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LOOK ALIKE SOUND ALIKE DRUGS IN ADULTS

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Abstract

One of the main causes of patient injury worldwide is medication errors. Due to their orthographic (look-alike) and phonetic (sound-alike) characteristics, medications labeled as LASAs are a well-known source of drug errors that can be confused. When it comes to packaging, form, color, and/or size, look-alike and sound-alike medications are identical physically, but their names, dosages, and/or strengths sound similar. Brand-to-brand, brand-to-generic, and generic-to-generic name confusion can happen. prescribing, dispense, administer, monitor, transcribing or documenting. Errors in prescribing can be attributed to a variety of factors, including handwritten prescriptions that are difficult to read, verbal instructions, the use of dangerous acronyms, and choosing a LASA medication when using computerized prescriber order entry (CPOE). Over- or under-dose of intended or unexpected drugs, as well as incorrect dosing, are possible consequences of LASA mistakes. More data would enable evidence-based methods that could lower errors brought on by Lasa medications, particularly from real-world contexts.

Keywords: Lasa errors, Medications, prescribing, Packaging.

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Introduction

Look alike and sound alike drugs with similar looking and similar sounding names. Look alike Sound alike medicines are well recognized cause of medication errors that are due to orthographic. Look alike and phonetic sound alike similarities between medicines. Look alike/sound alike (LASA) drugs errors can take place in hospital wards, and they can place patients at risk for adverse events and death. This study was aimed to realize a risk assessment model for preventing LASA drugs distribution errors by the 'S. Giovanni di Dio e Rig d'Aragona' hospital pharmacy, in Salerno, Italy (1). Medication errors are common causes of patient morbidity and mortality, and adds financial burden to the institution as well.

LASA medication errors occur when a patient receives an incorrect medication because its name is spelled or sounds like another medication. The first alert was launched 40 years ago in literature. In 1973, Teplitsky published a list of LASA medicines to highlight the importance of considering the interpretation of the doctor's writing in the prescription of the drugs, which can lead to errors by the pharmacist. A system approaches and a blame-free environment, aimed at better organizational performances, lead to much better results than focusing on individuals, which can be blamed for forgetfulness, carelessness or moralweakness.

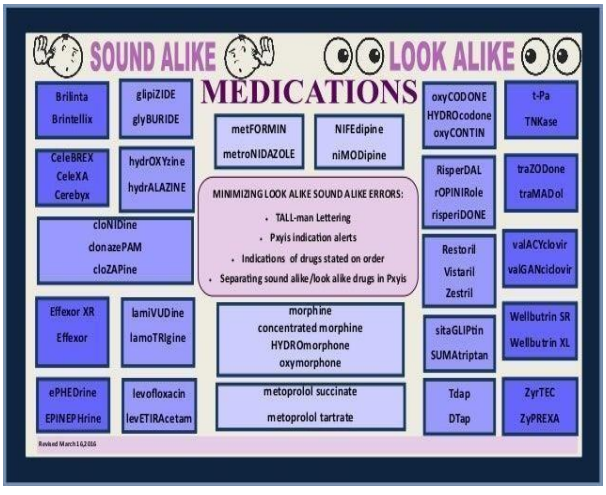

Fig1: Look alike Sound alike medications

Countries

1. WHO: The World Health Organization's International non-proprietary names expert group works to develop international non-proprietary names for pharmaceutical medicinal substances for acceptance worldwide. However, the drug brand names are fixed by pharmaceutical companies, which differ from country to country (2).
2. CANADA: The Health Canada is the federal department responsible for helping Canadians to maintain and improve their health. The health Canada has issued a revised draft on review of drug names for look-alike/sound-alike drugs attributes for the pharmaceutical industry. The policy objective of review of drug names for look-alike/sound-alike drugs is to provide market authorization holders more detailed direction on the process to be followed and information to be submitted to the health Canada (3).
3. UNITED STATES OF AMERICA: The National Coordinating Council for Medication Errors Reporting and Prevention was formed by the United States Pharmacopeia Convention to actively promote the reporting, understanding, and prevention of medication

In USA, the pharmaceutical manufacturers get pre-approval for proposed names from various organizations like US Pharmacopeia (USP) and US Food and Drug Administration(USFDA) (4).

