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Hospital E-Prescribing Implementation in Reducing Medication Error

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Abstract---*The purpose of this study was to describe and analyze hospital e-prescribing implementation in reducing medication errors. The hospital information system was an information system that was used for hospitals wherein this information system allows data flow from a hospital can be done electronically. The service to patients can be done more quickly, accurately, and transparently which in the end could provide satisfaction to patients. Medication errors often occurred in hospitals. One of the causes was prescription errors or prescribing errors. The wrong medical decision had an impact on the safety and quality of the patient's health. Therefore, the efforts were needed to prevent and reduce errors by e-prescribing. This study used a qualitative approach in which the research conducted was descriptive. That was how the implementation of e-prescribing in RSUP Sanglah Denpasar in reducing medication error. The research results obtained from interviews, observations, and documentation were the implementation of e-prescribing in Sanglah Hospital going well by involving interviews with management, IT, pharmacists, doctors, and nurses. However, the obstacle faced was the internet network was sometimes not strong and the number of devices a computer was lacking. It can interfere with the process of drug service. It was obtained from the documentation, the incompleteness of prescription writing by doctors before 2016, an average of 16.8%. After being carried out starting in 2018 the data trend showed a decrease in the incompleteness of writing, wherein the average generated 1.8%. The implementation of electronic prescribing with the right strategy will have a positive impact on patient safety and improve the quality of health services. The role of management in monitoring and evaluating the implementation of e-prescribing regularly needs to be improved.*
Keywords---*documentation, e-prescribing, hospital, medication error, prescription.*

Introduction

Hospital Information System (SIMRS) is an information system that is used for hospitals where this information system allows data flow from a hospital can be done electronically. The service to patients can be done more quickly, accurately and transparently which in the end can provide satisfaction to patients (Kusumadewi, 2009).

Minister of Health Regulation (PERMENKES) the Republic of Indonesia No. 72/2016 concerning pharmaceutical service standards in hospitals states pharmaceutical services are activities aimed at preventing, identifying, and resolving *drug-related problems* (DRP). The pharmacy is required to realize the expansion of the pharmaceutical service paradigm from product-oriented to drug-oriented and patient-oriented to the philosophy of pharmaceutical care. This pharmaceutical service is intended to improve the quality of life of patients as well as to minimize errors in medication services or medication errors (Sibailly *et al.,* 2005; Fox *et al.,* 2009). A medication error is an error in the treatment process. There is still under the supervision and responsibility of the health profession, patient or consumer, and should be prevented (Cohen *et al.,* 1996).

American Journal Society of Hospital Pharmacists (ASHP) 2009 classified the types of medication errors based on medication use system or the process of using drugs were divided into several types, one of which was a

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prescription error. Errors in prescription are defined as errors in drug selection, such as errors in dosage, amount, indications, and contraindications of treatment. A prescription error is a clinically meaningful prescription error due to an error in the prescription process. It can affect the effectiveness and timing of treatment and increase the risk when compared to general treatment.

Pratiwi & Lestari (2012), on outpatients, to compare prescribing errors in the implementation of e-prescribing and manually written recipes found 4.3% for errors in e-prescribing, 11% for prescriptions written by manual. In Indonesia, the studies report errors in prescribing are very limited. A study conducted at one of the hospitals in Jakarta in 2013, reported prescribing errors due to no drug dosage 39%, not writing the dosage form 84%, improper use rules 34%, no administration rate 49%, and there was not an administration rate 18%. Prescribing errors were also caused by the doctor's handwriting on prescription paper which was difficult to read and the use of nonstandard abbreviations in writing prescriptions could potentially harm the patient and could cause subpar patient care. Therefore, the efforts are needed to prevent prescription writing errors, for example, electronic prescription writing to improve service quality and patient safety. Sidiartha & Pratiwi (2018), the most common medication errors were at the prescribing stage. Timbongol (2016), the medication percentage error that occurred at the prescribing stage in Poli Interna RSUD Bitung showed that 74.53%, no dosage forms, 20.87%, no available dosages, 62.87%. There was no patient age and 6.50%, the prescription was illegible or unclear. There was the potential for medication errors.

