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KEYWORD: LOOK-ALIKE/SOUND-ALIKE MEDICATION, MEDICATION SAFETY, MEDICATION MANAGEMENT SYSTEM

CHATTRAPORN CHUMCHIT: DEVELOPMENT OF MEDICATION SAFETY MANAGEMENT SYSTEM FOR LOOK-ALIKE/SOUND-ALIKE DRUGS IN PUBLIC HOSPITALS. THESIS ADVISORS: YAOWALAK AMRUMPAI, Ph.D. AND ASST. PROF. CHAROEN TREESAK, Ph.D. 232 pp

The World Health Organization (WHO) declared patient safety as an important principle in health care systems. In the context of quality program, medication safety is one of the key issues which need to be standardized. Later, WHO launched the Nine Patient Safety Solutions, of which look-alike/sound-alike (LASA) drug names was the first solution to be concerned. In Thailand, the Ministry of Public Health (MoPH) announced the National Patient Safety Goal (NPSG) 2007 – 2008 policy of with medication safety measure as one of the main issues, and look-alike/sound-alike drug as one of the priorities for actions. The objectives of this thesis were to study perceptions of pharmacists in public hospitals toward medication safety measure in the NPSG policy, to study the LASA drug problems in public hospitals, to study the medication management system (MMS), to solve LASA problems in public hospitals, and to obtain information necessary for establishing national guideline to solve LASA problems for all healthcare levels.

Data collection included questionnaire mail survey, in-person interview, expert brainstorming, and case study in three public hospitals. Questionnaires were mailed to all 971 public hospitals with 48.40% return rate. We found that the majority knew about the national policy on medication safety (88.52%). While most hospitals reported complete implementation of medication safety measure (76.62%), 19.41% reported incomplete implementation. Most hospitals (82.46%) ranked LASA incidents the most troublesome cause of medication errors. Most given LASA errors were commonly found in various hospitals. There were 7,964 total drug pairs of LASA medications with 3,205 unique pairs (40.24 %) identified. Generic name LASA errors were most frequently reported (1,158 pairs, or 15.05% of total pairs). The activity in MMS most successfully implemented was separating LASA drugs apart.

In brainstorming on 15 experts to find information necessary for national guideline, the experts proposed the solutions to solve the LASA drug problems both at national and hospital level. At national level, they proposed 1) prevention LASA drug problem at drug registration and pre-marketing phase, 2) monitoring LASA drug problems at post-marketing phase, and 3) establishing a database of drug monographs and LASA drugs problems. In addition, to motivate hospitals, MoPH official enforcement on policy to solve LASA problem and incorporating reporting system of the LASA drugs into the Pay-for-Performance policy of the National Health Security Office were also suggested by the panel. At hospital level, the experts suggested that the LASA problems be solved by several measures especially those for drug name problems including avoiding similar drug names in the hospital formulary, measures for prescribing step, and the use of Tall-man letter. The problems of look-alike labeling, packaging, and tablets/capsules could be alleviated by products that could be purchased by deal price. In addition, since the hospitals were mandated to buy a vast majority of drugs from the Government Pharmaceutical Organization (GPO), LASA problems of GPO products should be alleviated by hospitals enforcing the GPO to change its products' labels, packages, and tablet/capsules. This measure could be used with the private pharmaceutical companies as well. In the 3 case studies, different techniques to solve LASA problems in each of the 3 hospital were found. These were due to different contexts, work system, location and human factors.

In conclusion, various measures to solve look-alike/sound-alike medication problems were implemented by most public hospitals. A more efficient measure to alleviate the problems may be the utilization of national level databases for drug registration and for healthcare providers. In addition, a national guideline for practical steps should be established for all healthcare levels.

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## EXECUTIVE SUMMARY

The mailed questionnaires were sent to 971 hospital pharmacists and waiting feedback mailed questionnaires a long time in order to getting feedback mail much as possible. With the limitation of using questionnaire, 470 mailed questionnaires were returned (a response rate of 48.40%). In addition to the mailed questionnaires, information from another 9 hospitals not returning the mailed questionnaires was obtained by means of in-person interview. A total of 479 hospitals provided information regarding recognition on medication safety policy, situation of LASA drug problems and implementation of safety measures in their hospitals.

This study showed that the most hospitals recognized medication safety policy through Thai National Patient Safety policy and implemented such policy to prevent medication errors from LASA medications, HAD and severe ADR and repeated drug allergy. Medication errors attributable to LASA drug names with several drug pairs were found.