4. AUSTRALIA: The proposed regulatory changes according to the Therapeutic Goods and Administration (TGA) Australia, state that companies or sponsors of new medicines will be required to submit evidence of risk assessment of the proposed labelling and packaging. Further, TGA is looking for methods to electronically screen proposed brand names against already existing brand names to identify potential look-alike and sound-alike names.
5. MALAYSIA: The Pharmaceutical Services Division, Ministry of Health, Malaysia has issued guidance on handling of look-alike/sound-alike medications (5). The guidelines consist of strategies to avoid errors with look-alike and sound- alike medications.
6. SINGAPORE: The Ministry of Health, Singapore has issued a guidance note on medication safety. Practice guidelines and tools mention about medication safety pointing towards medication errors. These guidelines and tools may help healthcare professionals to ensure thatthe medication use process is safe (6).
7. UNITED KINGDOM: The Medicines and Healthcare Products Regulatory Agency regulates medicines and medical devices in the UK. The agency plays leading role in protecting and improving public health. Through drug safety updates the agency gives information about particular care to be taken when prescribing or dispensing lookalike/sound-alike medicines. Recent examples of medication errors are listed in drug safety updates (7).
8. JAPAN: To find out similar names of drugs, an on-line searching system (Japanese Similar Names Searching System) was implemented in Japan in 2008. In addition, the Japan Council for Quality Healthcare has developed a system in order to avoid medication errors (8).
9. INDIA: The Pharmacovigilance Programmed of India was launched to improve patient safety and welfare in the Indian population by monitoring drug safety and thereby reducingrisk associated with the use of medicines. This programmed mainlyemphasizesonadverse drug events.
10. Look Alike Drugs List

Look alike drugs are drugs which is visually same and the drugs which are different in dosages like milligrams. Look alike is someone who looks almost exactly like another personand some looks alike are related and like identical twins or cousins who resemble each other.look alike drug are appearance that is very similar to each other (9).

Sound Alike Drugs List*:*

A person or thing that closely resembles another in sound, especially someone whose voice or style of speaking or singing is very similar to that of a famous person. The different meaningand different spelling are the words to, two, and too, they sound the exact same when spoken but have very different meanings and spelling. Look Alike Sound Alike Medications.

Folinic Acid	Folic Acid
Amidaron	Amlor
Zinnat	Zantac
Flumazenil	Flamazine
Parlodel	Panadol
Tazocin	Prazocin
Ferrosac	Ferriprox
Kafocid	Keflex
Lasix	Losec
Aldactone	Aldomet
Ranitidine	Loratidine
voltarin	ventolin

Fig.2. sound alike drugs list

Errors Occur in Look Alike Sound Alike Drugs (10).

Medication errors are a leading cause of patient harm globally. Look-alike, sound-alike(LASA) medicines are a well-recognized cause of medication errors that are due to orthographic (look- alike) and phonetic (sound-alike) similarities between medicines that can thus be confused. Look- alike medicines appear visually the same with respect to packaging, shape, color and/ or size, while sound-alike medicines are similar in the phonetics of their names, doses and/or strengths Confusions can occur between brand–brand, brand– generic or generic–generic names (11)

Similar appearance of medicines and their packaging, not color coding of different strengths, and storage of LASA medicine pairs close to one another can result in LASA errors during dispensing. Unclear instructions for administration, failure to double-check the order and failure to monitor the patient after administration can lead to administration and monitoringerrors. Failure to engage patients in their treatment at each stage of the medication

use processresults in LASA errors reaching the patients (12).

Clinical Impact of Lasa Errors and Vulnerable Patients

The impact on the patient will depend on the medicine administered and the condition of the patient. LASA errors can result in toxicity due to overdosing of a medicine, adverse effects ofan unintended medicine, and exacerbation of the disease for which the intended medicine was not given.18 Some errors are detected before the medicine is administered to a patient, while others are not found until much later LASA errors are considered below under the four domains of the WHO third global patient safety challenge: Medication without harm (13)

⊙ Medicines: medicines as products;

⊙ Patients and the public: role of patients and family members in preventing LASA errors;

⊙ Health care professionals: role of health and care workers in preventing LASA errors; Systems and practices of medication: health care systems and practices to be addressed (15).

