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Development and Evaluation of MediVerify: A New Digital Database and Search Engine for Registered Medicines in Sri Lanka

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ABSTRACT

Background: The National Medicines Regulatory Authority (NMRA) of Sri Lanka identified the need for a web-based application to enable rapid searches of registered medicines, improving access for regulators and the public to ensure medicine safety. **Method:** MediVerify (http://mediverify.lk), a web application with a database of 11,933 registered medicines, was developed to achieve this goal. It allows fast searches by generic and trade names and is indexed by search engines like Google. The platform features rapid response times and error-tolerant search capabilities to enhance usability. **Results:** Launched on July 11, 2024, by the Minister of Health, MediVerify recorded 21,710 searches in its first week (averaging 3,103 searches daily) across 4,008 medicines. Paracetamol preparations were most frequently searched (>25.88%), followed by cefuroxime (8.95%), co-amoxiclav (4.05%), amoxicillin (3.48%), atorvastatin (3.28%), losartan (2.91%), metformin (2.55%), and salbutamol (2.26%). Antibiotics like cefuroxime and co-amoxiclav, along with non-communicable disease medications such as atorvastatin and metformin, dominated searches. **Conclusions and Recommendations:** MediVerify demonstrated exceptional efficiency, with response times of 0.004 seconds for accurate queries and 1.4 seconds for similar or misspelt terms. This platform facilitates quick access to detailed medicine information, offering significant benefits for regulators and the public in Sri Lanka. We recommend expanding the platform's capabilities to include pricing information and suggest future collaborations with international regulatory systems for broader integration.

Keywords: Web application, Search engine, MediVerify, Medicines regulation

INTRODUCTION

The regulation of medicines and the digitalization of healthcare are interconnected areas that are rapidly evolving in many countries. Large volumes of data need constant perusal by stakeholders such as national regulatory authorities, clinicians, scientists, patients and industries, for the timely delivery of information on medicines.

According to the National Medicinal Drug Policy for Sri Lanka (1), the National Medicines Regulatory Authority (NMRA) (2) is the statutory organization in Sri Lanka vested with powers of

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registration, de-registration, issuance of licenses and regulation of medicines, similar to the Food and Drug Administration (FDA) of the United States of America and the Medicines and Healthcare Products Regulatory Agency (MHRA) in the United Kingdom.

Similar platforms have been developed internationally. For example, the FDA's Orange Book (Drugs@FDA) allows for comprehensive searches on drug approvals in the United States. The UK MHRA also provides searchable access to licensed medicines via their online Medicines and Healthcare products Regulatory Agency register. These systems offer real-time access to medicine registration data, often integrated with pricing and safety alerts. FDA has a similar system devised for regulatory affairs of medical devices and safety concern (MAUDE database), to which we have reported failure of equipment previously (3).

However, following the COVID-19 pandemic, Sri Lanka underwent a phase of geopolitical instability and financial hardships, which led to substandard and unregistered medications being made available as a stopgap measure for treating patients. This eroded the quality of healthcare and the principles of universal health coverage that Sri Lanka had previously enjoyed (4). There was a large influx of medication that needed vetting before registration in the country. The NMRA's former website had only information pertaining to previously registered medicines. The hosting and updating of these websites as well as the process of vetting these medicines, became increasingly difficult to do in a timely manner. This has led to only outdated information being available to the public (5).

Therefore, it was noted that a rapidly accessible web application, encompassing all current NMRA-registered medicines in Sri Lanka, was an essential need to ensure the safety of medicines to regulators and the public alike.

Objectives

Our objectives were to 1) design a rapidly searchable web application, with a comprehensive, up-to-date database of all registered medicines in Sri Lanka; 2) launch the app for use in collaboration with the NMRA; 3) demonstrate feasibility of search by generic and trade names of medicines; 4) assess the most commonly searched medicines; 5) assess the speed of the search engine; 6) make the registration data readily available to the public and 7) recognize commonly searched but unregistered medicines in Sri Lanka (as a long-term objective).

