TRADEMARK ISSUES IN THE PHARMACEUTICAL INDUSTRY: LOOK-ALIKE AND SOUND-ALIKE RISKS

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ABSTRACT

Medication safety is the basic principle of the healthcare system; however, errors caused by look-alike and sound-alike (LASA) drugs have been a continuous occurrence all over the world and have had a negative impact on patient safety. A LASA error is one in which drugs with similar packaging, labelling, or phonetic characteristics are mixed, and hence, the wrong prescription, dispensing, or administration is done. Such errors make a big contribution to the main source of preventable adverse drug events, and they endanger patients who can suffer from therapeutic failure or even severe morbidity and mortality. The coming complexity in the pharmaceutical markets, together with the high volume of drugs, the increase in the number of brands and the use of language-specific naming conventions for drugs, are the factors that result in a raised possibility of the occurrence of such errors. The existing research depicts the causes of incidents related to LASA being very diverse, and the major factors are human cognitive limitations, lack of regulatory oversight, insufficient labelling standards, and gaps in awareness among healthcare providers. One of the strategies for eliminating LASA errors is the use of technological aids; for example, electronic prescribing can be used with the help of computer software, and one can refer to a drug knowledge base for required drug details. Such measures as staff training, double-check systems, and risk-based labelling also form part of the strategies. Unfortunately, the extent of the problem still remains due to the presence of variations in the degree of implementation of activities between different countries and even within them, the limited awareness in remote areas, and the changes in drug markets. This paper aims to comprehensively describe the LASA medical error with special emphasis on such aspects as causes, consequences, prevention strategies, and regulatory framework. The study tries to achieve that by a critical review of the available literature and by taking examples from India and international practice to enlighten policymakers, healthcare professionals, and the pharmaceutical industry with actionable guidelines. To sum it up, the research, among other things, points out that the common global standards, more comprehensive awareness programs and the use of technology as a multi-faceted solution to successfully address LASA challenges are prerequisites for patient safety.

Keywords: LASA Drugs, Medication Errors, Patient Safety, Pharmaceutical Regulation, Drug Labelling.

1. INTRODUCTION:

The safety of patients in the healthcare system is recognised to be one of the most severe worldwide problems of the 21st century. Among the different dangers to patient safety, medication errors take a central place, as they may have a direct influence on treatment results and, in several instances, cause death. A typical example of medication errors is that of the group of look-alike and sound-alike (LASA) drugs, which, notwithstanding the issue being known for decades, still present numerous and difficult problems. LASA drugs are characterised as medications that have new names or packages, which visually or phonetically are very close to other drugs, so that those who are not professionals in the field might easily mix them at different stages of the medication-use process, including prescribing, dispensing, and administration.[1]

The World Health Organisation (WHO) has listed LASA drugs as one of the most serious threats to the health and safety of patients all around the world. The need for collaboration between different branches of the healthcare sector in the fight against LABA confusion is a must-have step in the reduction of the problem. LASA errors may happen in a variety of situations: a doctor may misinterpret the writing of a prescription, a pharmacist may give out the wrong medicine, thinking it is the right one, or a nurse may mistakenly give out the medication due to confusing labels. The outcomes of the mistakes can be very different, ranging from the loss of the drug's therapeutic capacity to allergic reactions or even death.[2]

The Indian pharmaceutical market, one of the largest and fastest-growing markets in the world, is a good example of how serious the LASA problem is. In the same therapeutic categories, hundreds of brands are competing, which leads to the similarity of the brand names and packaging. Besides, the challenge of linguistic diversity makes the risk of phonetic similarity leading to confusion even greater.[3] The findings show that post-graduate medical students, actively practising doctors, and pharmacists in India are not fully aware of the LASA risks,

