time	✓	✓	✓	✓
Priority Reviews: The authority recognises medical urgency as a criteria for accelerating the review and approval process for qualifying products	✓	✗	✓	✓
Parallel processing: The different sections of technical data (Quality, Safety, Efficacy) are reviewed in parallel rather than sequentially	✓	✓	✓	✓
Price negotiation: Discussion of pricing is separate from the technical review and does not hold up the approval of products	✗	✓	✓	✓
Sample analysis: The focus is on checking quality in the market place and therefore requirements for analytical work do not hold up the marketing authorisation	✓	✓	✓	✓

The SFDA conducts a type 3A (full assessment) review, in which quality, safety (pre-clinical), and efficacy (clinical) data are assessed in detail, and there are requirements for pre-registration elsewhere before the authorisation can be finalised. Canada and Australia conduct a type 3B review, which does not require an approval by a reference country. The type 2 or abridged assessment is also conducted in Australia; however, guidelines stipulate that the drug product has to be approved by two or more reference agencies and the drug must be identical to that in the reference countries. Although Singapore uses all three routes of assessment—verification (type 1), abridged (type 2), and full review (type 3)—the majority of its evaluations are abridged reviews.

#### 4.1.2 Certificate of Pharmaceutical Product

The SFDA requires a legalised Certificate of Pharmaceutical Product (CPP) at the time of application; however, if the product has not been approved elsewhere and has been designated as a priority product, the CPP can be submitted at the time of authorisation rather than at the time of submission. The World Health Organization (WHO) has stated that legalisation of the CPP is no longer required, and Canada, Singapore, and Australia do not require a CPP.

#### 4.1.3 Data Requirements

The SFDA currently requires full pharmaceutical, chemistry, manufacturing, and controls (CMC), non-clinical, and

clinical data with submissions. The agency conducts a detailed assessment of the pharmaceutical/CMC and clinical data, whereas the non-clinical data are only reviewed if a query has been raised. In addition, Saudi Arabia requires information relating to pricing as part of their review process.

Like the SFDA, Health Canada, the HSA, and the TGA require full pharmaceutical, CMC, non-clinical, and clinical data sets. The HSA carries out various assessments based on the type of review, allowing the agency to utilise their resources and expertise on applications for medicines that have a high-risk factor for their population. Unlike the SFDA, the agencies have separate groups that review pricing.

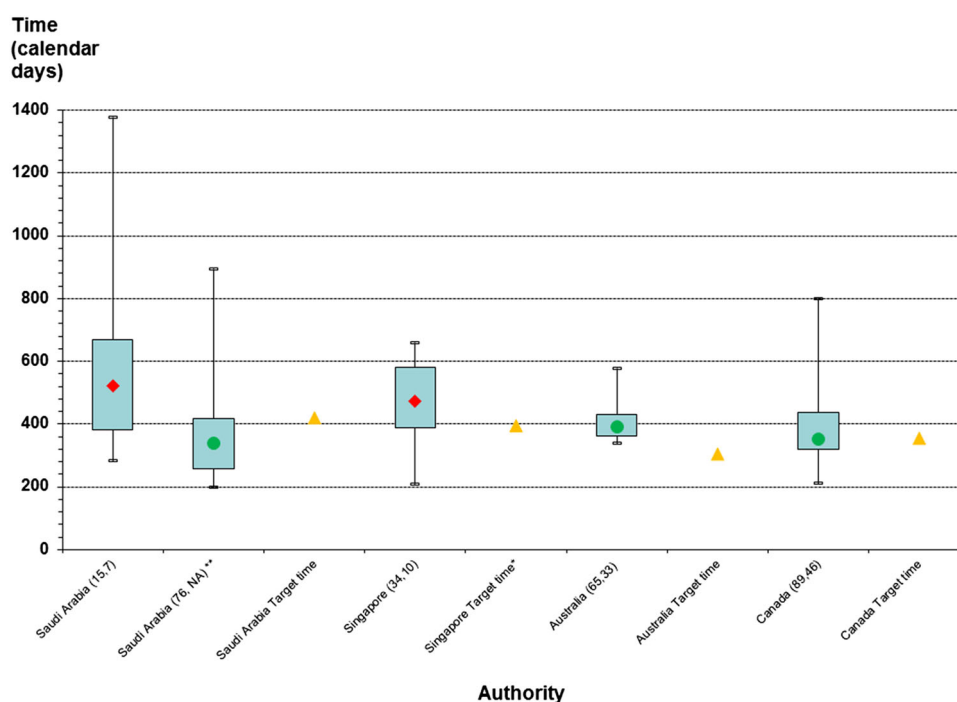
#### 4.1.4 Target and Approval Timing

The SFDA review process consists of validation of the dossier package, scientific assessment, company response time, and final authorisation. The SFDA has stipulated target times for validation, scientific assessment, authorisation and the overall approval time. The review of quality, safety, and efficacy data is conducted in parallel, and the primary scientific assessment is carried out internally, with external experts used on an ad hoc basis for advice on

clinical matters or recommendations. The target timing for scientific assessment in the SFDA is 354 calendar days and for overall approval is 420 calendar days.

