Injection Safety Knowledge and Practice among Nurses Working in Jimma University Medical Center; Jimma South West Ethiopia; 2018

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Abstract

Objective: The main objective of this study is to assess knowledge and practice about injection safety among nurses in Jimma University Medical centre.

Methods: The study was conducted in Jimma University Medical Centre in Jimma Zone, Oromia Regional State from March 8-15, 2018 in Jimma Zone. Institution based cross section study by using simple random sampling technique to select 247 nurses. Data was collected through self-administered questionnaire. Descriptive statistics and chi-square test was done to describe the study variables and identify factors associated with injection safety practice.

Results: About twenty nine percent of the study participants 7(28.7%) had good Knowledge about injection safety practice. The level of injection safety practice was 63(25.5%). Findings of the study also showed years of experience (p=0.000, df=3), sex (p=0.048, df=1) and level of education (p=0.003, df=1) was statistically associated with the current knowledge and practice about injection safety among nurses working at Jimma University Medical Centre.

Conclusion and recommendations: This study revealed that knowledge and practice on injection safety was poor among nurses in Jimma University Medical Centre. It is therefore recommended that regular training and workshops on injection safety should be organized by Jimma University Medical Centre and other concerned

Introduction

Injections are among the most frequently used medical procedures, with an estimated 20 billion injections administered each year world-wide. Injections can be given intravenously, intramuscularly, intra dermal, or subcutaneously. Majority of these injections are administered for curative purpose [1]. The World Health Organization (WHO) defined safe injection as one that is given using appropriate equipment and does not harm the recipient, does not expose the provider to any avoidable risks and does not result in waste that is dangerous for other people [2,3].

Unsafe injection is important cause of transmitting blood-borne diseases such as Hepatitis B (HBV), Human Immunodeficiency Virus (HIV), Hepatitis C virus (HCV). These diseases put the patient, health workers at great risk by causing reduced life expectancy, productivity and also create burden on communities and health-care systems in the form of high treatment costs. The burden of diseases from Needle Stick Injuries (NSIs) in Health Care Workers (HCWs) which showed that there were 3 million accidental needle-stick injuries leading to 37% of all new HBV, 39% of new HCV cases and around 5.5% of new HIV cases [4].

Unsafe injection practices reduce a great burden on health system by breaking the chain of transmitting blood-borne diseases and their consequences [8]. In the developing countries, unsafe injection practices exist substantially and are associated with the transmission of blood-borne pathogens [9].

Different studies showed different level of knowledge and practice in different areas for instance a study done in Benue State University Teaching Hospital healthcare professionals overall, the respondents had good (70.2%) knowledge, positive (87.2%) attitude and appropriate (79.8%) practice scores respectively. The commonest unsafe injection practice among the respondents was recap of needles (19.1%) [10]. Another comparative study carried out in two hospitals in Nigeria showed that participants knowledge level was high,

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70.4% associated unsafe injection with blood-borne infection, 55.9% had correct information that two handed recapping is not a safe injection practice, 84.4% claimed that contaminated sharps predisposes the community to bio-hazards, and 293(76.1%) had correct information that used syringes and needles should be discarded in a sharp waste box. However, regarding to practice about half of them (50.4%) of the participants recently sustained sharp injury through intramuscular and subcutaneous injections. Only 15.6% of this number reported the injuries to their institution [11]. A study done in south-east Nigeria only 67.2% had previously any form of training on injection safety and only 54% (81/150) had heard or seen colour coded bins. The standard needle and syringe is still widely used and 45% still recap needles or syringes after use. Half (50.6%) of the respondents had a previous needle prick injury. Only 25.6% with previous needle prick injury had post-exposure prophylaxis [12].

Methods and Materials

Study area and period

The study was conducted in JUMC Jimma Zone, Oromia Regional State from March to April 2018. Jimma Zone is one of the 17 zones of Oromia Regional State found at 352 km from AA, the capital city of Ethiopia. In this zone there are five public hospitals, namely, JUMC, Shenen Gibe, Limu Genet, Agaro and Seka hospital. The first two are situated in Jimma town where as the later one is at Limu town which is 72 km far from Jimma town. JUMC play a major role in this zone and it is the only teaching and referral hospital in south-western part of the country, and provides specialized clinical services to about 15 million people. Currently the total numbers of the nurses in our study are 546.