Clear Labelling Segregating Storage and Color Coding

Generic name	Brand name	Indications (class of drugs)
Aminophyl**line**	**Aminophylline,**	Antiasthma tic and chronic obstructive pulmonarydisease preparations
Amitripty**line**	Am**ine**	Antidepressants
Amoxi**cillin**	Actimox, **ano**xic	Penicillin
Ampi**cillin**	**Amp**ilin, eskay**cillin**	Penicillin
Azi**thromycin**	El**zithro**, Fo**rmycin**	Macrolides
Ery**thromycin**	Al**thorn**, Elto**cin**	Acne treatment preparations, macrolides
Aten**olol**	Ten**olol**, caten**ol**	Anti-anginal drugs, beta-blockers
Tim**olol**	Gluco**mol**, ny**olol**	Antiglaucoma preparations
Beclo**metasone**	**Becl**ate, **bec**oride	Topical corticosteroids, antiasthma tic and chronic obstructive pulmonary disease decongestants, other nasal preparations
Beta**methasone**	**Bet**nelan, **bet**nesol	Eye corticosteroids, ear corticosteroids, antiasthma tic and chronic
Bisacodyl	**Bi**dlax-5	Laxatives, purgatives
Bisoprolol	**Bis**beta, **bis**veda	Beta-blockers
Carbamazepine	**Carba**dac, me**zapin**	Anticonvulsants
Carbimazole	Thyro**zole**	Antithyroid agents
Clona**zepam**	Clono**pam,** o**zepam**	Anxiolytics, anticonvulsants
Lora**zepam**	L-Ze**pam**	Anxiolytics, anticonvulsants
Clofazi**mine**	**Clofa**z	Antileprotics
Clomipra**mine**	**Clomi**fril	Antidepressants
Carbo**platin**	**Carbo**plan, **carbo**tin	Cytotoxic chemotherapy
Cis**platin**	**Cispla**n, cyto**platin**	Cytotoxic chemotherapy
Cefota**xime**	**Cefotim**, si**fotaxim**	Cephalosporins
Cefuro**xime**	**Cef**oprim, **cef**urin	Cephalosporins
Cimeti**dine**	**Cimeti**get	Antacids, antire flux agents
Cloni**dine**	**Clo**dict	Antihypertensive drug
Dauno**rubicin**	**Dauno**tec	Cytotoxic chemotherapy
Doxo**rubicin**	**Doxo**bin	Cytotoxic chemotherapy
Digox**in**	**Digox**	Cardiac drugs
Doxep**in**	**Doxe**som	Antidepressants drugs
Dopa**mine**	**Dopa**card	Cardiac drugs
Dobuta**mine**	**Dobu**card	Cardiac drugs

