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Original Article

The Relationship between Antecedents and Processes of Unlearning and Organizational Innovation among Hamedan Teaching Hospitals

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Abstract

Introduction: Hospitals should provide necessary conditions for the renewal of knowledge, skill and attitude through unlearning. Thus, the present study aimed to determine the relationship between antecedents and processes of unlearning and organizational innovation among the teaching hospitals of Hamedan.

Methods: This is a descriptive correlational study. The statistical population of the study included 1352 health personnel in four teaching hospitals of Hamedan. To select the administrative personnel, we used the total population; also, for physicians, and for the health personnel we used purposeful voluntary sampling and stratified random sampling, respectively. Based on the methods, 431 were selected as the subjects. Research instruments were unlearning researcher-made questionnaire and innovation scale. Data were analyzed through multivariate regression analysis and structural equation model using SPSS19 and LISREL 8.54 software.

Results: The results indicated that organizational support and training, frequency of changes, and predictability of changes were the positive and significant predictors of the product, process and administrative dimensions. The group crisis was the negative and significant predictor of the product and administrative dimensions. Organizational memory was the positive and significant predictor of the administrative dimension. Individual processes, group processes, and organizational processes were the positive and significant predictors of organizational innovation.

Conclusion: Based on the effective role of organizational support and training, organizational memory and frequency of changes and predictability of changes on innovation in teaching hospitals, it is suggested that the administrators and authorities of the hospitals should accept new opinions of their personnel.

Keywords: Unlearning, Teaching hospitals, Organizational innovation, Health personnel

Introduction

Based on the rapid changes in the environment, it is necessary that the personnel and staff of the organizations be equipped with multiple skills in order to deal with the existing challenges. One of the most important skills is that of "unlearning". Unlearning can be defined based on organizational knowledge (1), structure (2), routines (3), behavior and value systems (4), and technology (5). Unlearning is a process through which individuals and organizations put aside their previous learning (assumptions and mental models) in order to acquire new information and behavior. Through deliberate elimination of old knowledge (old technologies and inflexible rules), organizations provides a proper setting and space for new learning (6). The unlearning process involves three levels of individual, group (7) and organizational unlearning (8). Organizational unlearning is deletion of organizational memory, and change of beliefs, norms, values, processes and the routines of the organization (3) emerging from the institutional objectives (9). Individual unlearning is taken from the needs and individual motivations, while group unlearning is taken from diverse needs and motives of people. Based on the findings about unlearning, it can be classified into the following dimensions (Table 1).

In the present turbulent conditions, hospitals need the unlearning process and a proper context to facilitate this process (10). Medical centers have a close relationship with their patients for their service provision, and the importance of medical services has a critical role from the view of learning in the health of the society, so the administrative personnel in the medical centers, especially hospitals, should start their move toward being learning organizations. There have been many studies about the aspects and levels of unlearning since 1981. However, none of the studies has comprehensively and simultaneously dealt with all of the levels and aspects of unlearning; thus, the present study was conducted to determine the role of unlearning and the antecedents and individual, group and organizational processes in organizational innovation of teaching hospitals in Hamedan.

Methods

Participants: The is a descriptive correlational study carried out among the health personnel in four teaching hospitals in Hamedan. The statistical population included 1352 health personnel in four teaching hospitals in Hamedan. To select the administrative personnel, we used the total population sampling; also, for the physicians and the health personnel, we used purposeful voluntary sampling and stratified random sampling, respectively. Based on this method, 90 managers and authorities (supervisors, head nurses and matrons)

and 25 physicians were selected. And with the use of Cochran formula and online sample size calculator (95% confidence level & 5% error level), 291 health personnel were selected. However, to achieve more valid results, we distributed 330 questionnaires among the health personnel. Finally, by omitting incomplete and messed up questionnaires, 316 questionnaires were completed by the health personnel. Overall, 431 questionnaires were collected.

Measures: Two scales were used for data collection: A) the researcher-made scale for unlearning: based on combinational framework of unlearning process (3, 6, 11, 12) which was designed in two parts: 1) demographic aspects and 2) seven subscales of individual, group and organizational and environmental antecedents and individual, group and organizational processes. The item analysis method was used for the validity of this instrument. Results of item analysis showed that the unlearning antecedents with 0.85, unlearning processes with 0.84, group processes with 0.90, and organizational processes with 0.92 had a good validity. Also, Cronbach's alpha showed that individual antecedents with 0.84, group antecedents with 0.85, organizational antecedents with 0.89, environmental antecedents with 0.90, individual processes with 0.88, group processes with 0.87, and organizational processes with 0.91 had a proper reliability. B) The organizational innovation scale that had three sub-scales (product, process and administrative) and 10 items was used (13). For the calculation of validity of this instrument, the item