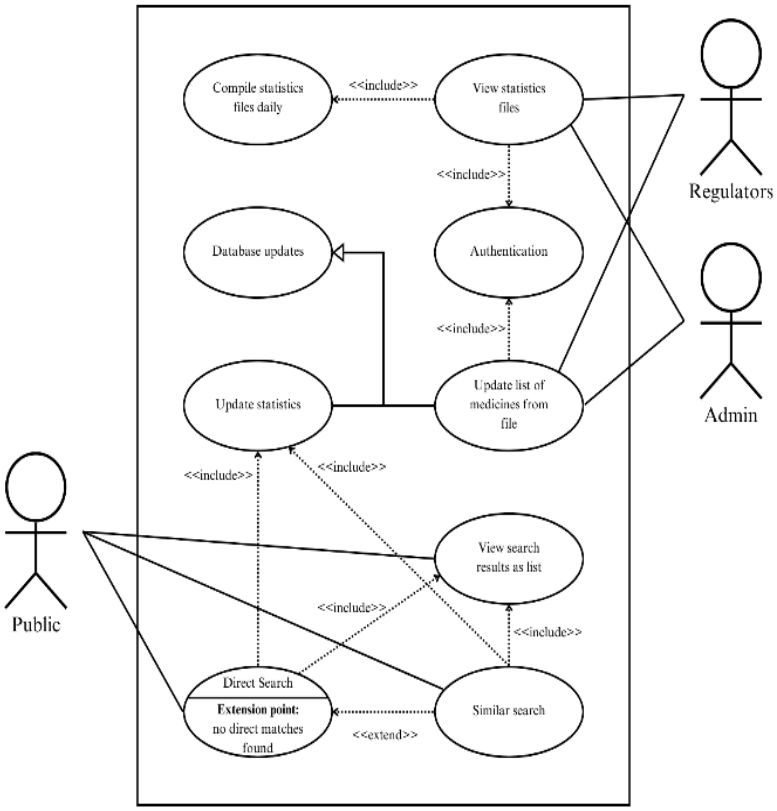
METHODOLOGY

The application was built in the Django web framework library for the Python programming language. An up-to-date database of all 11933 registered medicines in Sri Lanka was obtained with permission from the NMRA. This database was converted by a script from a Microsoft Excel spreadsheet to an SQL (Standard Query Language) database, allowing for faster searches. The processing of each query is handled by the backend (the server), and the results are sent back to the frontend (the user's device). The exact coding is awaiting a copyright, but the algorithm works in four steps. Firstly, when the backend receives a query, it filters it to only contain letters, numbers and spaces (to prevent an attack known as SQL injection which may occur when an input contains special characters). The backend then runs a parameterized SQL query, searching for an exact match in at least one of the generic or trade names of each medicine. If any exact matches are found, they are sent back to the frontend to be displayed. If not, the algorithm loops through each word in the database and query, finds the edit distance between them (the number of characters that must be changed to transform one word into the other) and sends it to the frontend if the edit distance is less than one quarter of the word in the query.

As per updating the database, the manual feeding of Excel spreadsheets required monthly, as a live update facility, similar to the FDA and other international regulatory bodies, was not existent. These updates were uploaded to the website and run through an automated script which converted it into the SQL database stored on the site. The database consists of one table that contains each medicine along with its details, and each medicine has a one-to-many relationship with objects of a second table, which contains each word that

appears in either the generic name or trade name of medicines.

