MEASUREMENT OF RESILIENCE POTENTIAL: DEVELOPMENT AND VALIDATION A TOOL

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Background

Crises that occur without warning test the abilities and resilience of Occupational Safety and Health (OSH) systems. Resilience engineering seeks ways to enhance the ability of systems to thrive under diverse conditions across various domains. However, developing metrics to measure and analyze the resilience potential of the OSH management systems remains a significant challenge. Therefore, it is of the crucial to build up a robust and resilient OSH system, capable to handling unforeseen events and emergent risks in order to ensure workers' safety and health. Resilience engineering has proposed the following four potentials for resilient performance (Hollnagel, 2017): potential to respond (knowing what to do); potential to monitor (knowing what to look for); potential to learn (knowing what has happened); and potential to anticipate (knowing what to expect). In view of the above, it is necessary to develop a new tool to measure the resilience potential of the OSH management system in this context according to theconcepts introduced by resilience engineering.

Objective

This study aims to develop and validate a resilience assessment tool to support OSH management sytems, specifically focusing on hospitals.

Methodology

The study approach has three stages: 1) Design of the questionnaire based on the Systemic Potential Management (SPM) formerly called Resilience Assessment Grid (RAG); 2) Validation of the content of the questionnaire by Delphi methodology; 3) Questionnaire pre-test. Firstly, the design of the questionnaire according to the SPM was carried out. To design the questionnaire, the primary reference for information was the book "Safety-II in Practice: Developing the Resilience Potentials" (Hollnagel, 2017). The first version of the questionnaire was developed by four researchers. In the second stage, the content of the proposed questionnaire was submitted to a validation process, for which the Delphi method was applied. The Delphi method is a qualitative research methodology based on expert judgment (Hasson, 2000). It involves the application of a questionnaire to a group of experts to express their opinion or judgment. Subsequently, the experts review their answers based on the feedback they receive in an iterative process (Rowe & Wright, 1999). This process ends when consensus is reached among the responses of all the experts. The experts were selected based on the selection criteria proposed by Hallowel and Gambatese (2010). A total of 19 experts participated evaluating the importance of each item in order to determine if they should be included in the questionnaire or if, on the contrary, they were not important enough to be included in the questionnaire. In the third stage, the final version of questionnaire was used in a pilot test or "Comprehension test". This approach allows to confirm the clarity and comprehensiveness of all items (Beaton et al., 2000). A sample of 30

subjects of the target population was used to this purpose. This number of subjects was considered appropriate (Perneger et al., 2015).

Results and Discussion

As a result, a questionnaire consisting of four dimensions was obtained, which represent the four potentials: potential to respond with a total of 11 items; potential to monitor with 14 items; potential of learn with 12 items; potential of anticipation with 13 items. The 24 potential experts from all over the country were formally contacted and invited by email to participate in the study. Of these 24 experts, 19 showed interest in participating, thus constituting the panel. In order to achieve consensus, three rounds were held. In the second round, a response rate of 94.74% was obtained (18 experts). Based on the experts' comments, six items were reformulated and four were eliminated. In the third round, only the items that did not reach consensus in the previous round and the items that the research group, based on the experts' opinions, considered pertinent to reformulate, were sent by e-mail. A response rate of 89.47% (17 experts) was obtained in the third round. Over the three rounds of the Delphi methodology the level of consensus increased as expected. There was a decrease in the number of experts, which may have occurred due to their difficulties in responding in a timely manner to successive rounds. However, this issue was not considered critical for the results obtained. A questionnaire with a total of 47 items was obtained. The questionnaire consists of four dimensions that correspond to the four resilience potentials for resilient performance (respond, monitor, learn and anticipate).

Conclusions

The study successfully developed and validated a resilience assessment tool. The questionnaire consists of four dimensions representing different resilience potentials. Further research is needed to validate the tool's effectiveness and explore its implications in enhancing OSH management system. The authors believe that the application of this tool will contribute to the definition of strategies that help to create resilience to face any future crises that might lie ahead. Furthermore, it might be performed multiple times by a single hospital to monitor implemented strategies in futures studies.

Keywords: Hospitals, Occupational Safety and Health, Resilience Engineering, Safety-II

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