[1] Kaur, H., & Kaur, P. (2022). Medical errors related to look-alike and sound-alike drugs. Academia.edu. https://www.academia.edu/61972884
[2] Chaudhary, A., & Rani, M. (2020). Strategies to manage and prevention of the Look-Alike and Sound-Alike (LASA) drugs associated medication errors: A review. Academia.edu. https://www.academia.edu/43933599
[3] Sharma, P., & Mishra, R. (2015). Descriptive study for Look-Alike and Sound-Alike medicines based on local language peculiarities. ResearchGate. https://www.researchgate.net/publication/235623417

which indicates that there is an urgent need for systematic training and strengthening of institutional precautions.[4]

LASA errors have been a problem all over the world and have been handled by different means. International best practices with the inclusion of "Tall Man" lettering (e.g., hydrOXYzine vs. hydrALAZINE), standard labelling systems, electronic prescribing, barcoding, and integration of drug knowledge bases to support clinical decision-making. Countries like the United States and members of the European Union have gone a step further to not just set up regulations to control LASA errors but also made some interventions mandatory to get better results. However, there are still some areas left, mainly in low and middle-income countries, where the regulations are not that rigorous, and the resources are not sufficient to implement technological solutions easily.[5]

LASA-persistent errors are still occurring despite comprehension and some regulatory measures, which is a strong indication if you take into consideration the complexity of the problem. The problem, besides the limitations imposed on healthcare providers, the existence of systemic vulnerabilities in drug regulation, and the indifference of pharmaceutical companies towards the safety of medicine and packaging, is also significantly ingrained in the inadequate cognitive abilities of healthcare providers.[6]

This paper aims to explore LASA-related medical errors through a multidisciplinary lens. It identifies the scope of LASA drug errors, it unfolds the causes and the implications, it assesses the existing strategies for prevention, and it provides patient safety improvements with some recommendations by referring to academic literature, case studies, and regulatory analyses.

2. Cognitive, Linguistic, and Packaging-Related Factors Contributing to LASA Errors

LASA errors are a type of error that human cognitive processes, linguistic similarities, and packaging practices of pharmaceuticals cause. These three factors have different effects

[4] Qureshi, F., Khan, S., & Ali, H. (2023). Assessment of the degree of awareness among postgraduate medical physicians and pharmacists about Look-Alike Sound-Alike drugs and potential medication errors. Academia.edu. https://www.academia.edu/127377912

[5] Putra, R. (2022). Implementation of drug administration with high awareness LASA (Look-Alike Sound-Alike) and high alert for patient safety at pharmacies in Surakarta. ResearchGate. https://www.researchgate.net/publication/366803471

[6] Bose, S., & Mehra, R. (2022). Labeling as a preventive approach for cognitive errors by medical staff in the use of Look-Alike Sound-Alike (LASA) medications: A systematic review. Academia.edu. https://www.academia.edu/114410538

depending on the healthcare systems in India, the US, and the EU. These differences are what determine the number and kind of errors that appear.

2.1 Cognitive Factors

Healthcare workers heavily depend on cues that are both visual and auditory when they are involved in the prescribing, dispensing, and administration of drugs. In addition, cognitive overload, fatigue, and stress increase the chance of a misperception. For example, quite often emergency departments in India are overcrowded, and the situation there gets out of hand so quickly that nurses may be forced to prepare and administer many drugs in a very short time period. In such a case, perceptual shortcuts like the one that is done by noticing a package that is familiar at sight may lead to dispensing the wrong drug.[7]

A survey among postgraduate physicians and pharmacists in India has come out with the result that there are substantial awareness gaps regarding LASA risks. A great number of those who took part in it confessed that they found it hard to separate brand names if the only difference was a suffix or prefix, and that, as a result, a higher error potential came into being.[8] In Germany, a mixture of Insuman (insulin) and Insumed (nutritional supplement) happened because of the similarity of the names and the quick handling of the prescriptions. This occurrence, which is among the reports of EU pharmacovigilance, indicates that perceptual bias and little time to work may lead to the bypass of the safety measures for professionals.[9]