Study design

An institutional based Cross Sectional study design was employed.

Sample size determination

Standard sample size calculation formula was used to determine the required sample size and 247 Nurses were selected by using Simple random sampling techniques.

Data collection procedure

Data was collected through a self-administered questionnaire using structured questionnaire. The questionnaires comprised of three main parts; socio demography, knowledge and practice questions about injection safety.

Data quality control

Pre-test was done at Shenen Gibe General Hospital among 5% of respondents. Training was given for data collectors. Then data was cross checked each day by data collection supervisor and principal investigator for consistency and accuracy.

Data analysis procedure

Descriptive statistics and chi-square test was done to describe the study variable and identify factors associated with injection safety practice.

Ethical consideration

Ethical clearance and approval to conduct the study was obtained from Jimma University Ethical Review Board (JUIRB) and permission letter was secured in order to get support for the study from administrative body. The purpose of study was explained to the participants and they are told as participation was voluntarily, confidential and anonymity will be ensured throughout the execution. Finally, verbal and written consent was assured from the study subjects.

Results

Socio-demographic characteristics

A total of 247 questionnaires was distributed and returned with full information which yields 100% response rate. From the total 247 participant 104(42.1%) were males whereas 143(57.9%) were females. Concerning age of the respondents, 115(46.6%) was between 20-29 years old. Regarding the religion, 84 of them were orthodox. Concerning the ethnic composition of the nurses more than half (57.5%) were Oromo’s. In terms of the educational level, 147(59.5%) were BSC and the rest 100(40.5%) were diploma holders. 81(32.8%) were single and 146(59.1%) were married. Concerning to year of services 113(45.7%) have one to four years working experience. Regarding working units of the study participants, OPD, Medical, Surgical, Pediatrics, Gynaecology and Obstetrics (Table 1).

Injection safety knowledge

Most respondents had good knowledge about transmission of Hepatitis B infection which is 219(88.8%) and its prevention through vaccination 192(77.7%) and also possessed knowledge on Hepatitis C transmission 217(87.8%). The areas in which nurses showed the good knowledge were hand washing 235(95.2%), HIV infection 227(91.9%), PEP 227(91.9%) choice of correct injection devices 231(93.5%) and implementing measures to prevent sudden patient movement during injection 228(92.3%).

As shown in table 2, nurses were more likely to wash their hands after contact with clients 182(73.7%) and after removing gloves 221(89.5%) compared to between procedures 17(6.9%) or before putting on gloves 18(7.3%) to administer injections.

From the total participants 227(92%) of the respondent uses new sterile syringe from sealed pack. 213(87.9%) respondents indicated that they always avoided contamination of medication and 217(86.2%) respondents always avoid contamination of injection equipment during the injection process (Table 2). 63(25.5%) of respondents reported that they always adhered to recommended infection prevention practices during preparation of injections. Findings of the chi square test showed that clinical practice was significantly associated with respondent sex (p=0.027, df=1).

Out of the 247 respondent only 56(22.7%) indicated that they always avoid contamination of medication and 217(86.2%) respondents always avoid contamination of injection equipment during the injection process (Table 2). 63(25.5%) of respondents reported that they always adhered to recommended infection prevention practices during preparation of injections. Findings of the chi square test showed that clinical practice was significantly associated with respondent sex (p=0.027, df=1).

Pre-test was done at Shenen Gibe General Hospital among 5% of respondents. Training was given for data collectors. Then data was cross checked each day by data collection supervisor and principal investigator for consistency and accuracy.
Factors associated with Injection Safety Knowledge and Practice

Findings of the study showed years of experience (p=0.000, df=3), sex (p=0.048, df=1) and level of education (p=0.003, df=1) was statistically associated with the current knowledge and practice about injection safety among nurses working at Jimma University Medical Centre (Table 4).