Case diagram (Figure 1), illustrates the basic functionality of the application.




```
<head>
    {% load static %}
    <link rel="stylesheet" href="{% static 'main.css' %}">
</head>
{% include "common/headersmall.html" %}
{% if found %}
<body class="scroll">
{% else %}
<body>
{% endif %}
    <section class="main higher">
        <h1 class="good bold">"{{query}}" was found in the list of registered medicines!</h1>
        <h1 class="bold">Results for "{{query}}":</h1>
        <h3 class="light">Click on each result to see more about the medicine.</h3>
        <h4 class="light">Time taken: {{time}} seconds</h4>
        <a href="{% url 'similar' %}?query={{query}}&direct=1" class="similar"><h4 class="light">Click here to search for similar results (may take a minute or two)</h4></a>
        {% for medicine in results %}
            <button class="searchresult bold">
                {% if medicine.brandname %}
                <h4 class="searchtitle">{{medicine.fullname}} <b>by {{medicine.brandname}}</b></h4>
                {% else %}
                <h4 class="searchtitle">{{medicine.fullname}}</h4>
                {% endif %}
            </button>
            <div class="searchcontent bold">
                <h5>Name: {{medicine.fullname}}</h5>
                <h5>Brand: {{medicine.brandname}}</h5>
                <h5>Dosage Form: {{medicine.dosageform}}</h5>
                <h5>Pack Type: {{medicine.packtype}}</h5>
                <h5>Pack Size: {{medicine.packsize}}</h5>
                <h5>Manufacturer: {{medicine.manufacturer}}</h5>
                <h5>Made in {{medicine.country}}</h5>
                <h5>Local Agent: {{medicine.localagent}}</h5>
                <h5>Dossier Number: {{medicine.dossierno}}</h5>
                <h5>Registration Number: {{medicine.regno}}</h5>
                <h5>Registration Date: {{medicine.regdate}}</h5>
                <h5>Validity Period: {{medicine.validityper}}</h5>
                <h5>Schedule: {{medicine.schedule}}</h5>
            </div>
        {% endfor %}
```

Figure 1: Use case diagram and sample code on Visual Studio editor, illustrating how the web application works

Following the registration of the web domain, the website was launched as part of the new NMRA website. The data of searches was then anonymously reviewed (ensured by storing only aggregate data with no personal identifiers), tabulated and analysed by the authors using Excel and SPSS.

RESULTS

The time taken for a search (excluding the time for Internet connectivity from and to the end-user) was typically in the range of 0.004 seconds for queries with the correct syntax, and was around 1.4 seconds for queries with an incorrect syntax, to find potential matching medicines in the database (Figure 2). This is fast enough to fulfil the requirements of the public.

In the first week following the launch of MediVerify, 21710 searches (approximately 3203 searches per day, with a range of 573-3423) were conducted by users across 4008 of the totals of 11933 registered medicines. The approximate percentage of searches for the top eleven medications is shown in Table 1.

Searches on paracetamol preparations had the highest frequency (25.88%), while paediatric preparations were 1.77% of the searches. This was followed by cefuroxime (8.95%), co-amoxiclav (4.05%), amoxicillin (3.48%), atorvastatin (3.28%), losartan (2.91%), metformin (2.55%) and salbutamol (2.26%) (see Table 1). We analysed, in depth, all medicines that were searched thirty times or more. Of these, piracetam was registered but not on the list of essential medicines of Sri

