POTENTIAL HAZARDS OF ILLEGIBLE PRESCRIPTION: LOOK ALIKE SOUND ALIKE TRADE AND GENERIC NAMES

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ABSTRACT
Objective: In India, where market has thousands of trade name medicines and prescriptions of doctors are usually in illegible handwriting there is high probability of dispensing and medication errors due to look-alike sound-alike (LASA) trade names. This study is an attempt to correlate doctor's handwriting and confusion of trade name to develop a help list of confusing product names. Methodology: A total of 5472 prescriptions presented for dispensing during a period of six months were studied and analyzed to determine and identify the confusing trade names, so as to design a ready made list of such products which will serve as a cautionary reference for avoiding dispensing errors. Findings: Potentially confusing trade name pairs of medicines available in local market of Andhra Pradesh, India were paired out and categorized. A list of 55 pairs of almost identical trade names was compiled, which shall serve as a ready reference for pharmacists while dealing such prescriptions. The list has been arranged alphabetically for ease of reference. Practical implications: It recommends three step audit of prescription before final dispensing to avoid any potential error. Originality/value: This research shall have direct implication on reducing chances of wrong dispensing due to poor/illegible handwriting of doctors. Conclusion: Several trade names are almost identical orthographically or phonologically with very minor difference in spelling but having entirely different molecule or therapeutic class or disease for which it is intended to be used. This leads to ever increasing number of look-alike sound-alike (LASA) trade names and dispensing error. The problem is further compounded by illegible prescription writing and selling of medicines by salesmen who do not have any knowledge of medicine or disease and are not registered pharmacist. As a result of these, medication error becomes eminent which can cause anything from discomfort to serious health problems and even death or disability to the patient. Pharmacists are professionally and ethically bound to ensuring therapeutic efficacy and patient safety and therefore it becomes her/his key duty to prevent medication error. Although issues relating confusing brand names and their consequences have been regularly studied and reported. Literature review also revealed that in the United States of America Food and Drug Administration uses POCA (phonetic and orthographic computer analysis) software to evaluated names of drug products submitted for approval. However, the consequences of illegible prescription writing and its impact on LASA trade names remain largely untouched.

In light of the above background a systematic study was conducted during a period of six months from December 2013 to May 2014. Comparison of hand written prescriptions with trade name of products was done to estimate chance of confusion due to spelling similarity.

RESULTS
During a period of six months 5742 prescriptions of patients were studied and analyzed for this research work. Out of the 5742 patients 3589 (62.51%) were male and 2153 (37.49%) were female (Figure 1). The prescriptions were further categorized into children and geriatric patient. Out of the 5742 prescriptions 3609(62.85%) were children below the age of 12 years and 1658(28.87%) were geriatric patient above the age of 65 years (Figure 2). The geriatric patients were further categorized into young old (ages 65–75 years) 957(16.67%), the old (ages 75–85 years) 510 (08.89%) and the old old (age > 85 years) 191 (03.33%).

Key words: Illegible prescription; LASA trade names; Medication error; Dispensing error; Prescribing error.

INTRODUCTION
Trade name of medicines is arbitrarily decided by manufacturers without any relevance to the drug molecule or therapeutic class or disease for which it is intended to be used. This leads to ever increasing number of look-alike sound-alike (LASA) trade names and dispensing error. The problem is further compounded by illegible prescription writing and selling of medicines by salesmen who do not have any knowledge of medicine or disease and are not registered pharmacist. As a result of these, medication error becomes eminent which can cause anything from discomfort to serious health problems and even death or disability to the patient. Pharmacists are professionally and ethically bound to ensuring therapeutic efficacy and patient safety and therefore it becomes her/his key duty to prevent medication error. Although issues relating confusing brand names and their consequences have been regularly studied and reported. However, the consequences of illegible prescription writing and its impact on LASA trade names remain largely untouched.

In light of the above background a systematic study was conducted during a period of six months from December 2013 to May 2014. Comparison of hand written prescriptions with trade name of products was done to estimate chance of confusion due to spelling similarity.

METHODS
A systematic study of 5472 handwritten prescriptions and medicines available on shelves of shop were conducted during a period of six months from December 2013 to May 2014. Comparison of hand written prescriptions with trade name of products was done to estimate chance of confusion due to spelling similarity.

