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Letter to the Editor

Comparison of Standardized Plant Analysis Risk Human Reliability Analysis (SPAR-H) and Cognitive Reliability Error Analysis Methods (CREAM) in Quantifying Human Error in Nursing Practice

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Dear Editor-in-Chief

Nurses spend much more time dealing with patients compared with other healthcare personnel. This group has a significant role in identification of threatening complexities of patients, removing medical errors and in keeping patients safe, on the other hand, a considerable amount of human errors is committed by nurses (1). Therefore, nurses have to face with many occupational risks compared with other jobs and may suits relating to occupational negligence (1). Human errors associated with nursing duties; in particular, medication error has been identified as a central concern for the nursing profession (1). As the result of such events, patient is hurt unwantedly and staff suffers a great deal of damage. These events often result from the change of systemic specifications in duties, group, work environment, and organization (3).

The present study was a cross sectional research aimed at comparing two human error identification and assessment methods, SPAR-H and CREAM, in nursing practice at a hospital in Iran. We investigated 31 duties according to job description announced by Iran Nursing Organization and professors of nursing.

In the first step, we analyzed occupational duties using Hierarchical Task Analysis (HTA) method (4). Next, different tasks are executed for each sub task. After completing CREAM and SPAR-H worksheets, we first grouped the worksheets for each duty and analyzed total error probability and error risk using SPSS-16 (Chicago, IL, USA). In order to compare the two techniques based on multivariable decision making, we used analytical hierarchy process (5).

The findings of demonstrated that, the estimated human error probability by SPAR-H was higher than those estimated by CREAM, but the most critical task, "taking initial measures for cardiopulmonary resuscitation until the arrival of resuscitation team", was the same in both techniques. Moreover, it was determined that both techniques have similar results in identifying and assessing critical tasks with high probability of human error (Table 1). Furthermore, there was more difference between these two techniques in ranking potential errors with low probabilities; for instance, preparing bed before arrival of patient have the rank of 27 when we used SPAR-H technique 27, while its rank using CREAM technique was determined at 10 (Table 1).

Based on previous studies in this field and also eliciting domain expert knowledge, seven criteria were selected for comparing two techniques with each other (6).

Table 1: Human Error Probability (HEP) and CFPt for each duty nursing using SPAR-H and CREAM methods

Duties	HEP (SPAR-H)	Rank (SPAR-H)	CFPt* (CREAM)	Rank (CREAM)
Taking initial measures for cardiopulmonary resuscitation until the arrival of resuscitation team	0.37180	1	0.0591	1
Notification of code and starting initial steps of cardiopulmonary resuscitation	0.24489	2	0.02086	4
Adjusting and using DC shock in emergency cases	0.23295	3	0.02108	2
Performing intubation in emergency cases	0.19574	4	0.01730	6
Taking urgent actions for dysrhythmia	0.12217	5	0.01189	11
Recording data in integrated hospital system	0.08552	6	0.02088	3
Heart monitoring	0.05340	7	0.01413	9
Performing suction of airway secretions and tracheal tube	0.04886	8	0.00888	15
Education before, during and after hospitalization	0.04596	9	0.02060	5
Establishing IV line	0.04415	10	0.00489	24

*Cognitive Failure Probability total

These criteria are as follows:

1. Training courses required for implementation (TN)
2. Cost of Execution (CE)
3. Duration of Execution (DE)
4. Focus on Social Factors(SF)
5. Focus on Organizational Factors(OF)
6. Focus on Individual Factors(IF)
7. Preventive Measures (PM).

Table 2 shows results of the final weight of each component and criteria based on AHP method for both SPAR-H and CREAM methods.

The final weight in SPAR-H and CREAM methods is calculated as follows:

SPAR-H= $0.967 \times 0.834 + 2.834 \times 0.166 + 6.2 \times 0.33 + 4.12 \times 0.834 + 1.192 \times 0.166 + 2.567 \times 0.88 + 0.387 \times 0.75 = 8.094234$

CREAM = $0.967 \times 0.166 + 2.834 \times 0.834 + 6.2 \times 0.66 + 4.12 \times 0.166 + 1.192 \times 0.834 + 2.567 \times 0.66 + 0.387 \times 0.25 = 10.0851$

Final score in CREAM (10.0851) was more than SPAR-H (8.094234) method, then, it can be concluded that CREAM is more efficient than SPAR-H.

Table 2: Final weight of the components and criteria's in SPAR-H and CREAM methods

	DE	TN	IF	OF	SF	PM	CE
SPAR-H	0.834	0.166	0.33	0.834	0.166	0.33	0.75
CREAM	0.166	0.834	0.66	0.166	0.834	0.66	0.25
Final weight	0.967	2.834	6.2	4.12	1.192	2.567	0.387

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