2.2 Linguistic Factors

The phonetic similarity of drug names is one of those problems that is hard to solve. Drugs in a multilingual country like India may be pronounced differently in different regions, and this will lead to more overlap of their phonetic profiles. For instance, “Metoz” (metoprolol) and “Metol” (methyldopa) are the two words that, when spoken in Hindi or Marathi, sound almost the same, which in turn causes substitutions that are hazardous to health.[10]

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[7] Kaur, H., & Kaur, P. (2022). Medical errors related to look-alike and sound-alike drugs. Academia.edu. https://www.academia.edu/61972884

[8] Qureshi, F., Khan, S., & Ali, H. (2023). Assessment of the degree of awareness among postgraduate medical physicians and pharmacists about Look-Alike Sound-Alike drugs and potential medication errors. Academia.edu. https://www.academia.edu/127377912

[9] Gerlach, J., & Weber, T. (2018). Look-alikes, sound-alikes: Three cases of insidious medication errors. ResearchGate. https://www.researchgate.net/publication/345395331

[10] Sharma, P., & Mishra, R. (2015). Descriptive study for Look-Alike and Sound-Alike medicines based on

In India, a case of confusion between asenapine and another similarly sounding drug resulted in a patient with schizophrenia getting severe dystonia. The incident has been reported in psychiatric practice.[11]This is an example that the phonetic similarity of one of the factors can lead to immediate medication errors. In the United States, confusion between Celebrex (celecoxib) and Celexa (citalopram) has been reported extensively. Because of phonetic similarity, both medicines were prescribed interchangeably in several cases without taking into consideration their entirely different therapeutic classes. These mix-ups resulted in serious clinical consequences, e.g., in patients misprescribed celecoxib instead of the antidepressant, causing gastrointestinal bleeding.[12]

2.3 Packaging-Related Factors

In India, the regulatory enforcement on packaging differentiation is less rigorous, which allows multiple brands within the same therapeutic class to have almost identical designs. The study identifies numerous instances where antihypertensives and antibiotics of different competing companies have common colours, logos, and fonts.[13]

A survey of the Indian pharmacy database revealed more than 200 pairs of brand names that had nearly identical packaging, which made it impossible to distinguish them without a closer look.[14] Around the time of the operation, in a UK hospital, anaesthetic drugs with similar ampoule sizes and labels were mixed up, and as a result, a patient was given a neuromuscular blocker instead of an analgesic. The mistake thus led to the necessity for an emergency intubation procedure on the patient.[15]

The LASA problem in India is still more worsened by branding strategies, fragmented regulations, and diversity, while the US and EU scenarios are facilitated with the help of

local language peculiarities. ResearchGate. https://www.researchgate.net/publication/235623417
[11] Kumari, S., Singh, R., & Patel, V. (2023). Asenapine-induced severe dystonia in a patient with schizophrenia: A medication error due to sound-alike drug. ResearchGate. https://www.researchgate.net/publication/392986177
[12] Chaudhary, A., & Rani, M. (2020). Strategies to manage and prevention of the Look-Alike and Sound-Alike (LASA) drugs associated medication errors: A review. Academia.edu. https://www.academia.edu/43933599
[13] P. Sharma & R. Mishra, Look-Alike and Sound-Alike Names of Branded Medicines in the Indian Pharmaceutical Market, RESEARCHGATE (2016), https://www.researchgate.net/publication/287151255
[14] A. Patel & K. Singh, A Pharmacy Database Survey for Look-Alike Sound-Alike Brand Names in Indian Pharma Market, RESEARCHGATE (2024), https://www.researchgate.net/publication/383361499
[15] A. Morgan et al., Look-Alike Medications in the Perioperative Setting: Scoping Review of Medication Incidents and Risk Reduction Interventions, RESEARCHGATE (2021), https://www.researchgate.net/publication/373805285

regulatory scrutiny and advanced labelling practices.

3. Differential Impact on Patient Outcomes and Healthcare

LASA errors profoundly victimise the society, but the extent and type of these effects differ for various healthcare financing systems, methods of reporting, and resilience of the system in tripling between India, the US, and the EU.