RESULTS
During a period of six months 5742 prescriptions of patients were studied and analyzed for this research work. Out of the 5742 patients 3589 (62.51%) were male and 2153 (37.49%) were female (Figure 1). The prescriptions were further categorized into children and geriatric patient. Out of the 5742 prescriptions 3609(62.85%) were children below the age of 12 years and 1658(28.87%) were geriatric patient above the age of 65 years (Figure 2). The geriatric patients were further categorized into young old (ages 65–75 years) 957(16.67%), the old (ages 75–85 years) 510 (08.89%) and the old old (age > 85 years) 191 (03.33%).

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The study of the 5742 handwritten prescriptions revealed that as many as 55 pairs of LASA trade names were there which could be confused for the prescribed medicine if the prescription is not audited before dispensing to identify the diagnosis and correlate the prescribed medicines with that as well as complaints of the patient. In order to reach at conclusion it was also necessary in such cases to interact with the patient or patient's attendant as also examine the reports. Table 1 presents help list of pair of medicines which had maximum chance of substitution for each other due to illegible or cursive handwriting and very minor difference in spelling.

Table 1: LASA trade name pairs

<table>
<thead>
<tr>
<th>No.</th>
<th>Trade name</th>
<th>Active ingredient</th>
<th>Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ABAN</td>
<td>Albendazole</td>
<td>Antihelminic</td>
</tr>
<tr>
<td>2</td>
<td>ABANA</td>
<td>Pyrantel</td>
<td>Antihelminic</td>
</tr>
<tr>
<td>3</td>
<td>AC1</td>
<td>Cimetidine</td>
<td>Antacid</td>
</tr>
<tr>
<td>4</td>
<td>AC2</td>
<td>Ranitidine</td>
<td>Antacid</td>
</tr>
<tr>
<td>5</td>
<td>ACETEN</td>
<td>Captopril</td>
<td>Antihypertensive</td>
</tr>
<tr>
<td>6</td>
<td>ACETEC</td>
<td>Atorvastatin</td>
<td>Antihyperlipidemic</td>
</tr>
<tr>
<td>7</td>
<td>ADEX</td>
<td>Nifedipine</td>
<td>Antianginal</td>
</tr>
<tr>
<td>8</td>
<td>ADEXL</td>
<td>Losartan</td>
<td>Antihyperlipidemic</td>
</tr>
<tr>
<td>9</td>
<td>ALEXA</td>
<td>Desferal</td>
<td>Anti-inflammation</td>
</tr>
<tr>
<td>10</td>
<td>ALPERO</td>
<td>Amoxicillin+Clavulanic acid</td>
<td>Broad-spectrum antibiotic</td>
</tr>
<tr>
<td>11</td>
<td>BUSCOPAN</td>
<td>Albuterol</td>
<td>Antiasthmatic</td>
</tr>
<tr>
<td>12</td>
<td>BUSPHIN</td>
<td>Busulfan</td>
<td>Treatment of cancer</td>
</tr>
<tr>
<td>13</td>
<td>CARMAX</td>
<td>Pantoprazole</td>
<td>Antacids for gastro-esophageal reflux disease (GERD)</td>
</tr>
<tr>
<td>14</td>
<td>CYPAN</td>
<td>Pantoprazole</td>
<td>Antacids for gastro-esophageal reflux disease (GERD)</td>
</tr>
<tr>
<td>15</td>
<td>CYRON</td>
<td>Crofeprazone</td>
<td>Antacids for gastro-esophageal reflux disease (GERD)</td>
</tr>
<tr>
<td>16</td>
<td>VIDEO</td>
<td>Labetalol</td>
<td>Anti-hypertensive</td>
</tr>
<tr>
<td>17</td>
<td>DAXED</td>
<td>Sertraline</td>
<td>Antidepressant</td>
</tr>
<tr>
<td>18</td>
<td>DAXDI</td>
<td>Diclofenacin</td>
<td>Non-steroidal anti-inflammatory</td>
</tr>
<tr>
<td>19</td>
<td>DIAKOM</td>
<td>Trazodone</td>
<td>Antidepressant</td>
</tr>
<tr>
<td>20</td>
<td>DIGENE</td>
<td>Alendronate</td>
<td>Antiresorptive</td>
</tr>
<tr>
<td>21</td>
<td>DROXYL</td>
<td>Cefuroxime</td>
<td>Broad-spectrum antibiotic</td>
</tr>
<tr>
<td>22</td>
<td>DROXYL-1</td>
<td>Ofloxacin</td>
<td>Broad-spectrum antibiotic</td>
</tr>
<tr>
<td>23</td>
<td>EPRIV</td>
<td>Eptifibatide</td>
<td>Antiplatelet activity</td>
</tr>
<tr>
<td>24</td>
<td>GANET-ING</td>
<td>Gaba-mes DNA</td>
<td>Anticonvulstant</td>
</tr>
<tr>
<td>25</td>
<td>GANETOP</td>
<td>Gemifloxacin</td>
<td>Broad-spectrum antibacterial</td>
</tr>
</tbody>
</table>