The use of manual recipes in RSUP Sanglah has been changed and modified to reduce medication errors. The prescription name is changed to an inpatient *drug instruction card (KIO)*. In the implementation, many received complaints from doctors and nurses. Due to it was considered impractical. Many obstacles occurred, for example, filling the demand for drugs and medical devices in one form back and forth, often scattered from the patient's medical record, filling the patient's identity incomplete and often also the doctor's writing illegible by the pharmaceutical department. Many drug returns have been extended to the patient due to drug requests that are often uncontrolled and excessive. This will have a detrimental effect on patients and hospitals.

Based on pharmacy installation data and *Committee of Quality and Safety Patients (KMKP)* at RSUP Sanglah in 2016 for the prescribing phase, about 22.73% of prescriptions were experiencing detailed medication errors into prescribing errors (16.8%), transcribing errors (4, 03%) and dispensing error (1.9%). The electronic medical record system at a hospital triggers the idea of electronic prescribing or e-prescribing. It was developed to reduce errors in prescribing and provide the most effective process for patients and service providers to improve service quality and patient safety. The idea arose because there were reports that the doctor's handwriting on prescription paper was sometimes difficult to read and the use of nonstandard abbreviations could cause misinterpretation from the pharmacy and potentially endanger the patient. This error can be prevented. This literature review aims to provide information about the benefits of implementing electronic prescribing and the right strategy in its implementation. Based on the above description, then the problem can be formulated 'how is the implementation of hospital e-prescribing in reducing medication error?'

Theoretical Framework

Hospital Management Information System (SIMRS)

A hospital information system is an information system that is used for hospitals wherein this information system allows the flow of data from a hospital can be done electronically. The service to patients can be done more quickly, accurately, and transparently which can ultimately provide satisfaction to patients (Kusumadewi, 2009). The development currently and the use of *information technology (IT)* both individuals and agencies is growing rapidly. The developments in the IT world should be utilized to improve efficiency and effectiveness in providing health services in hospitals. Based on the Law of the Republic of Indonesia No. 44/2009 regarding hospital article 52. It is stated each hospital is required to record and report all activities in the organization of hospitals in the form of a hospital management information system.

Medication error

Medication errors are events can adversely affect patient safety due to drug use during the supervision of the treatment of health workers, which can be prevented (Depkes RI, 2014). Errors can occur every phase starting from prescribing (doctors), dispensing (pharmacists or dispensing staff), and administration (nurses or patients). The causes of prescribing errors are work environment factors, health worker factors, and patient factors (Bayang *et al.,* 2013). Prescribing errors occur in the form of unreadable recipe writing, the use of unusual abbreviations, and the

problem of recipe completeness. The problem with the completeness of the prescription often occurs is the absence of the name of the prescription doctor and there are no rules of use. Other problems cause medication errors are the writing of incorrect dosages of medication, and therapeutic errors, namely the duplication of therapy wherein two drugs are prescribed in one prescription (Bayang *et al.,* 2013).

E-prescribing

E-prescribing is an electronic process that can send an electronic prescription request from a doctor. It can be sent by the provider to the pharmacy computer intended from the doctor's place of care/practice. A doctor no longer needs to write drugs will be given to patients with their handwriting on prescription paper, but can be direct to the computer (Vogenberg, 2009). In e-prescribing, an e-prescription can be sent through a safer internet network system (*intranet*). Finally, each access user who will enter a closed internet network system must first verify requires a user name and password or another secure ID. According to Muliarta (2016), the benefits of an electronic prescription system include.

a) Improve pharmacy efficiency
b) Speed up recipe reception
c) Promotion of compliance for drugs
d) Improves rectify for the wrong recipe
e) Reducing drug reactions
f) Identification for the wrong dosage
g) Reduces the drug interaction risk
h) Prevention of risks to the danger of health costs
i) Improve service quality and reduce malpractice claims

E-prescribing process flow

The way to make and manage electronic recipes involves several stages, as it is illustrated in the process map below.