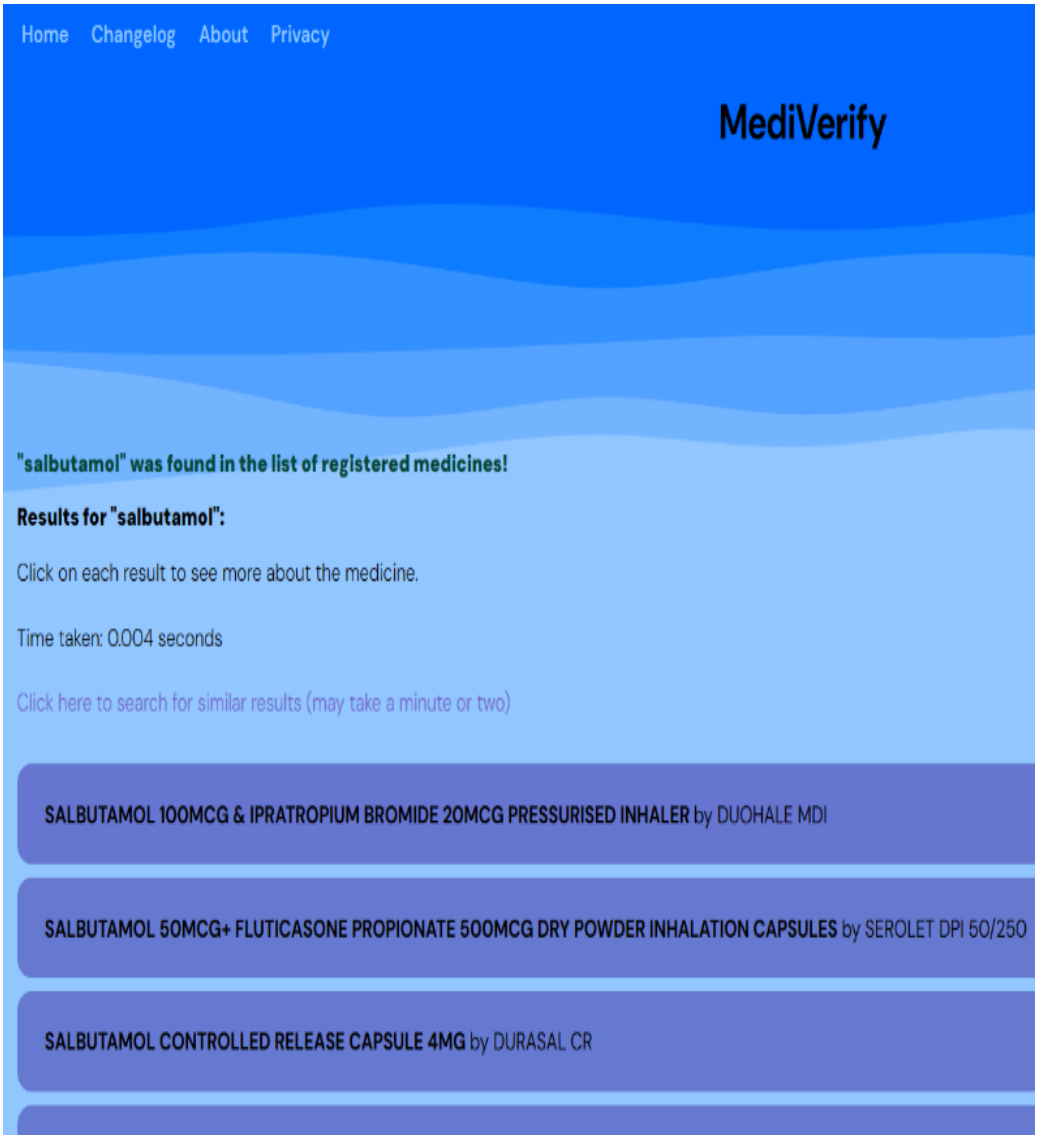


Figure 2: MediVerify app search, on a named medicine with correct syntax (e.g. salbutamol), illustrating the rapidity of the search (0.004 seconds)

Table 1: MediVerify app: top medicines searched in one week, by percentage of all searches

Medication	% of searched medications
paracetamol preps	25.88
cefuroxime	8.95
co - amoxiclav	4.05
amoxicillin	3.48
montelukast	3.29
atorvastatin	3.28
losartan	2.91
metformin	2.55
salbutamol	2.26
paediatric paracetamol	1.77

Lanka (4), accounting for 0.24% of the searches. There were also rarer medicines that had at least thirty searches, such as eltrombopag, human immunoglobulin, clobetasol and trastuzumab.

We believe that the large volume of searches for paracetamol could be because of the public testing the application using the most well-known medicine. However, we also believe that the searches for rare medications are genuine.

The app also generated a sub-analysis of medicines based on the trade name, producer, dosage forms, dose and all other information, as illustrated in Figure 3, with paracetamol preparations as an example. For instance, this week, there were 188 searches for parenteral preparations of paracetamol (6% of all paracetamol searches). Such data could be useful for identifying temporal trends of medicine preparations highly searched for, and likely in demand by end users in the country.

DISCUSSION

MediVerify can operate on multiple devices and is capable of efficient searches on all registered medicines in Sri Lanka, making it a valuable digital search utility that empowers regulators, clinicians and the public throughout Sri Lanka to check the registration status of a medicine found in the country. The accuracy of search results was confirmed during internal testing, with correct results returned consistently for all valid inputs across generic and trade names. The fuzzy matching feature further enhanced reliability by accommodating minor spelling variations. The details of names/dosage forms, manufacturer, help to identify commonly searched medicines, potential non-registered medications, dosage forms and temporal trends. This is valuable for hospitals, pharmacists, regulators and the general public, in times of building confidence in medicines and their regulation in the country. The Independent Medical Practitioners of Sri Lanka (6) has adopted this platform as their drug index for General Practitioners to check the details of medicines.