All the prescriptions were further analyzed for legibility of handwriting for the name of medicines prescribed. Out of the 5742 prescriptions only 319 (05.56%) prescriptions had name of medicines written in capital letters, which did not cause any problem in identifying the prescribed medicine and even the literate patient or her/his attendant could compare the prescribed and supplied medicine to be sure.

Further 5423 prescriptions (94.44%) contained name of the medicines in running handwriting beginning with capital letter in which difference between small letter a, o/c/e, e/i/i/l/m/n/r/v/u, v is hard to find and thus probability of guessing become usual resort for the salesmen.

All the 5742 prescriptions were also analyzed to assess clarity of instructions for the use of the medicines. Surprisingly only 579 (10.08%) contained visual clarity of instructions for the use of the medicines in running handwriting beginning with capital letter where the prescribed medicine and even the literate patient or her/his attendant could compare the prescribed and supplied medicine and even the literate patient or her/his attendant could compare the prescribed and supplied medicine and even the literate patient or her/his attendant could compare the prescribed and supplied medicine to be sure.

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All the prescriptions were also analyzed for precautions regarding food and beverages which may be required to be avoided during medication. Surprisingly none of the 5742 prescriptions under study contained any such instruction.

The study of the 5742 handwritten prescriptions revealed that as many as 55 pairs of LASA trade names were there which could be confused for the prescribed medicine if the prescription is not audited before dispensing to identify the diagnosis and correlate the prescribed medicines with that as well as complaints of the patient. In order to reach at conclusion it was also necessary in such cases to interact with the patient or patient's attendant as also examine the reports. Table 1 presents help list of pair of medicines which had maximum chance of substitution for each other due to illegible or cursive handwriting and very minor difference in spelling.
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<table>
<thead>
<tr>
<th>No.</th>
<th>Trade name</th>
<th>Active ingredient</th>
<th>Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>ZOPID</td>
<td>Zolpidem</td>
<td>Hypnotic and sedative</td>
</tr>
<tr>
<td>26</td>
<td>YESROX</td>
<td>Oxetacaine</td>
<td>Antiulcer</td>
</tr>
<tr>
<td>27</td>
<td>INDOM</td>
<td>Indomethacin</td>
<td>Anti-inflammatory</td>
</tr>
<tr>
<td>28</td>
<td>FLORID</td>
<td>Fluridoxine</td>
<td>Antiallergic</td>
</tr>
<tr>
<td>29</td>
<td>XMET</td>
<td>Xemethorpic</td>
<td>Antidyspepsia</td>
</tr>
<tr>
<td>30</td>
<td>XONE</td>
<td>Xonetacine</td>
<td>Antihistamine and Antiallergic</td>
</tr>
<tr>
<td>31</td>
<td>JUGAM</td>
<td>Jugalpine</td>
<td>Antidiabetic</td>
</tr>
<tr>
<td>32</td>
<td>MICROGEL</td>
<td>Microgest</td>
<td>Progestin for maintaining pregnancy</td>
</tr>
<tr>
<td>33</td>
<td>JUREN</td>
<td>Jurethorpic</td>
<td>Antispasmodic</td>
</tr>
<tr>
<td>34</td>
<td>VALUE</td>
<td>Valuezine</td>
<td>Antidyspepsia</td>
</tr>
<tr>
<td>35</td>
<td>UZEX</td>
<td>Uzexacin</td>
<td>Antiglaucoma</td>
</tr>
<tr>
<td>36</td>
<td>LPCARE</td>
<td>Lomalcarb</td>
<td>Antilupus</td>
</tr>
<tr>
<td>37</td>
<td>PACID</td>
<td>Pantoprazole</td>
<td>Peptic ulcer and gastro-oesophageal reflux disease (GERD)</td>
</tr>
<tr>
<td>38</td>
<td>PACR</td>
<td>Pacrinex</td>
<td>Antiinfectious and Antiulcer</td>
</tr>
<tr>
<td>39</td>
<td>RIBI-D</td>
<td>Riboflavin</td>
<td>Vitamin B2</td>
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<tr>
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<td>SIBIDEC</td>
<td>Sibidecine</td>
<td>Antihypertensive</td>
</tr>
<tr>
<td>41</td>
<td>TRENCH</td>
<td>Trenchol</td>