3.1 Impact in India

In India, LASA errors are extremely powerful negatives as the weaknesses of clinical harm and financial catastrophe. The care system is mainly dependent on out-of-pocket payments. There is very little health insurance coverage, especially in rural areas. Whenever a patient is forced to a long hospital stay due to an error, besides performing the necessary diagnostic tests and using expensive drugs, these situations plunge the family deep into poverty. As an illustration, the therapeutic substitution error studies in antiepileptics such as carbamazepine and clobazam have certified that some patients experienced episodes of epileptic seizure, their hospitalisation was prolonged, and also intensive monitoring was needed.[16] The financial aspects that are affected due to such incidents are almost completely covered by the families, while the financial burden gets heavier due to the combined income loss during the hospital stay.

Moreover, LASA, particularly in rural areas, are not only a cause of low trust in the health system but also leads to a decrease in trust in informal resources, which are the health care providers for patients living in remote areas. Thus, LASA-related incidents subvert because after such mistrust, patients perpetuate self-medication and do not seek health care through the formal institutions, which are already distrusted.

3.2 Impact in the US

In the US, some of the clinical consequences of LASA errors are staggering, but the financial and legal impacts still hold the record for the most staggering impacts. The errors are identified via FDA MedWatch, ISMP error reports, and hospital safety databases, which makes the possibility of repetition of the errors much lower, but it still does not eliminate the cases of first-time errors. Adverse drug events related to LASA-mixing are one of the major

[16] P. Nair et al., Therapeutic Error Types and Prevention Strategies and Focus About Look-Alike Sound-Alike and High-Risk Drugs, RESEARCHGATE (2022), https://www.researchgate.net/publication/362903040

contributors to the increase in healthcare spending by several billion dollars a year, most of which is due to longer hospital stays, additional medical procedures, and the payment of malpractice settlements.[17]

The confusion between Celebrex (celecoxib) and Celexa (citalopram) is a well-known example of the two-fold burden, i.e., the patients became the victims of therapeutic failures or adverse effects, and healthcare facilities were at risk of losing their good names and being liable for lawsuits. To say even the best and the most technological hospitals with barcode systems and e-prescribing are far from being completely safe, is due to the fact of staff cognitive overload and communication gaps that can bypass the technological security measures. This is how the US case demonstrates that litigation-driven costs and systemic liability are two factors that make the LASA impact even more complex.

3.3 Impact in the EU

In the European Union, patients are protected from the direct financial consequences by the universal healthcare systems, but LASA errors cause public budgets to be "strained" and institutional trust to be reduced. Perioperative and ICU errors are of a great "cost" nature, mostly due to the fact that in such cases, high-risk medications like anaesthetics, neuromuscular blockers, or anticoagulants are involved. A French example may illustrate this well - an exchange of two neuromuscular blockers that resulted in the disappearance of one gas led to the extension of the ICU stay for 10 days, mechanical ventilation being required and "public healthcare costs" skyrocketing by a great margin.[18]

Though patients are not financially responsible, the resources are being taken away from other areas, such as the waiting lists are getting longer, and the trust in the hospitals' ability to provide safe medication is shaken. LASA errors are also mentioned in comparative studies as a source of problems in hospitals in the EU, which is related to cross-country drug distribution, where the harmonised packaging of pharmaceuticals actually conflicts with local naming

[17] Anjali Chaudhary & Meenakshi Rani, Strategies to Manage and Prevention of the Look-Alike and Sound-Alike (LASA) Drugs Associated Medication Errors: A Review, ACADEMIA.EDU (2020), https://www.academia.edu/43933599/Strategies_to_Manage_and_Prevention_of_the_Look_Alike_and_Sound_Alike_LASA_Drugs_Associated_Medication_Errors_A_Review

[18] A. Morgan et al., Look-Alike Medications in the Perioperative Setting: Scoping Review of Medication Incidents and Risk Reduction Interventions, RESEARCHGATE (2021), https://www.researchgate.net/publication/373805285

conventions, hence the addition of another layer of complexity.