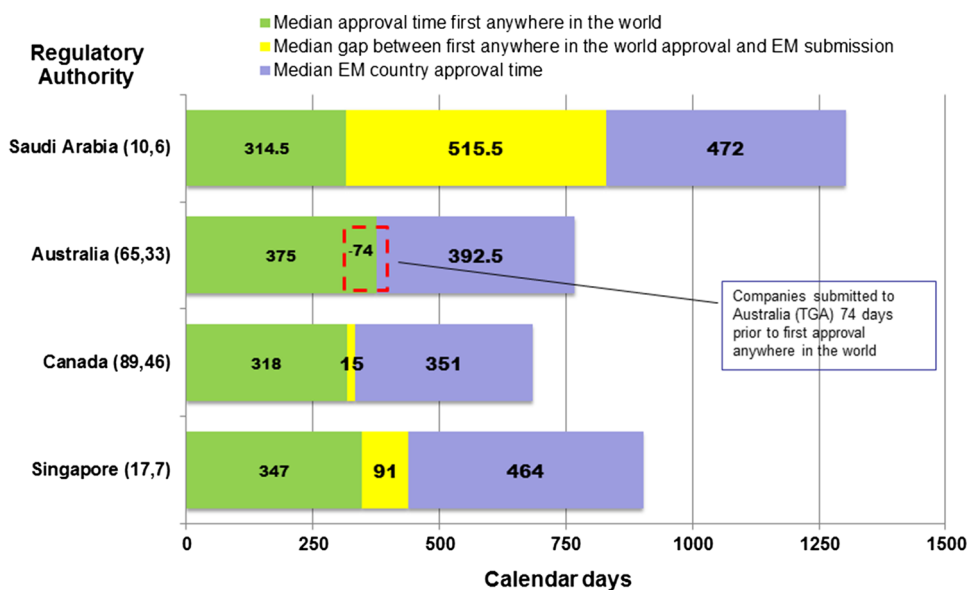
The target times for type 3B scientific assessment for agencies in Health Canada, the HSA, and the TGA range from 186 to 395 calendar days, with the authorisation procedure for most agencies being within 1 month. The overall target approval time for a type 3B review is between 305 days in the TGA and 395 calendar days in the HSA.

From 2011 to 2013, company-documented approval times for NASs approved by the SFDA show variability, ranging from 284 to 1377 calendar days, with a median of 521 days. Whilst it should be recognised that these data are from a limited number of companies, agency-provided data also show a large variance in approval times, ranging from 198 to 893 calendar days, with a median approval time of 340 calendar days, which is in line with SFDA target times. Target and approval times for NASs from 2011 to 2013 according to company-supplied and agency-supplied data for the SFDA, Health Canada, the HSA, and the TGA are shown in Fig. 2. It can be seen that the SFDA median approval time for NASs is comparable to those provided by other agencies monitored in this study.



**Fig. 2** Regulatory approval time from date of submission to date of approval for NASs approved 2011–2013 in Saudi Arabia, Canada, Singapore, and Australia. ( $n_1$ ,  $n_2$ ) number of drug applications, number of companies providing data, *boxes* 25th and 75th percentiles, *whiskers* 5th and 95th percentiles, *diamonds* company-provided data, *triangles* agency target time, *circles* agency-provided data (from

agency and public domain). Singapore company data shows approval time for all review types, but the majority of the applications were an abridged review. *NA* not available, *NAS* new active substance. *Asterisks* Singapore target time shown for type 3B review (full review); *double asterisks* NAS approval time shown for local and international companies



**Fig. 3** Median time to rollout of NASs in Saudi Arabia, Australia, Canada, and Singapore, 2011–2013. *N in bar* median number of days, (*n1*, *n2*) number of NASs, number of companies. NASs in this analysis include those with first anywhere in the world submission, first anywhere in the world approval; application submission and application approval dates only. Australia and Canada data are

provided from the public domain and from the agency. Singapore company data show approval time for all review types, but the majority of the applications underwent an abridged review. *EM* emerging markets, *NAS* new active substance, *TGA* Therapeutic Goods Administration

