Finding the Association Rule between Nursing Interventions and Early Evaluation Results of In-Hospital Cardiac Arrest to Improve Patient Safety

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Abstract : Background: In-Hospital Cardiac Arrest (IHCA) threaten life of the inpatients, cause serious effect to patient safety, quality of inpatients care and hospital service. Health providers must identify the signs of IHCA early to avoid the occurrence of IHCA. This study will consider the potential association between early signs of IHCA and the essence of patient care provided by nurses and other professionals before an IHCA occurs. The aim of this study is to identify significant associations between nursing interventions and abnormal early evaluation results of IHCA that can assist health care providers in monitoring inpatients at risk of IHCA to increase opportunities of IHCA early detection and prevention. Materials and Methods: This study used one of the data mining techniques called association rules mining to compute associations between nursing interventions and abnormal early evaluation results of IHCA. The nursing interventions and abnormal early evaluation results of IHCA were considered to be co-occurring if nursing interventions were provided within 24 hours of last being observed in abnormal early evaluation results of IHCA. The rule based methods were utilized 23.6 million electronic medical records (EMR) from a medical center in Taipei, Taiwan. This dataset includes 733 concepts of nursing interventions that coded by clinical care classification (CCC) codes and 13 early evaluation results of IHCA with binary codes. The values of interestingness and lift were computed as Q values to measure the co-occurrence and associations' strength between all in-hospital patient care measures and abnormal early evaluation results of IHCA. The associations were evaluated by comparing the results of Q values and verified by medical experts. Results and Conclusions: The results show that there are 4195 pairs of associations between nursing interventions and abnormal early evaluation results of IHCA with their Q values. The indication of positive association is 203 pairs with Q values greater than 5. Inpatients with high blood sugar level (hyperglycemia) have positive association with having heart rate lower than 50 beats per minute or higher than 120 beats per minute, Q value is 6.636. Inpatients with temporary pacemaker (TPM) have significant association with high risk of IHCA, Q value is 47.403. There is significant positive correlation between inpatients with hypovolemia and happened abnormal heart rhythms (arrhythmias), Q value is 127.49. The results of this study can help to prevent IHCA from occurring by making health care providers early recognition of inpatients at risk of IHCA, assist with monitoring patients for providing quality of care to patients, improve IHCA surveillance and quality of in-hospital care.

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