Data regarding drug pairs associating with LASA medication errors were from 476 of 479 hospitals. Of all 7,964 pairs of LASA medications reported, 3,205 unique pairs were identified (40.24% of all pairs). Of all 7,964 pairs of LASA medication pairs reported, generic drug name LASA errors were the most frequently reported type of LASA medication problems (1,158 of all 7,964 pairs). Among the unique pairs, however, the problem with the greatest magnitude was LASA errors associating with similar drug tablets or capsules, regardless of drug names, from different pharmaceutical companies (419 of all 3,205 unique).

Regarding specific LASA medication errors with the greatest magnitude, 10 unique pairs most frequently reported were selected consisting of 3 brand name and 7 generic name LASA pairs. Among various error types, Losec<sup>®</sup> and Lasix<sup>®</sup> was the most found as reported by 122 hospitals. For package related LASA errors, about 3 to 4 specific types of errors in each unique pair were found. For example, among 182 error pairs of amoxicillin 250 mg and amoxicillin 500 mg oral solid dosage form (tablet or capsule) reported from 127 hospitals, 4 types of package-related LASA problems were

identified including 1) look-alike labels from the same company, 2) look-alike boxes from the same company, 3) look-alike package foils or blisters from the same company and 4) look-alike tablets or capsules from the same company.

The steps in MMS mostly likely to succeed when implementing measures to solve the LASA drug problems were 1) drug storage, followed by 2) drug preparing and dispensing, 3) drug ordering, prescribing and transcribing medication order, 4) drug monitoring, 5) medication selection and procurement, and 6) drug administration, respectively. The solving of the LASA drug problems in various hospitals would not have a way as the best.

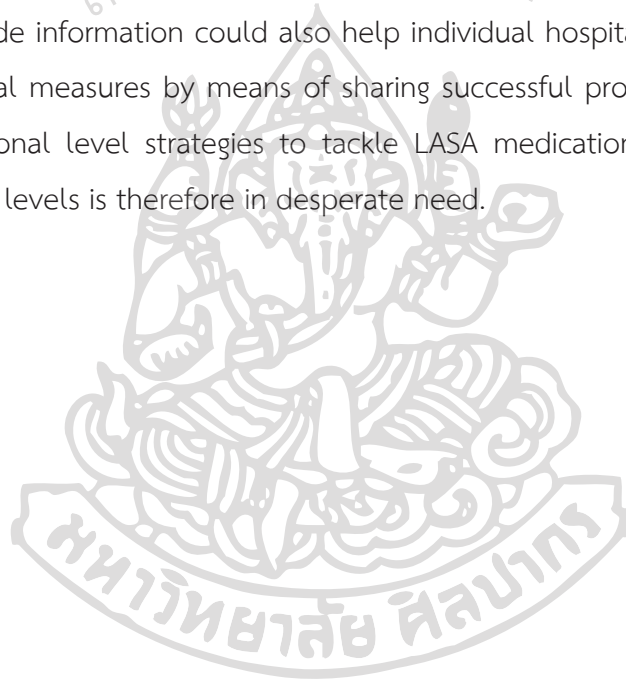
From the observational study, the various activities were applied to solve LASA drug problem that were separating look-alike drug name or package apart; making dissimilarity of LASA drug name in computerized database and on printed drug label; and informing the list of LASA drug names to all staff. It was found that there were different techniques to solve LASA problems in each hospital due to different contexts, working system, location and human factors. But LASA drug problems are moving all the times, so the effective monitoring system in each hospital may be a key success factor.

Each hospital should find a ways to prevent and solve problems in the own hospital to reduce the medication error to minimum. The risk management process should be applied to find problems, assess problems and select solutions to solve the problems.

The solutions to solve LASA drug problems at national level were further divided to 3 measures as follows: 1) prevention of LASA drug problems at drug registration and pre-marketing phase; 2) monitoring LASA drug problems at post-marketing phase; and 3) developing database of drug monographs and LASA drugs problems. The solving LASA drug problems in national level, if it can happen it will help prevent problems before the LASA drugs reach a hospital. Some LASA drugs can be solved by the drug registration system, the manufacturing of pharmaceutical companies. However, the prevention of problems in the hospitals still needs to be conducted continuously. If the monitoring information in overall incidence of the

country will cause learning problems and prevent recurring incidence in different hospitals following.

In Thailand, despite the fact that LASA medication errors remain the possible leading cause of medication safety problem, there has been no authoritative agent to collect and analyze the nationwide data. The information from the nationwide data could help push the patient safety policy especially implementing measures at national level. With its impact greater than the measure carried out by individual hospitals, national level measure could accelerate product change process on the manufacturer side, and reduce the burden of collective efforts on the hospital side. Not only solving the LASA problems at the manufacturer and policy maker level, such nationwide information could also help individual hospitals solve the problems that need local measures by means of sharing successful problem-solving methods. The Thai national level strategies to tackle LASA medication error problem at all health system levels is therefore in desperate need.



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