Discussion

Seventy one (28.7%) respondent had good knowledge on injection safety and 176(71.3%) respondent had poor knowledge. And also they had specific knowledge on infections that could result from unsafe injection practices especially HIV and HBV. This is consistent with another study in Ilorin, Nigeria in which 58.3% had knowledge of diseases transmissible by needle stick injury [10]. The high level of awareness about the mode of transmission of HIV infection and the ingrained fear of the disease in the society may be responsible for this. Similar studies in Cambodia and China also found that most prescribers and injection providers were aware that HIV, HBV, and HCV were transmitted through unsafe injection practices [11,12].

Knowledge of injection safety was significantly associated with the years of experience of the respondents. Although a better knowledge is a major contributor to the practice of injection safety, it is likely that the incurable nature of HIV/AIDS and its attendant stigma may force nurses to be more careful when handling sharps without necessarily having detail knowledge of the definition of injection safety which formed the basis for determining the knowledge of injection safety.

In this study, 227(91.9%) of the respondents knew that unsafe injections are associated with HIV transmission, 219(88.8%) knew Hepatitis B transmission is associated with unsafe injections. 217(87.8%) respondents were aware of Hepatitis C transmissions. Using data presented in a study done in China, among 118 nurse professionals had knowledge with another study in Ilorin, Nigeria in which 58.3% had knowledge of diseases transmissible by needle stick injury [10]. The high level of awareness about the mode of transmission of HIV infection and the ingrained fear of the disease in the society may be responsible for this. Similar studies in Cambodia and China also found that most prescribers and injection providers were aware that HIV, HBV, and HCV were transmitted through unsafe injection practices [11,12].

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In this study, sixty three (25.5%) respondent had good practice on injection safety and 184(74.5%) respondent had poor practice on injection safety. Reported practice varied for the different aspects of injection safety. There was poor practice at ward level which was reflected by the unavailability of soap in all the taps in patient care areas. Majority of nurses were wash their hands after contact with contamination but only 18(7.3%) reported that they washed their hands before putting on gloves.

Table 1: Socio-demographic characteristics on the study of knowledge and practice about injection safety among nurses in Jimma University Medical centre, 2018.

* Gyn/Oby=Gynaecology Obstetrics

Injection safety practices

Most respondents 181(73.2%) reported that they never recapped needles after administering injections and 49(19.6%). Out of 247, 121 (49%) of respondents reported that they always disposed generated waste into recommended colour coded bins, while 50(20.2%) practiced waste segregation at point of waste generation, and 46(18.6%) segregated waste according to type.

Fifty two (21.1%) out of the 247 participant in this study reported that they practiced all three recommended waste management practices examined namely: type at point of waste generation, segregation according to type and disposal in recommended bins.

Table 3 shows that pre-drawn medications were rarely labelled 18(7.3%) with the name of the person who had reconstituted the preparation. On the other hand, 237(96%) of pre-drawn drugs were labelled to indicate medication name, time of preparation 57(23%), strength of medication 63(25.5%) and expiry date 51(21%).
**Table 2:** Responses to injection safety items on the study of knowledge and practice about injection safety among nurses in Jimma University Medical Centre, 2018.