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</tr>
<tr>
<td>42</td>
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<td>43</td>
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<tr>
<td>44</td>
<td>4LUR</td>
<td>4Luracine</td>
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<tr>
<td>45</td>
<td>ULTRAN</td>
<td>Ultranex</td>
<td>Antiarthritic</td>
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<td>46</td>
<td>ULTRIC</td>
<td>Ultrichol</td>
<td>Antihistamine</td>
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<tr>
<td>47</td>
<td>ULFEX</td>
<td>Ulfexacin</td>
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</tr>
<tr>
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<td>VAL-JC</td>
<td>Valjacine</td>
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<tr>
<td>49</td>
<td>VAL-CL-P</td>
<td>Valclocarol</td>
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<tr>
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<td>WANCPI</td>
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</tr>
<tr>
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<td>Xetacine</td>
<td>Antiallergic</td>
</tr>
<tr>
<td>52</td>
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<td>Xmetacin</td>
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</tr>
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<td>53</td>
<td>XONE</td>
<td>Xonacol</td>
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</tr>
<tr>
<td>54</td>
<td>YEMX</td>
<td>Yemexacin</td>
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</tr>
<tr>
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<td>ZINNIC</td>
<td>Zinic acid</td>
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</tr>
<tr>
<td>56</td>
<td>ZOPID</td>
<td>Zopicpine</td>
<td>Antiallergic</td>
</tr>
</tbody>
</table>

### DISCUSSION

Analysis of legibility of the prescriptions clearly indicated that very low percentage (5.56%) of the prescriptions had name of medicines in capital letters where there was no chance of ambiguity or dispensing error. In such cases even the patient or her/his attendant can compare the prescribed medicine with product supplied to them. Such prescriptions are ideal prescriptions and every doctor should aim to write names of medicines in capital letters and leave no scope for guessing about the product. This will drastically reduce medication error and improve therapeutic success of the prescription.

Analysis of Table 1 reveals that every pair of trade names has high potential for confusion and replacement for each other. It also reveals that the two trade names of same pair are from entirely different therapeutic class. Thus the probability of wrong dispensing becomes therapeutic hazard to the patient as the substituted product. This will drastically reduce medication error and improve therapeutic success of the prescription. Analysis of Table 1 reveals that every pair of trade names has high potential for confusion and replacement for each other. It also reveals that the two trade names of same pair are from entirely different therapeutic class. Thus the probability of wrong dispensing becomes therapeutic hazard to the patient as the substituted product. This will drastically reduce medication error and improve therapeutic success of the prescription.

### CONCLUSION

Several trade names are almost identical orthographically or phonologically with very minor difference in spelling but having entirely different pharmacological, therapeutic and toxic effects. Such trade names or generic names sound or appear to be similar to each other when handwritten or spoken. Poor handwriting and fast writing makes the prescription reading difficult and increases the chance of guessing. Preventing such possibility during dispensing of prescriptions shall have great medical and social value. The help list (table 1) is a step forward to minimize dispensing error and ensure safe therapy.

### REFERENCES

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