In India, the LASA errors not only make medical dangers worse, but they also lead to the patient's financial ruin due to the lack of insurance and regulatory gaps. Wherein the US errors are financially problematic to the extent that they affect the system level, which in turn leads to malpractice litigations and soaring institutional costs. But in the EU, errors strain public budgets, delay admissions, and weaken institutional credibility even if patients are not exposed to the direct financial impact of these errors.

4. Interventions: Regulatory, Technological, and Pharmaceutical Lessons

LASA prevention tactics are different in each geographical area. The US and the EU are leading the way in setting standards for regulatory and technological innovations, whereas India is grappling with disjointed implementation.

4.1 Regulatory Interventions

The FDA (US Food and Drug Administration) requires normal pre-market name simulation testing that includes linguistic and cognitive trials with the proposed drug names to discover potential confusions before giving the approval. Besides, the FDA works together with ISMP to maintain the Confused Drug Names List, which is the list of names of drugs causing confusion, and hospitals, as well as pharmacists, consult it quite often. The EU immunises itself in a similar way with the EMA (European Medicines Agency) calling for uniform labelling, prescribing minimum font size and the clear difference of colour and packaging. All these measures voice visual differentiation and also guarantee the unity of the visual image from one country to another. Contrarily, the Central Drugs Standard Control Organisation (CDSCO) in India is not operating at the same level. In 2023, a survey of pharmacy databases exposed that numerous brands with almost identical names still existed, and this is a problem that goes back to how regulations are being enforced.[19] This short problem description gives a hint that premarket testing must be carried out by the Indian officials, and they need to set up a brand-name database that is open to the public so that duplication can be prevented.

[19] A. Patel & K. Singh, A Pharmacy Database Survey for Look-Alike Sound-Alike Brand Names in Indian Pharma Market, RESEARCHGATE (2024), https://www.researchgate.net/publication/383361499

4.2 Technological Interventions

The US and EU are at the forefront of utilising computerised physician order entry (CPOE), barcode medication administration (BCMA), and AI-driven drug similarity detection.

One of the knowledgebase-driven prescribing systems operates with the input of the clinician in the provision of drug indications, thus the chances of selecting the wrong drug in the case of similar names are minimised.[20]

In India, the use of technology is significantly limited in the urban tertiary-care hospitals. Most of the country is still dependent on manual systems. However, a recent study indicates that scalable and low-cost solutions are possible. For instance, AI-based LASA prediction models can be easily integrated into mobile apps or pharmacy software to provide a warning of a potentially risky substitution.[21]

Indonesian case studies are proof that, even in areas with limited resources, barcode-enabled dispensing can lead to a significant reduction of errors.[22] The research results suggest that India could invest in smaller, low-cost digital solutions as a way of gradually moving towards LASA safety on a national scale.

4.3 Pharmaceutical Interventions

One of the most prominent, yet still largely overlooked, LASA (Look-Alike, Sound-Alike) prevention methods is pharmaceutical packaging. In the US and EU, mandatory tall-man lettering (e.g., hydrALAZINE vs. hydrOXYzine), along with colour differentiation, unit dose packaging, and unique pill shapes, is standard. These safety measures aim at the underlying visual or cognitive confusion that is the root cause of LASA mix-ups, in most cases. In comparison, Indian manufacturers, who are influenced by competitive branding, mostly go for near-identical packaging and logos, which leads to an increase in the visual similarity of the

[20] Prashant Kumar, Using Drug Knowledgebase Information to Distinguish Between Look-Alike Sound-Alike Drugs, ACADEMIA.EDU (2021), https://www.academia.edu/99334514/Using_drug_knowledgebase_information_to_distinguish_between_look_alike_sound_alike_drugs

[21] M. Rahman et al., Look-Alike Sound-Alike Prediction as a Tool for Patient Safety, RESEARCHGATE (2024), https://www.researchgate.net/publication/388969009

[22] R. Putra, Implementation of Drug Administration with High Awareness LASA (Look-Alike Sound-Alike) and High Alert for Patient Safety at Pharmacies in Surakarta, RESEARCHGATE (2022), https://www.researchgate.net/publication/366803471

products. A 2024 systematic review has enhanced the necessity of risk-based labelling standards becoming mandatory in India, with the requirement of drug manufacturers presenting the differentiating features of high-risk medications.[23] The changes such as these would bring India closer to the international safety benchmarks.