<table>
<thead>
<tr>
<th>Injection safety knowledge items</th>
<th>True</th>
<th>False</th>
<th>I don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
</tr>
<tr>
<td>A safe injection poses no danger to the patient</td>
<td>233</td>
<td>94.3%</td>
<td>10</td>
</tr>
<tr>
<td>A safe injection is not dangerous to injection provider</td>
<td>211</td>
<td>85.4%</td>
<td>26</td>
</tr>
<tr>
<td>Safe injection practices do not pose harm</td>
<td>207</td>
<td>83.8%</td>
<td>25</td>
</tr>
<tr>
<td>HIV infections is a risk associated with unsafe injections</td>
<td>227</td>
<td>91.9%</td>
<td>13</td>
</tr>
<tr>
<td>Hepatitis B infections are associated with unsafe injections</td>
<td>219</td>
<td>88.8%</td>
<td>16</td>
</tr>
<tr>
<td>Hepatitis C infections are associated with unsafe injections</td>
<td>217</td>
<td>87.8%</td>
<td>19</td>
</tr>
<tr>
<td>Recapping the needle after injecting a patient is a safe injection practice</td>
<td>22</td>
<td>8.9%</td>
<td>188</td>
</tr>
<tr>
<td>Hepatitis B vaccine is important to injection providers</td>
<td>192</td>
<td>77.7%</td>
<td>18</td>
</tr>
<tr>
<td>Maintaining the reorder levels in stocks of injection supplies is important in injection safety</td>
<td>178</td>
<td>72%</td>
<td>27</td>
</tr>
<tr>
<td>I anticipate and take measures to prevent sudden patient movement</td>
<td>228</td>
<td>92.3%</td>
<td>14</td>
</tr>
<tr>
<td>Hand washing prior to administering an injection is a safe injection practice</td>
<td>237</td>
<td>95.3%</td>
<td>7</td>
</tr>
<tr>
<td>Hand washing after administering an injection is a safe injection practice</td>
<td>235</td>
<td>95.2%</td>
<td>9</td>
</tr>
<tr>
<td>Observation of proper storage conditions, such as temperature as per manufactures instructions is safe injection practice</td>
<td>165</td>
<td>66.8%</td>
<td>22</td>
</tr>
<tr>
<td>Drug administration practice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medication name</td>
<td>237</td>
<td>96%</td>
<td>7</td>
</tr>
<tr>
<td>Time it was done</td>
<td>57</td>
<td>23%</td>
<td>177</td>
</tr>
<tr>
<td>Name of the person who did it</td>
<td>18</td>
<td>7.3%</td>
<td>219</td>
</tr>
<tr>
<td>Strength of the medication</td>
<td>63</td>
<td>25.5%</td>
<td>157</td>
</tr>
<tr>
<td>Expiration date</td>
<td>51</td>
<td>21%</td>
<td>173</td>
</tr>
<tr>
<td>I choose injection site according to;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of patient</td>
<td>47</td>
<td>19.1%</td>
<td>143</td>
</tr>
<tr>
<td>The dosage</td>
<td>205</td>
<td>83%</td>
<td>26</td>
</tr>
<tr>
<td>The type of injection</td>
<td>236</td>
<td>95.5%</td>
<td>7</td>
</tr>
</tbody>
</table>

**Table 3:** Hand washing practices on the study of knowledge and practice about injection safety among nurses in Jimma University Medical Centre, 2018.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Always</th>
<th></th>
<th>Never</th>
<th></th>
<th>don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Hands washing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immediately on arrival to work</td>
<td>22</td>
<td>8.9%</td>
<td>202</td>
<td>81.4%</td>
<td>23</td>
</tr>
<tr>
<td>Before putting on to give an injection</td>
<td>18</td>
<td>7.3%</td>
<td>217</td>
<td>87.9%</td>
<td>12</td>
</tr>
<tr>
<td>After removing the gloves</td>
<td>221</td>
<td>89.5%</td>
<td>20</td>
<td>8.1%</td>
<td>6</td>
</tr>
<tr>
<td>After contact with any form of contamination even when gloves are worn</td>
<td>182</td>
<td>73.7%</td>
<td>45</td>
<td>18.2%</td>
<td>20</td>
</tr>
<tr>
<td>Between procedures on same patient</td>
<td>17</td>
<td>6.9%</td>
<td>216</td>
<td>87.4%</td>
<td>14</td>
</tr>
<tr>
<td>I use a new sterile syringe from a sealed pack for the injections</td>
<td>227</td>
<td>92%</td>
<td>17</td>
<td>6.8%</td>
<td>3</td>
</tr>
<tr>
<td>I reuse disposable syringes</td>
<td>5</td>
<td>2%</td>
<td>239</td>
<td>76.7%</td>
<td>3</td>
</tr>
<tr>
<td>I verify the integrity of the packet of the disposable syringe before use</td>
<td>53</td>
<td>21.5%</td>
<td>171</td>
<td>69.2%</td>
<td>23</td>
</tr>
<tr>
<td>I prepare each injection in a clean designated area.</td>
<td>69</td>
<td>28.2%</td>
<td>137</td>
<td>55.5%</td>
<td>41</td>
</tr>
<tr>
<td>With multi dose vials, I place the septum with a sterile needle.</td>
<td>223</td>
<td>90.3%</td>
<td>17</td>
<td>6.9%</td>
<td>7</td>
</tr>
<tr>
<td>I use a clean protective barrier (e.g. small gauze pad) to protect fingers when opening a glass ampoule.</td>
<td>53</td>
<td>21.5%</td>
<td>176</td>
<td>71.3%</td>
<td>18</td>
</tr>
<tr>
<td>I discard medications with visible contamination</td>
<td>17</td>
<td>6.5%</td>
<td>193</td>
<td>78%</td>
<td>37</td>
</tr>
<tr>
<td>I discard needles with visible contamination</td>
<td>96</td>
<td>39%</td>
<td>127</td>
<td>51.3%</td>
<td>24</td>
</tr>
<tr>
<td>During the injection process, I avoid contamination of; Injection equipment and The medication</td>
<td>213</td>
<td>86.2%</td>
<td>34</td>
<td>13.8%</td>
<td>0</td>
</tr>
</tbody>
</table>