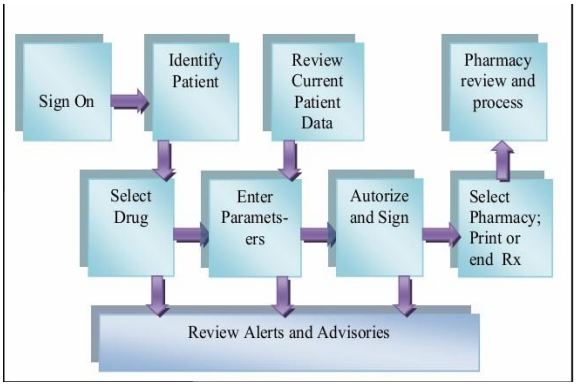


Figure 1. E-prescribing process flow

a) Registration (*signing on*)
   Users used by doctors, pharmacists, and other health staff who have authority. The data authentication type used is only the username and password. Even though today they use *Secure ID*
b) Identifying the patient
   In the next stage, patient identification, the doctor enters complete patient data, for example, first name, last name, date of birth, zip code) into the e-prescribing system.
c) Review the patient's current medication list and medication history information to check the history of treatment that has been undertaken and medical history based on the illness experienced.
d) Viewing drugs (*select drug*)
   The next step the doctor makes a prescription by choosing a drug following the disease diagnosis and the history of the disease that the doctor already knows.
e) Entering Medication (*enter parameters*), entering other parameters to prescribe medicine, if the selected drug

is not available at the pharmacy so the doctor can provide alternative medicine with an adjusted dose.

f) Check and identify recipes (*authorize and sign*).
   After all the drugs are selected which are then made a prescription, thus, the doctor sends them to the pharmacy.
g) Select pharmacy (*select pharmacy print or send*)
   The doctor sends the prescription that has been entered into the pharmacy for processing the medicine.
h) Viewing prescription status from the pharmacy (*pharmacy review and process*)
i) The pharmacist looks at the prescription sent by the doctor by opening the user, then processes the medicine.

Implementation of e-prescribing requires an appropriate strategy that includes the development of user-friendly software from certified providers, special training for clinical staff, and collaborative support from pharmacies/pharmaceutical depots that work together in implementing e-prescribing (Lapane *et al.,* 2011; Rupp & Warholak, 2008; Odukoya *et al.,* 2014; Odukoya & Chui, 2013). Internet access and the level of comfort with changes in behavior in the work environment using protocols and sophisticated technology are also the keys to the successful implementation of e-prescribing. Furthermore, policies to encourage e-prescribing can facilitate positive attitude changes towards the implementation of electronic medical records (Gandhi *et al.,* 2003). The implementation of health information technology will be more successful if supported by user-friendly software. The support system must be adjusted for each institution based on the needs of formularies and local prescription practices. Providers as e-prescribing software developers need to constantly test, improve, update, and adjust systems to be able to keep up with changing prescription needs, trends, and physician practices.

Research Method

This study uses a qualitative approach in which the research conducted is descriptive. Maloeng (2007), revealed that qualitative research is research that intends to understand phenomena about what is experienced by research subjects, for example, behavior, motivation, perception, actions, etc. Holistically and means of descriptions in the form of words and language, in one special context are natural and utilizing various scientific methods.

E-prescribing also increases the efficiency of pharmacies. Electronic prescription delivery shortens the time to read the prescription. Therefore, the pharmacist can prepare the required medication faster. The system in which the management of inpatients in hospitals and outpatients can reduce longer stays, prevent morbidity, mortality, and minimize the addition of greater costs by proactively finding errors in drug use (Pham *et al.,* 2011; Wittich *et al.,* 2014; Crespin, 2010). Furthermore, the policy of implementing e-prescribing can facilitate changes in positive attitudes towards the implementation of a more complete electronic medical record.

The privacy of the patient's personal health information contained in a prescription, whether written or electronic is protected and protected by law. E-prescriptions meet the requirements because the patient's personal health information is shared only to provide services related to clinical care. If the patient wants a print-out of a prescription made for themselves, the doctor can print the prescription and give it to the patient. This new technology communication between pharmacists and doctors is more efficient. Thus, pharmacies can prepare medicines faster and patients do not have to wait long at the pharmacy. If additional information is needed from the e-prescription, the pharmacy can communicate quickly to the prescribing doctor.