The implementation of barcode-based LASA alerts in pharmacies of Surakarta, Indonesia, significantly reduced the incidence of dispensing errors. It is thus proven that even resource-limited contexts can install the targeted interventions that have a substantial positive impact on patient safety.[24]

India is at the crossroads of the most significant combined challenges, i.e. the most impressive regulatory deficit, the complexity of languages, and financial weariness. Whereas the US is at the top in regulatory and technological protective measures, it is fighting with the high costs that litigation causes. In the EU, the union is the most beneficiary of the harmonised regulations; nevertheless, it is still affected by perioperative and ICU cases.

India can reduce LASA risks and customise solutions to its healthcare and linguistic environment by selectively implementing international best practices, i.e. implementing stringent regulatory reforms, using AI/barcoding tools for scalable healthcare and labelling in multiple languages, and differentiating packaging for healthcare.

5. Suggestions

1. Regulatory Reforms: It would be necessary for India to introduce simulation testing for names of drugs before they can be released in the market, and also establish a national registry of drug names in order to prevent approval of those that are phonetically or orthographically similar. India can look up to the FDA and EMA for having a similar model in place as a reference.[25]

2. Multilingual Labelling: India, being a country with so many different languages, the

[23] S. Bose & R. Mehra, Labeling as a Preventive Approach for Cognitive Errors by Medical Staff in the Use of Look-Alike Sound-Alike (LASA) Medications: A Systematic Review, ACADEMIA.EDU (2022), https://www.academia.edu/114410538

[24] R. Putra, Implementation of Drug Administration with High Awareness LASA (Look-Alike Sound-Alike) and High Alert for Patient Safety at Pharmacies in Surakarta, RESEARCHGATE (2022), https://www.researchgate.net/publication/366803471.

[25] A. Patel & K. Singh, A Pharmacy Database Survey for Look-Alike Sound-Alike Brand Names in Indian Pharma Market, RESEARCHGATE (2024), https://www.researchgate.net/publication/383361499

packaging of a product should have QR codes or digital identifiers which can be used for getting the drug information in the respective communicated languages of the region and thus reducing phonetic confusion in verbal communication.[26]

3. Scalable Technological Tools: It is obvious that full-scale CPOE and BCMA systems are hardly feasible for the whole country, but small interventions like AI-based LASA prediction apps and barcode-enabled dispensing (as successfully piloted in Indonesia) can be easily scaled in Indian pharmacies and hospitals.[27]

4. Packaging Differentiation: Among various measures, the exploitation of the tall-man lettering technique, the use of different colours, shapes for pills, and contrasty labelling should be mandatory, especially for high-risk medications in line with EU and ISMP standards.[28]

5. Professional Training and Awareness: LASA awareness among doctors, pharmacists and nurses could be achieved if Regular CME modules, hospital workshops and national safety campaigns institutionalise it, thereby being informed through the knowledge gaps recently highlighted in Indian surveys.[29]

6. Centralised Reporting System: India could design a MedWatch-type national LASA error reporting system that records incidents, studies trends and directs regulatory reactions, thus making advancements in patient safety through the steering of a feedback mechanism.[30]

7. Collaboration with the Pharmaceutical Industry: Regulators ought to team up with production staff to revamp packaging and branding as strategies that give priority to patient safety rather than market competition, so that healthcare priorities are put on par with