**Fig. 4** Regulatory quality measures at regulatory agencies in Saudi Arabia, Canada, Singapore, and Australia. (*n1/n2*) number of measures in use at the agency/number of possible measures. *GCC* Gulf Cooperation Council, *SOPs* standard operating procedures. *Asterisks* as part of the GCC process; *double asterisks* agency has an internal quality audit programme framework

Measure	Regulatory Authority			
	Saudi Arabia (6/7)	Australia (6/7)	Canada (5/7)	Singapore (5/7)
Internal quality policy	✘	✓	✘**	✘
Good Review Practice System	✓ (informally)	✓ (informally)	✓ (formally)	✓ (informally)
SOPs for guidance of assessors	✓	✓	✓	✓
Assessment templates	✓	✓	✓	✓
Quality Department	✓	✘	✘	✘
Scientific Committee	✓	✓	✓	✓
Shared and joint reviews	✓*	✓ (Occasionally)	✓ (Occasionally)	✓ (Occasionally)

#### 4.1.5 Lag Time

Dossiers for NASs submitted to the SFDA lag behind the first approval in the world by a median of 1 year, whereas they were submitted to the TGA within a median of 74 days prior to the completion of the first approval anywhere in the world and to Health Canada 15 days after the first approval anywhere in the world. The HSA submissions

reflect a slightly longer lag time in comparison to the TGA and Health Canada; however, this analysis combines type 1, 2, and 3 reviews. The majority of HSA applications are reviewed using a type 2 review model, which requires prior approval from at least one other reference stringent agency (Fig. 3). These differences in timing may reflect the importance of the market and company strategy as well as the requirements of the country. It should be noted that the

**Fig. 5** Transparency and communication measures at regulatory agencies in Saudi Arabia, Canada, Singapore and Australia. (n1/n2) number of measures in use at the agency/ number of possible measures

Measure	Regulatory Authority			
	Saudi Arabia (5/9)	Australia (9/9)	Canada (8/9)	Singapore (6/9)
Feedback to industry on submitted dossiers	✘	✓	✓	✘
Details of technical staff to contact	✘	✓	✓	✓
Pre-submission scientific advice to industry	✓	✓	✓	✓
Official guidelines to assist industry	✓	✓	✓	✓
Industry can track progress of applications	✓	✓	✓	✓
Summary of the grounds on which approval was granted	✘	✓	✓	✘
Approval times	✓	✓	✓	✓
Advisory committee meeting dates	✘	✓	✘	✘
Approval of products	✓	✓	✓	✓

**Fig. 6** Continuous improvement initiatives at regulatory agencies in Saudi Arabia, Canada, Singapore, and Australia. (n1/n2) number of measures in use at the agency/ number of possible measures. NA not available

Measure	Regulatory Authority			
	Saudi Arabia (5/5)	Australia (4/5)	Canada (3/5)	Singapore (4/5)
External quality audits	✓	✘	✘	✘
Internal quality audits	✓	✓	✓	✓
Internal tracking systems	✓	✓	✓	✓
Reviews of assessors' feedback	✓	✓	NA	✓
Reviews of stakeholders' feedback	✓	✓	✓	✓

data set for Saudi Arabia is very small, with only 15 NASs and seven companies, so may not be a true representation of the complete data set of approved products.

## 4.2 Good Review Practice

### 4.2.1 Quality Measures

The quality measures included in the agencies' decision-making processes and evaluated in this comparative study included the use of an internal quality policy, good review practices, the availability of standard operating procedures (SOPs) for assessors, the use of assessment

templates, the availability of a quality assurance department, the use of a scientific committee, and the use of shared and joint reviews with other agencies. The SFDA have five out of these seven measures in place, namely, SOPs for assessors, assessment templates, a quality assurance department, a scientific committee, and shared and joint reviews employed for the GCC process; however, these good review practices are implemented informally. Like the SFDA, Health Canada and the HSA employ five of the seven measures, whilst the TGA uses six. Of the four agencies, only the SFDA indicated that they have established a quality assurance department (Fig. 4).