LIMITATIONS, CHALLENGES AND FUTURE DEVELOPMENTS

A key limitation of MediVerify is the lack of live integration with NMRA's real-time database, requiring monthly manual uploads and conversion. Another difficulty was the integration of data collection, as converting the statistics into an analyzable form was done by an automated script, which at first contained errors and required a large amount of debugging. Compatibility issues also arose, particularly with iOS browsers such as Safari, due to differences in how styles and scripts were rendered. Moreover, due to limited experience in hosting web servers, we faced significant challenges in configuring and deploying our project, including cost management and server security. These limitations were gradually addressed during the rollout phase.

We feel that adding the maximum retail price (MRP) of each drug would enhance the cost-effective usage of medications by prescribers across the country. However, due to frequent changes in pricing, taxation and exchange rates, this process is quite complicated. Nonetheless, MediVerify is a digital initiative that fulfils the provision of information for the safety of medicines and universal health coverage (7) in par with other such initiatives globally (8). Regulators and end users can provide feedback to developers by email for future development of features of the app. We acknowledge that multilingual interfacing may increase reach; however, with an increase in the complexity and slower processing through the app.

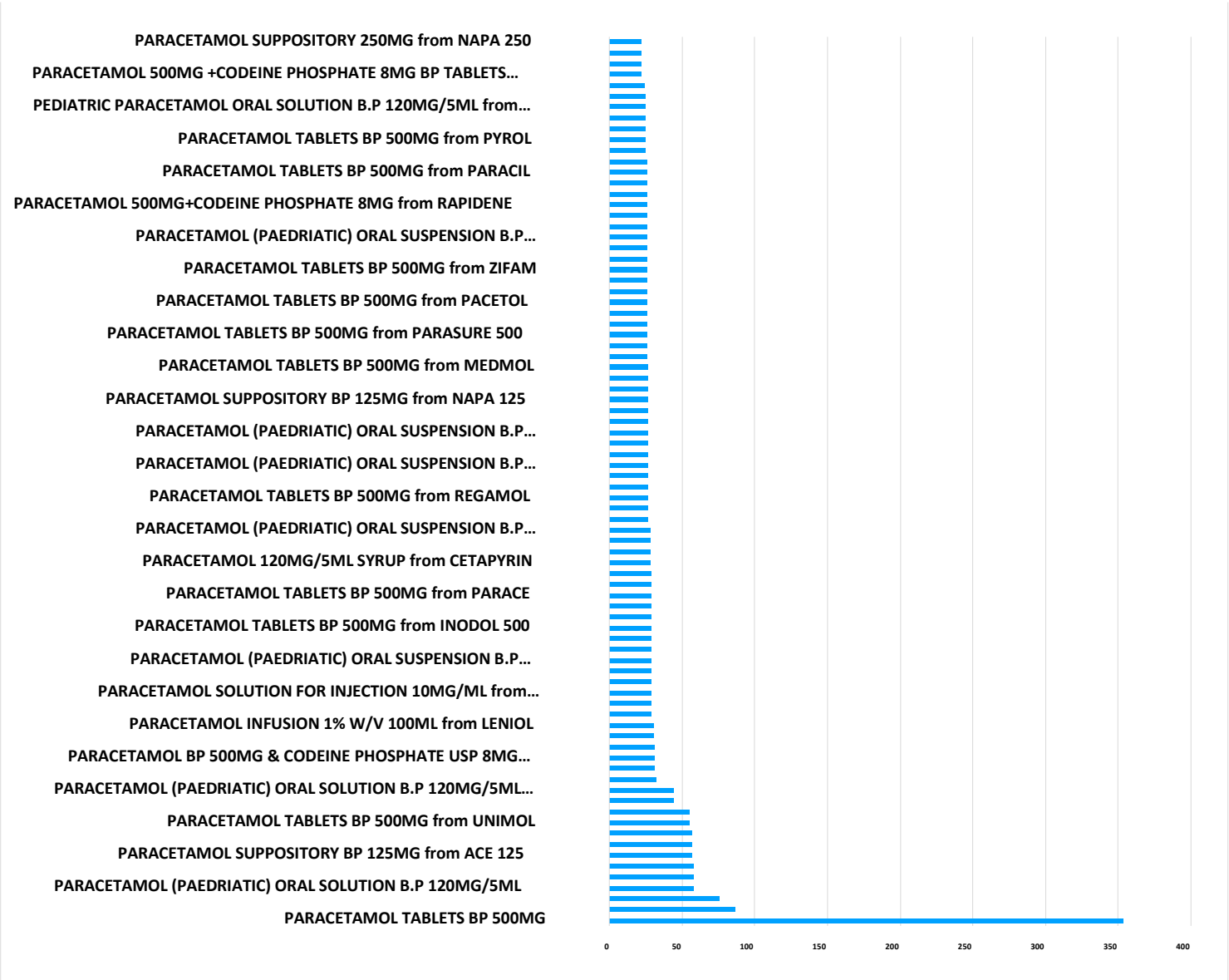


Figure 3: MediVerify app search – highest frequency of searches on various paracetamol preparations

Author declaration

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Authors' contributions:
Coding, Manuscript Writing and Revision: PCAA; Medicine List Development, Data Analysis, Writing – Original Draft, and Evaluation of Revisions: RF, PAA.

Conflicts of interest:
The authors declare that there is no financial or non-financial conflict of interest.

Funding statement:
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Ethics statement:
As this study uses secondary search frequency data, already visible to NMRA in their domains, with users consenting upfront to the collection of the anonymised data for research and app improvement, and with no patient or personal data being collected, no ethical clearance is required for this analysis (similar to a meta-analysis).

Statement on data availability:
The MediVerify platform is publicly accessible, and anonymised search data is accessible on request. The full database is maintained by the developers and the National Medicines Regulatory Authority (NMRA) of Sri Lanka.

REFERENCES

1. Ministry of Health Care and Nutrition. National Medicinal Drug Policy for Sri Lanka [Internet]. 2022 [cited 2025 Mar 8]. https://www.health.gov.lk/wp-content/uploads/2022/10/8_Medicinal-Drug.pdf
2. National Medicines Regulatory Authority (NMRA). NMRA Sri Lanka [Internet]. 2024 [cited 2025 Mar 8]. https://www.nmra.gov.lk/
3. Athauda-Arachchi P, Dorman S. Retention and fracture of a hydrophilic radial artery sheath due to severe spasm. Interv Cardiol. 2012;4(1):57-60. doi:10.2217/ica.11.86. https://www.openaccessjournals.com/articles/retention-and-fracture-of-a-hydrophilic-radial-artery-sheath-due-to-severe-spasm.html
4. Athauda-Arachchi P, Gamage A, Sathasivam S, De Silva A. , Fernandopulle R. Ailing Healthcare, Eroding Trust: Sri Lanka's Healthcare Crisis and Its Geopolitical Implications. J Indo-Pac Aff. 2024;7(5):123-30. doi:10.1234/jipa.2024.12345. https://media.defense.gov/2024/Aug/02/2003516618/-1/-1/1/COMMENTARY_ATHAUDA-ARACHCHI.PDF
5. Ministry of Health Care and Nutrition. Revision of Pharmaceutical Formulary for Government Healthcare Institutions [Internet]. 2021 [cited 2025 Mar 8]. https://www.msd.gov.lk/files/publications/Pharmaceuticals%20FR%20Report%2020,21.pdf
6. Independent Medical Practitioners Association of Sri Lanka (IMPA). IMPA-SL [Internet]. 2024 [cited 2025 Mar 8]. https://impa-sl.com/
7. World Health Organization. Digital health interventions for universal health coverage [Internet]. WHO Tech Rep Ser. 2023;1021:45-67. [cited 2025 Mar 8]. https://www.who.int/ai-in-health
8. Smith J, Thompson R, Li F, Andersson N. Digital Medicine Registries: A Global Review. Lancet Digit Health. 2022;4(3):e123-e130. https://doi.org/10.1016/s1473-3099(21)00344-3