Ergot**amine**	Vasograin	Antimigraine preparations
Ethion**amide**	**Ethi**de	Anti-TB agents, antileprotics
Fol**ic acid**	**Foli**day	Vitamins and minerals
Fusid**ic acid**	**Fu**cidin	Topical antibiotics
Gat**ifloxacin**	**Gati**quin DPS	Eye anti-infectives, antiseptics
Gem**ifloxacin**	**Gemi**bid	Quinolones
Glicla**zide**	**Gl**azed	Antidiabetic agents
Glipi**zide**	Dibi**zide**	Antidiabetic agents
Ibu**profen**	Bru**fen**	Nonsteroidal anti-inflammatory drugs
Keto**profen**	**Keto**patch	Nonsteroidal anti-inflammatory drugs
Rabepr**azole**	R.P. **Zole**, **rabe**zil	Antacids, antireflux agents, antiulcerants
Ketocon**azole**	**Keto**fast	Topical antifungals
Methyl**dopa**	Alpha**dopa**	Other antihypertensive drugs
Levo**dopa**	**Levo**pa	Antiparkinsonian drugs
Meben**dazole**	Meb**azole**	Anthelmintics
Metroni**dazole**	**Met**ron	Preparations for vaginal conditions, topical antibiotics,antiamoebics
Nife**dipine**	De**pin**, **nife**dine	Anti-anginal drugs, calcium antagonists
Nimo**dipine**	**Modipin**, **Nimodip**	Peripheral vasodilators, cerebral activators
Olanza**pine**	**Ol**zap, **lezapin**-MD	Antipsychotics
Olapata**dine**	**Ol**odin, opat	Ophthalmic decongestants,
Pheniram**ine**	**Pheniramin**, retard	Antihistamines, antiallergics
Phenylephr**ine**	Drosyn	Mydriatic drugs, anorectal preparations, cough andcoldpreparations
Quini**dine**	Natcar**dine**	Cardiac drugs, antimalarials
Quin**ine** sulphate	Sacqu**ine**	Antimalarials
Roxa**tidine**	Rota**ne**	Antacids, antireflux agents, antiulcerants
Rupa**tadine**	**Rupa**nex, **rup-**AL	Antihistamines, antiallergics
Spira**mycin**	Rova**mycin** Forte	Macrolides
Strepto**mycin**	**Strepto**mac	Aminoglycosides
Simva**statin**	**Simv**otin	Dyslipidaemic agents
Somato**statin**	**Somato**san	Haemostatics
Tramadol	**Trama**, **trama**zac	Analgesics (opioid)
Trazodone	**Tra**ze	Anxiolytics, antidepressants
Vinblas**tine**	**Cyto**blastin	Carcione-chemotherapeutic drugs
Vincris**tine**	**Cytocristin**, B-**kristina**	Carcino-chemotherapeutic drugs
Generic name	**Brand name**	**Indications (class of drugs)**
Am**oxicillin** + c**loxacillin**	Alclox	Penicillin
Cloxa**cillin** + ampi**cillin**	Ampoxin	Penicillin
Flucon**azole** + tinid**azole**	Fluzon-T	Antifungals
Levo**dopa** + carbi**dopa**	Pardopa	Antiparkinsonian drugs
Tramad**ol** + paracetam**ol**	Trammel-DT	Analgesics

Procedure and Guide Lines*:*

Due to differing medication management processes at each Health System site and the implementation of various technology solutions, the exact procedure for managing LASA designated medications shall be determined by local P&T Committees. Recommended strategies may include, but are not limited (16)

- Computerized Physician Order Entry – require/include indication in the medication order for pairs that are in different therapeutic classes (17)
- Pharmacy Storage – do not store LASA medications alphabetically by name but rather store them out of /order, or in a different location; place label stating "Look- Alike / Sound-Alike" on medication bins of LASA agents (18)
- Automated Dispensing Cabinets – a "Look-Alike /

Sound-Alike" alert should appear when loading and removing LASA medications from the cabinet (19)

- Formulary Management – consider LASA names and similar labeling of generic products when determining the Formulary determination of products
- Pharmacist Order Entry/Validation – include "Look-Alike/Sound-Alike" warnings into Pharmacists' entering and/or validating LASA medication orders [20, 21, 22].

Tall Man Lettering

Table 1. FDA-Approved List of Generic Drug Names with Tall Man Letters

Drug Name with Tall Man Letters	Confused with
acetaZOLAMIDE	acetoHEXAMIDE
acetoHEXAMIDE	acetaZOLAMIDE
buPROPion	busPIRone
busPIRone	buPROPion
chlorproMAZINE	chlorproPAMIDE
chlorproPAMIDE	chlorproMAZINE
clomiPHENE	clomiPRAMINE
clomiPRAMINE	clomiPHENE
cycloSERINE	cycloSPORINE
cycloSPORINE	cycloSERINE
DAUNOrubicin	DOXOrubicin
dimenhyDRINATE	diphenhydrAMINE
diphenhydrAMINE	dimenhyDRINATE
DOBUTamine	DOPamine
DOPamine	DOBUTamine

FIG:3: Tall man letters

Summary and Conclusion

One common system failure is confusing medicine names. As a matter of fact, a lot of drug names have similar names to other drugs, which could result in patients taking the wrong medication and suffering grave repercussions (20). Through a risk assessment model based on the Italian Ministry of Health's (2010) recommendation and the FMEA process, this study has proactively evaluated all potential negative events that could arise during the drugs LASA distribution process carried out by our hospital pharmacy. The ensuing corrective actions were then identified. In other hospitals from developed nations, our model may help determine the most effective corrective measures to lower LASA medication errors during the distribution process. Solutions for information technology have a lot of potential. But it also needs to be implemented consistently with these automated technologies.

Author contributions

All authors are contributed equally.

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Declaration of Competing Interest

The authors have no conflicts of interest to declare.

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