**Fig. 7** Training and education initiatives at regulatory agencies in Saudi Arabia, Canada, Singapore, and Australia. (n1/n2) number of measures in use at the agency/number of possible measures

Measure	Regulatory Authority			
	Saudi Arabia (8/8)	Australia (8/8)	Canada (8/8)	Singapore (8/8)
International workshops / conferences	✓	✓	✓	✓
External courses	✓	✓	✓	✓
In-house courses	✓	✓	✓	✓
On-the-job training	✓	✓	✓	✓
External speakers invited to the authority	✓	✓	✓	✓
Induction training	✓	✓	✓	✓
Sponsorship of post-graduate degrees	✓	✓	✓	✓
Placements and secondments	✓	✓	✓	✓

#### 4.2.2 Transparency and Communication

Information communicated by regulators to stakeholders could include feedback on submitted dossiers, technical staff contact information, pre-submission scientific advice, official guidelines, ability to track the progress of applications, summary of the grounds of approval, approval times, advisory committee meeting dates, and the approval of products. The SFDA has five of these nine parameters, the HSA has six, Health Canada eight, and the TGA all nine. Of the four agencies, the SFDA, Health Canada, and the HSA do not supply advisory meeting dates, the SFDA and the HSA do not publish the Summary Basis of Approval or give feedback to the industry on the submitted dossier. The SFDA is the only agency that does not share information that is needed to contact their technical staff during the review (Fig. 5).

#### 4.2.3 Continuous Improvement Initiatives

The continuous improvement initiatives assessed in this study included external and internal quality audits, tracking systems, and review of assessors' and stakeholders' feedback. The SFDA has all of these continuous improvement processes in place, while the TGA and HSA have four and Health Canada has three (Fig. 6).

#### 4.2.4 Training and Education

The type of training and continuing education that can enhance the review process include international workshops, external and in-house courses, on-the-job training, lectures by external speakers, induction training,

sponsorship of postgraduate degrees, and placements and secondments. The SFDA is in line with Health Canada, the HSA and the TGA, employing all eight measures with respect to training and education (Fig. 7).

#### 4.2.5 Contributors and Barriers to Good-Quality Decision Making

The SFDA questionnaire responses indicated that adaption of international regulatory framework guidelines, training of staff, and developing an electronic tracking system and database for registered products are the major contributors to an effective and efficient regulatory authority. Whilst the other agencies provided a diverse set of enablers as part of their questionnaire responses, there was some consistency among all four agencies regarding the need for a focus on good-quality review measures and qualified staff.

Factors that act as a barrier to the SFDA quality review are the lack of experienced staff and a high turnover, the lack of on-the-job training with international regulatory authorities and the GCC process, all of which have an impact on the national review approval timelines. The comparative agencies indicated that incomplete submissions were a barrier to an effective and efficient regulatory authority in their jurisdiction.

## 5 Discussion

The SFDA currently conducts a full review assessment of applications (type 3A), which is an appropriate methodology based on the competency of the staff. However, reviewer resources are limited, causing delays, and



alternate methods should be considered. Regulatory agencies should consider the use of a risk-stratification approach that enables them to both conserve and utilise constrained resources more efficiently [1]. The HSA and TGA both employ such a risk-stratification approach, and Health Canada is piloting this strategy for abridged reviews (type 2). The HSA, while carrying out both full and abridged reviews, also conducts a verification assessment on products that have been approved by two or more reference agencies.

WHO guidelines no longer require a CPP for regulatory submission; however, the SFDA currently conducts a full review of dossiers with the requirement of a CPP at the time of submission, which can cause delays in submission and consequent delays in patients' access to medicines. The SFDA currently maintains a submission pathway that allows the CPP to be submitted at the time of authorisation for certain products, and consideration should be given to expanding these criteria for use of this pathway. In addition, the utilisation of other tools such as reference agency websites to confirm marketing authorisation could expedite patients' access to medicines [7].

Some agencies in jurisdictions with emerging pharmaceutical markets such as Brazil, Mexico, Taiwan, and Turkey only require the receipt of the CPP at the time of market authorisation. The SFDA may wish to consider this approach, which has resulted in a shorter lag time from first approval anywhere in the world to submission in these countries and an expedited rollout of new medicines and their consequent availability to patients.

Defining target times within the review process allows the agency and other stakeholders to plan for a more predictable outcome, and detailing each specific milestone in the review process allows the identification of areas in which improvements can be made. The SFDA has a robust tracking system that monitors the key milestones of the review process. In addition, median SFDA approval times are within the stated targets; however, the appreciable variability in approval times suggests the need for improved consistency and process predictability in the system. This may result from both a lack of experienced staff and recent agency organisational changes. However, one-third of SFDA review time (90 working days) is allotted to company response times and this variability could also result from irregularity in the time taken to answer questions by the company.