**Sharp Waste Management Generation, Segregation, Transport and Disposal**

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I dispose injection waste into the recommended colour coded waste bins</td>
<td>121</td>
<td>49%</td>
<td>92</td>
<td>37.3%</td>
<td>34</td>
</tr>
<tr>
<td>I practice waste segregation at the point of generation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I practice waste segregation according to type</td>
<td>46</td>
<td>18.6%</td>
<td>168</td>
<td>68.8%</td>
<td>33</td>
</tr>
</tbody>
</table>
A similar study done in West Africa indicated that only 12.3\% of injection providers washed their hands before and after administering injections [14]. While this is an improvement in hand washing practice and depicts better performance from 12.3\% in 2009 to the current 33\%, it is still relatively low and presents an opportunity for spread of avoidable infections. All the taps in the patient care areas had running water but none had soap or alcohol hand rubs available.

In our study sixty nine (28.2\%) of the respondents reported that they prepared each injection in a clean designated area and 5(2\%) respondents reported that they reused disposable syringes. Only 53(21.5\%) of the respondents verify the integrity of the packet of the disposable syringe before use. In JUMC, 182(73.7\%) of the respondents reported that they reused disposable syringes. Only 52(21.1\%) of the 247 respondents reported that they followed all three recommended waste management steps examined namely: waste segregation by type at point of waste generation, segregation according to type and disposal in recommended bins. Some of the wards practiced immediate waste segregation at the point of generation. The recommended colour coded bins were available. All the wards studied had puncture proof sharp disposal boxes were available. Almost similar report was obtained in a study conducted in Nyanza and Western province revealed that 69\% practiced waste segregation and 3\% of injection providers and 5\% of those involved in waste handling were fully protected from Hepatitis B [6].

Some of the staffs working in paediatrics department reported that they did practice recapping about 9(19.6\%) while 9(23.7\%) of respondents working in the maternity department recapped needles. In our study site, sharp waste remained within the patient care environment and was not kept away in safe holding rooms. This practice was in contrast to a countrywide survey done in Kenya which showed that 47\% of the hospitals had waste holding rooms as it awaited transportation and was not kept away in safe holding rooms. This practice was in contrast to a national cross-sectional survey in Kenya on injection safety practices indicated that there is over prescription of injections [16].

While infectious waste and sharps constitute hazardous waste and their disposal system is considered appropriate if the collected and disposed of in the right manner [13]. In current study, Only 52(21.1\%) out of the 247 respondents reported that they followed all three recommended waste management steps examined namely: waste segregation by type at point of waste generation, segregation according to type and disposal in recommended bins. Some of the wards practiced immediate waste segregation at the point of generation. The recommended colour coded bins were available. All the wards studied had puncture proof sharp disposal boxes were available. Almost similar report was obtained in a study conducted in Nyanza and Western province revealed that 69\% practiced waste segregation and 3\% of injection providers and 5\% of those involved in waste handling were fully protected from Hepatitis B [6].