Results and Discussion

RSUP Sanglah as a type A education hospital and a national referral in Eastern Indonesia always innovate in providing patient services that require treatment and care. One of the strategies undertaken by management to reduce medication error is by e-prescribing, which is an electronic prescription which is a module in the *hospital administration management information system (SIMARS).*

The development of SIMARS was carried out independently at RSUP Sanglah starting in 2017 and gradually developed according to the grand design has been made including front office modules and other supporting modules. E-prescribing is a clinical module which is the forerunner to the *electronic medical record (EMR)* module. The development of e-prescribing implementation, pharmacies can verify the eligibility of patient coverage and pharmacists can review the use of drugs received by patients to prevent potential dangers that may occur. Potential dangers are, for example, inappropriate prescriptions, drug interactions, first-time drug use, compliance, mandatory

counseling for patients, and more. Prescribing errors that endanger the patient and result in high medical costs can be prevented if the pharmacist in a clinical role helps choose a drug that is safe and affordable for the patient.

Overall, the implementation of e-prescribing and changes in the pharmacy management technology system in RSUP Sanglah can improve the efficiency of pharmacy operations. Professionals are also aware of the need for technological reform measures considering in the future large amounts of new drugs will be added to the national formulary (Carroll *et al.,* 1993; Hendrich *et al.,* 1995; Mulsant & Servan-Schreiber, 1984). Through the implementation of e-prescribing, which is part of the completeness of the electronic medical record. It is expected to improve service quality, reduce errors, improve efficiency and management services. To support this implementation, the management and the IT department need to anticipate things are not expected as a result of the application of e-prescribing, for example, information systems and internet network errors, information systems that suddenly down, and so on. Interview results from doctors who said:

> *" yaa…E-prescribing merupakan peresepan elektronik yang sangat bermanfaat untuk mempermudah dalam peresepan, kontrol obat, monitoring dibandingkan dengan resep kertas. .....pasti dong bisa mengurangi kesalahan dalam penulisan dan pembacaan obat dari dokter ke bagian farmasi.*
> *……..kendala yang kadang terjadi lemahnya jaringan wifi sehingga menyebabkan keterlambatan melakukan peresepan dan sarana komputer masih kurang."*

Translation:

> *"Well ... E-prescribing is an electronic prescription that is very useful to facilitate prescribing, drug control, monitoring compared to paper prescriptions. ..... surely can reduce errors in writing and reading drugs from the doctor to the pharmacy.*
> *... ... ... constraints that sometimes occur due to weak wifi networks, causing delays in prescribing and lacking computer facilities."*

Sabila *et al.* (2018), in reducing prescription writing errors stated the efforts to prevent the occurrence of prescription writing errors can be done by computerized intervention, namely, using e-prescribing. E-prescribing can prevent the risk of misreading prescriptions, can provide the right dose of medication, and can provide information about the history in previous treatment. The use of e-prescribing can provide information about the patient's drug allergy, the effects of the drug consumed by the patient, the data input process is faster and more efficient in the use of paper and more practical.

E-prescribing completeness

Completeness/facilities in e-prescription are almost the same as the recipes written in paper, but there is complete data that needs to be added to the e-prescription included, name of the intended pharmacy/depo pharmacy in the e-prescribing network.

a) Recipes writing time
b) Financing guarantee
c) Patient's disease diagnosis

Before the prescription is prepared to be given to patients, the hospital pharmacy installation/unit will first verify the prescription, included.

a) Selected medicine
b) The number of drugs, including the number of given antibiotics
c) Drug dosage, frequency, and rules of administration
d) Drug dosage forms and drug units
e) Drug interactions
f) Substitution drug
g) Laboratory results related to the given drugs

Steps to consider in writing e-recipes:

a) Choose the pharmacy depot intended.
b) Determined whether to make recipe concoction or non-concoction
c) Determined the number of drugs, frequency of administration, drug dosage and drug units to be given to patients

d) Determine the exact time of administration of the choice of the frequency of drug administration per day (*Figure 2*)
e) Information about contraindications and drug interactions can be seen
f) Facilities are available for additional information regarding the rules of administration (example: simvastatin drug is taken 1 time per day; 1 tablet at night)
g) Information about drug prices in the prescription is available
h) Before processing, the recipe must pass verification by the verification team (pharmacist).

Below is the e-prescribing process in RSUP Sanglah Denpasar through SIMARS as follows.