HSA- and TGA-supplied data show approval times that are shorter than the data for approval times supplied by pharmaceutical companies, but this analysis is based on a small data set from a limited number of companies. Health Canada target and approval times are relatively similar and this may be because Canada is governed by the *User Fees Act*, which includes penalties of up to 50 % for non-

adherence to service standards, and the agency has taken measures to ensure adherence to timelines to avoid a loss in revenue and thus a resulting reduction in regulatory resources.

In addition to the SFDA CPP requirements, pricing negotiations at the regulatory agency add to the product approval timing in Saudi Arabia. As part of these pricing negotiations, the SFDA requires a pricing list from 12 countries where the product has been approved, which then increases the lag time to submission in Saudi Arabia after first approval anywhere in the world. All of the three comparative agencies in this study maintain a separation of pricing and regulatory functions.

According to the recently published WHO guidelines on good review practices, the employment of good review practices can expedite patients' access to important medicines by facilitating a timely, quality regulatory review and can also maximise the use of scarce resources by enabling regulatory convergence [8]. Like Health Canada, the HSA, and the TGA, the SFDA currently has all the fundamental quality measures in place, to improve and ensure consistency and process predictability; however, the SFDA should consider establishing a formal good review practices system, which would ensure the implementation of that system.

Processes for good decision making enable improved communication to stakeholders [9]; however, neither the SFDA nor the HSA publish a summary of the grounds on which approval is granted; that is, a Summary Basis of Approval or similar documentation. Should the SFDA consider the provision of such documentation, this would provide transparency to patients and healthcare providers regarding internal decision making. In addition, providing feedback on the dossier to industry is a form of communication that could enhance the quality of future submissions, thus minimising errors and reducing deficiency questions during the review [10]. The SFDA employs more continuous improvement processes than Health Canada, the HSA, or the TGA, reflecting the considerable efforts it is making to evolve agency competency to become a Centre of Excellence in the Gulf Region.

Training is a fundamental requirement for quality, predictability, and capacity building of regulatory processes [11], and training measures have been implemented at the SFDA to develop the expertise of the staff. The introduction of additional in-house training methods and the provision of education incentives could help retain staff and promote consistent practices. One of the best methods for training is "job shadowing" an assessor from another agency, and it may be beneficial for the SFDA to develop such a relationship with one or two reference agencies who might be willing to place one of their reviewers at the SFDA or allow the SFDA reviewers to be seconded to their agency.

It is recognised that a framework for a systematic structured approach to benefit–risk assessment is critical to a good-quality review [11]. The WHO good review practices guidelines specify that a review strategy should enable the reviewer or review team to understand and describe the benefit–risk profile of the medical product, given its indication and context of use. The Universal Methodology for Benefit Risk Assessment (UMBRA) framework, which has been evaluated and found to be fit for purpose by Health Canada, the HSA, and the TGA [12] as well as by several international regulatory agencies around the world [13], may be a useful tool for SFDA decision making.

## 6 Conclusions

The country with the largest population and a dominating economy in the Gulf Region is Saudi Arabia [14]. Therefore, it was appropriate to compare the current SFDA processes and practices with those of similar medium-size regulatory agencies such as Health Canada, the HSA, and the TGA. This has enabled the development of several proposals to assist the agency in its efforts to become an internationally recognised reference agency.

The SFDA should consider:

1. Exploring a risk-stratification approach based on the Singapore model; that is, a verification review for products that have been approved by two or more reference agencies and an abridged review for medicines approved by one or more agencies, with a full review only employed for those products that have not been reviewed elsewhere by a reference agency.
2. Replacing the requirement for a legalised CPP with other data sources such as reference agencies' websites to confirm marketing authorisation. Alternatively, the SFDA could require receipt of the CPP at the time of market authorisation rather than at the time of submission.
3. Investigating the separation of pricing negotiations from the review process to remove a rate-limiting step in the review process.
4. Publishing a Summary Basis of Approval or other document that transparently communicates the rationale for agency decisions to stakeholders.
5. Introducing a feedback process to industry on the quality of the dossier to improve future submissions and decrease the number of deficiency questions, thereby shortening the time required for the review.

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## Compliance with Ethical Standards

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**Conflicts of interest** Hajed Hashan is employed by the Saudi Food and Drug Authority. Ibrahim Aljuffali is Vice President of the Saudi Food and Drug Authority. Prisha Patel is employed by the Centre for Innovation in Regulatory Science, London, UK, which conducted the research described in this report. Stuart Walker is the founder of the Centre for Innovation in Regulatory Science, London, UK, which conducted the research described in this report.

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