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### Conclusion and Recommendations

There was poor level of knowledge and practice on injection safety among nurses in JUMC. Knowledge and practice on injection safety was significantly associated with working experience, sex and level of education. The practice on injection safety also was poor in some of the areas like re-use of disposable syringes, recapping of needles and overfilling of safety boxes.

There was poor handling of waste, improper waste segregation, transportation and final disposal among the study participant. Head nurse should provide training about injection safety for junior staffs assigned to their working unit. Due emphasis should be given for nurses by the health institution and Zonal Health Bureaus on proper collection and disposal of needles, syringes and sharps.

### Author’s Contribution

Admasu Belay contributed to the study conception and design, supervised the study, conducted data analysis and wrote the manuscript. Eldana Amare and Yeshitila Belay planned the study, involved in data collection, prepared the first draft proposal and paper. Dagmawit Birhanu contributed on data analysis, supervised the study and critically revised the manuscript.

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References


Journal of Anesthesia & Clinical Care
Journal of Addiction & Addictive Disorders
Advances in Microbiology Research
Advances in Industrial Biotechnology
Journal of Agronomy & Agricultural Science
Journal of AIDS Clinical Research & STDs
Journal of Alcoholism, Drug Abuse & Substance Dependence
Journal of Allergy Disorders & Therapy
Journal of Alternative, Complementary & Integrative Medicine
Journal of Alzheimer’s & Neurodegenerative Diseases
Journal of Angiology & Vascular Surgery
Journal of Animal Research & Veterinary Science
Archives of Zoological Studies
Archives of Urology
Journal of Atmospheric & Earth-Sciences
Journal of Aquaculture & Fisheries
Journal of Biotech Research & Biochemistry
Journal of Brain & Neuroscience Research
Journal of Cancer Biology & Treatment
Journal of Cardiology: Study & Research
Journal of Cell Biology & Cell Metabolism
Journal of Clinical Dermatology & Therapy
Journal of Clinical Immunology & Immunotherapy
Journal of Clinical Studies & Medical Case Reports
Journal of Community Medicine & Public Health Care
Current Trends: Medical & Biological Engineering
Journal of Cytology & Tissue Biology
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Journal of Diabetes & Metabolic Disorders
Journal of Dairy Research & Technology
Journal of Emergency Medicine Trauma & Surgical Care
Journal of Environmental Science: Current Research
Journal of Food Science & Nutrition
Journal of Forensic, Legal & Investigative Sciences
Journal of Gastroenterology & Hepatology Research
Journal of Gerontology & Geriatric Medicine
Journal of Genetics & Genomic Sciences
Journal of Hematology, Blood Transfusion & Disorders
Journal of Human Endocrinology
Journal of Hospice & Palliative Medical Care
Journal of Internal Medicine & Primary Healthcare
Journal of Infectious & Non Infectious Diseases
Journal of Light & Laser: Current Trends
Journal of Modern Chemical Sciences
Journal of Medicine: Study & Research
Journal of Nanotechnology: Nanomedicine & Nanobiotechnology
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Journal of Nephrology & Renal Therapy
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Journal of Orthopedic Research & Physiotherapy
Journal of Otolaryngology, Head & Neck Surgery
Journal of Protein Research & Bioinformatics
Journal of Pathology Clinical & Medical Research
Journal of Pharmacology, Pharmaceutics & Pharmacovigilance
Journal of Physical Medicine, Rehabilitation & Disabilities
Journal of Plant Science: Current Research
Journal of Psychiatry, Depression & Anxiety
Journal of Pulmonary Medicine & Respiratory Research
Journal of Reproductive Medicine, Gynaecology & Obstetrics
Journal of Reproductive Medicine, Gynaecology & Obstetrics
Journal of Surgery: Current Trends & Innovations
Journal of Toxicology: Current Research
Journal of Translational Science and Research
Trends in Anatomy & Physiology
Journal of Vaccines Research & Vaccination
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