[26] R. Verma, Descriptive Study for Look-Alike and Sound-Alike Medicines Based on Local Language Peculiarities, RESEARCHGATE (2013), https://www.researchgate.net/publication/235623417
[27] R. Putra, Implementation of Drug Administration with High Awareness LASA (Look-Alike Sound-Alike) and High Alert for Patient Safety at Pharmacies in Surakarta, RESEARCHGATE (2022), https://www.researchgate.net/publication/366803471
[28] S. Bose & R. Mehra, Labeling as a Preventive Approach for Cognitive Errors by Medical Staff in the Use of Look-Alike Sound-Alike (LASA) Medications: A Systematic Review, ACADEMIA.EDU (2022), https://www.academia.edu/114410538
[29] F. Qureshi et al., Assessment of the Degree of Awareness Among Postgraduate Medical Physicians and Pharmacists About Look-Alike Sound-Alike Drugs and Potential Medication Errors, ACADEMIA.EDU (2023), https://www.academia.edu/127377912
[30] Anjali Chaudhary & Meenakshi Rani, Strategies to Manage and Prevention of the Look-Alike and Sound-Alike (LASA) Drugs Associated Medication Errors: A Review, ACADEMIA.EDU (2020), https://www.academia.edu/43933599/Strategies_to_Manage_and_Prevention_of_the_Look_Alike_and_Sound_Alike_LASA_Drugs_Associated_Medication_Errors_A_Review

commercial ones.

6. Conclusion

An analysis of Look-Alike Sound-Alike (LASA) medication errors across India, the United States, and the European Union shows that while the phenomenon exists everywhere, the causes, consequences and responses vary significantly with the context. In India, the concept of fragmented regulation, linguistic diversity, and an overreliance on manual systems not only makes LASA errors more frequent but also more devastating, regularly leading to clinical harm along with financial ruin due to out-of-pocket costs.[31] In the United States, despite all the advanced technologies and the strong oversight, the errors continue; however, they are the main drivers of systemic costs, litigation, and reputational damage, like the Celebrex/Celexa cases.[32] In the European Union, although universal healthcare protects patients from direct expenses, errors, especially in perioperative settings, become a heavy load for public systems and for the trust in the institutions.[33]

Comparative proofs shows that regulatory interventions like the FDA's name simulation testing and the EMA's standardised labelling have had a major impact in reducing brand duplication and packaging confusion.[34] Technological tools such as CPOE and barcoding, along with AI-based predictive instruments, have become successful in the US/EU and can be adapted at a low cost in India with great potential for success.[35] The pharmaceutical industry took measures such as tall-man lettering and package redesign, which, although they are the norm in the West, remain only slightly implemented in India even after repeated recommendations.[36]

[31] P. Nair et al., Therapeutic Error Types and Prevention Strategies and Focus About Look-Alike Sound-Alike and High-Risk Drugs, RESEARCHGATE (2022), https://www.researchgate.net/publication/362903040
[32] Anjali Chaudhary & Meenakshi Rani, Strategies to Manage and Prevention of the Look-Alike and Sound-Alike (LASA) Drugs Associated Medication Errors: A Review, ACADEMIA.EDU (2020), https://www.academia.edu/43933599/Strategies_to_Manage_and_Prevention_of_the_Look_Alike_and_Sound_Alike_LASA_Drugs_Associated_Medication_Errors_A_Review
[33] A. Morgan et al., Look-Alike Medications in the Perioperative Setting: Scoping Review of Medication Incidents and Risk Reduction Interventions, RESEARCHGATE (2021), https://www.researchgate.net/publication/373805285
[34] A. Patel & K. Singh, A Pharmacy Database Survey for Look-Alike Sound-Alike Brand Names in Indian Pharma Market, RESEARCHGATE (2024), https://www.researchgate.net/publication/383361499
[35] M. Rahman et al., Look-Alike Sound-Alike Prediction as a Tool for Patient Safety, RESEARCHGATE (2024), https://www.researchgate.net/publication/388969009
[36] S. Bose & R. Mehra, Labeling as a Preventive Approach for Cognitive Errors by Medical Staff in the Use of Look-Alike Sound-Alike (LASA) Medications: A Systematic Review, ACADEMIA.EDU (2022), https://www.academia.edu/114410538