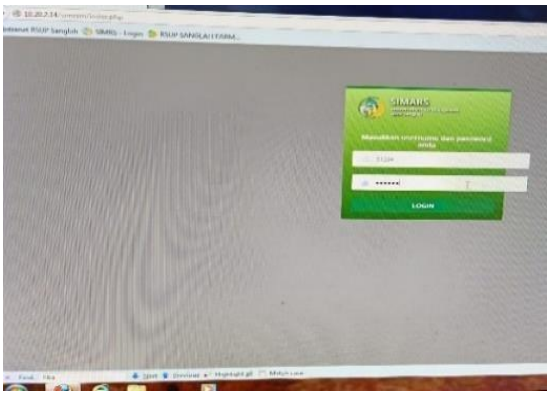


Figure 2. Use of e-prescribing logins

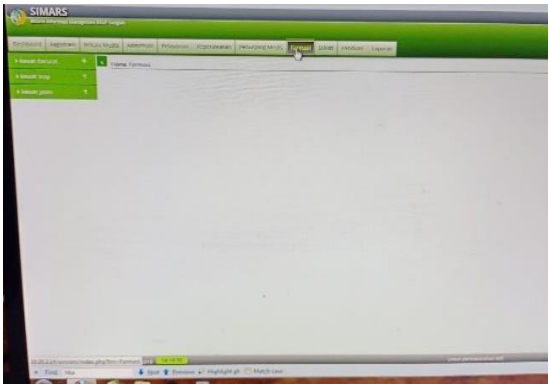


Figure 3. Selection of e-prescribing menu

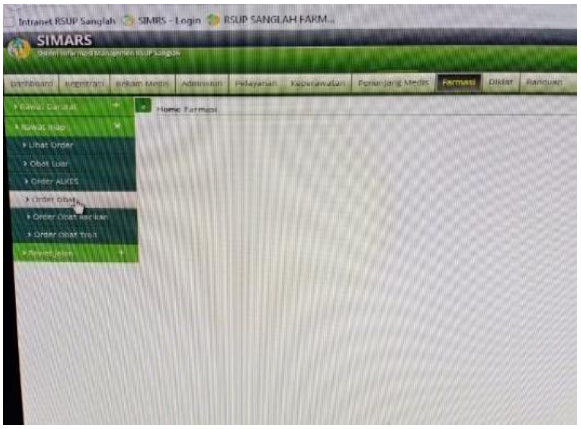


Figure 4. Selection of the e-prescribing menu

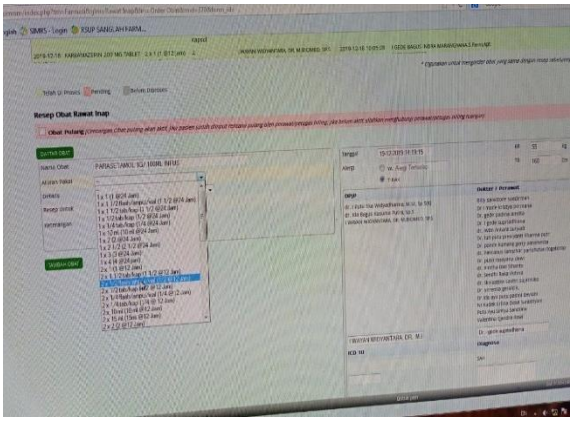


Figure 5. Entering the patient's identity

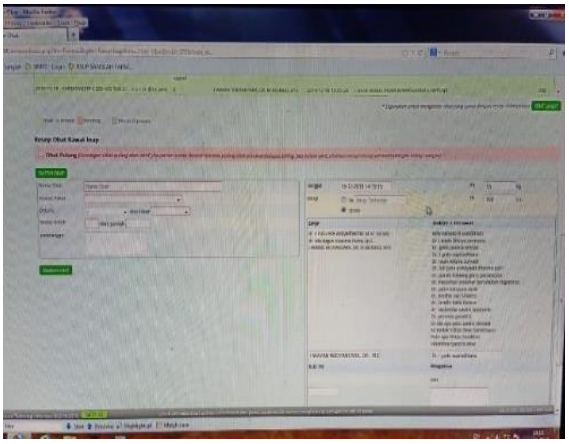


Figure 6. Entering the DPJP

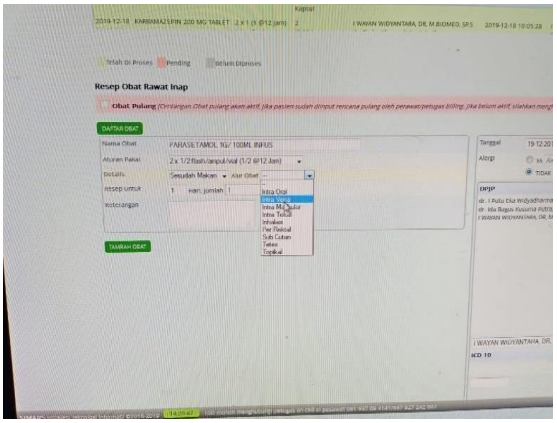


Figure 7. The selection of drugs to give to patients

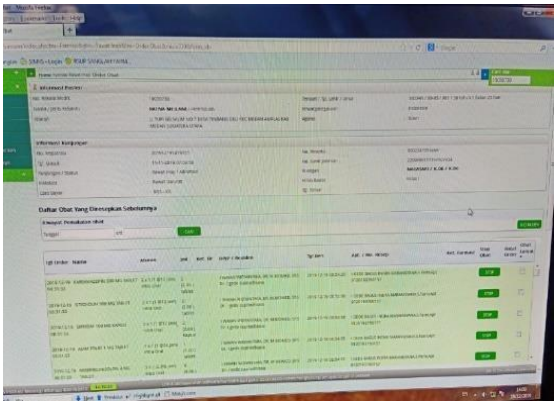
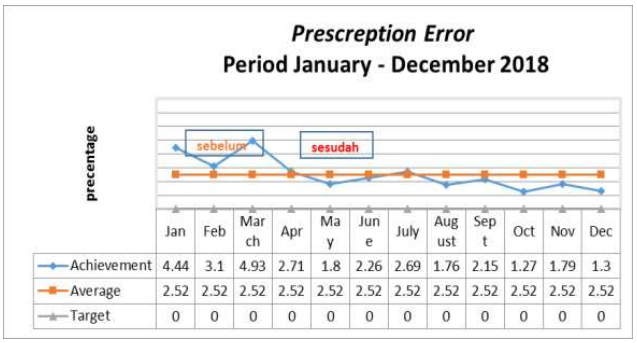


Figure 8. Entering the dose and route of the given drug



	Jan	Feb	March	Apr	May	June	July	August	Sept	Oct	Nov	Dec
Achievement	4.44	3.1	4.93	2.71	1.8	2.26	2.69	1.76	2.15	1.27	1.79	1.3
Average	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52
Target	0	0	0	0	0	0	0	0	0	0	0	0

Figure 9. The results of 2018 prescription error before and after PDSA
Source: PDSA 2018 focus report on pharmacy installation in RSUP Sanglah

Figure 9 shows the results of the 2018 prescription error in RSUP Sanglah in Denpasar. Based on the above data it can be concluded the achievement data of the incompleteness of prescription writing by a doctor before PDSA is performed with an average of 4.2%. After the PDSA began in April the data trend showed a decrease in writing incompleteness, wherein the average yield was 1.8%. The IT department continues to improve services by electronic prescribing in 2019, the implementation of electronic prescribing will be carried out thoroughly in all areas of the hospital.

Conclusion

The implementation of e-prescribing with the right strategy will increase the accuracy of prescribing, alertness to potential adverse drug interactions, history of drug allergies, and efficiency of service time at the pharmacy. It has a positive impact on patient safety and improving the quality of health services. To be able to take advantage of the electronic recipe program optimally, the recommended minimum computer specifications are computers that use a CPU with 2 (two) core processors and use a 100 Mbps LAN card. Some problems that can occur if you use an electronic prescription system include (a) PLN power outages can disrupt patient services. (b) possible hardware damage, software interruption (such as viruses) and network disruptions, therefore, the clinic staff cannot operate electronic prescription programs. To overcome the possible problems can arise, there are several things need to be done as a preventive effort, namely the use of *UPS (Uninterruptible Power Supply)* or the installation of an electric generator. If it is possible, to prevent obstruction of public health services during power outages and the provision of technical training to employees clinic to be able to overcome problems that might occur.

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