Table 1: The combinational framework of the unlearning process

Aspects	Levels	Components	References
Antecedents	Individual	Positive Prior Outlook/ Frames of Reference & Individual Inertia/ Feelings & Expectations/ Positive Experiences & Informal Support/ Explicit Knowledge/ Tacit Knowledge/ Assessment of New Way/ Understanding The Need for Change	Becker(2007); Windeknecht,& Delahaye(2004)
	Group	Group (Team) Crisis/ Group (Team) Anxiety	Akgün et al(2006)
	Organizational	History of Organizational Change/ Organizational Support and Training/ Inert Knowledge/ Organizational Culture/ Organizational Memory	Becker(2007); Windeknecht,& Delahaye(2004)
	Environmental	Environmental Turbulence	Schein(1993); Akgün et al(2006)
Processes	Individual	Problem Identification/ Changing of Cognitive Patterns/ New Actions	Cegarra-Navarro & Dewhurst(2003)
	Group	Knowledge Disintegration/ Knowledge Sharing/ Elimination of Knowledge	Cegarra-Navarro & Moya(2005)
	Organizational	Knowledge Disintegration/ Knowledge Sharing/ Elimination of Knowledge	Cegarra-Navarro & Moya(2005)
Consequence	Organizational Innovation		Cegarra-Navarro et al(2010); Yang et al(2014); Leal-Rodríguez et al(2015)

analysis method was used. The results of item analysis showed that the sub-scale of product with 0.89, the process dimension with 0.88, and the administrative dimension with 0.93 had a proper validity. Also, Crobach's alpha showed that the product dimension with 0.78, the process dimension with 0.89, and the administrative dimension with 0.85 had a proper reliability.

Investigation program: After obtaining the required permission from the deputy of research and technology of Hamedan Medical Sciences University, the questionnaires were distributed among the statistical sample for the collection of quantitative data. The necessary explanations about research objectives were provided to the subjects and they were assured of the confidentiality of their information. About 25 days after the distribution, the questionnaires were filled out and collected.

Data analysis methods: For the descriptive analysis of data, mean and standard deviation were calculated using SPSS 19, and for the analysis of the relationship between unlearning antecedents and the dimensions of organizational innovation, the multivariate regression was used by LISREL 8.54.

Results

Descriptive Statistics

The results indicated that among the dimensions of unlearning antecedents, individual antecedents (3.62) had the highest and lowest mean belonged to the organizational antecedents (3.32) (Table 2).

Among dimensions of unlearning processes, individual processes (3.33) had the highest mean and the lowest mean belonged to the organizational processes (3.23) (Table 3).

Among the dimensions of organizational innovation, process dimension (3.34) had the highest mean and the lowest mean was related to administrative dimension (3.23) had (Table 4).

Inferential Statistics

For explanation of significant predicators of organizational innovation of Hamedan Hospitals, multivariate regression was used. Data were analyzed in Lisrel 8.54 software. Figure 1 shows the results of multivariate regression analysis about the role of strongest antecedents of unlearning in the prediction of organizational innovation among Hamedan hospitals. It was found that group crisis from the dimensions of group antecedents ($\beta=-0.14$, $P<0.001$) was the negative and significant predictor of the product, as one of the dimensions of organizational innovation. Also, organizational support and training ($\beta=0.26$, $P<0.001$), as the dimensions of organizational antecedents, was the positive and significant predictor of the product. Also, the frequency of changes, as one of the dimensions of environmental antecedents ($\beta=0.14$, $P<0.001$), was the positive and significant predictor of the product, and the predictability of changes, as the dimension of environmental antecedents ($\beta=0.12$, $P<0.001$) was the positive and significant predictor of the product. Organizational support and training ($\beta=0.34$, $P<0.001$) was the positive and significant predictor of the process as the dimension of innovation; the frequency of change ($\beta=0.15$, $P<0.001$) was the

**Table 2:** Frequency, mean and standard deviation of the unlearning antecedents

Unlearning antecedents	N	Mean±SD
Individual Antecedents	431	3.62±0.64
Group Antecedents	431	3.41±0.68
Organizational Antecedents	431	3.32±0.74
Environmental Antecedents	431	3.35±0.73

Table 3: Frequency, mean and standard deviation of the unlearning processes

Unlearning antecedents	N	Mean±SD
Individual Process	431	3.33±0.86
Group Process	431	3.32±0.84
Organizational Process	431	3.23±0.85

Table 4: Frequency, mean and standard deviation of the dimensions of organizational innovation

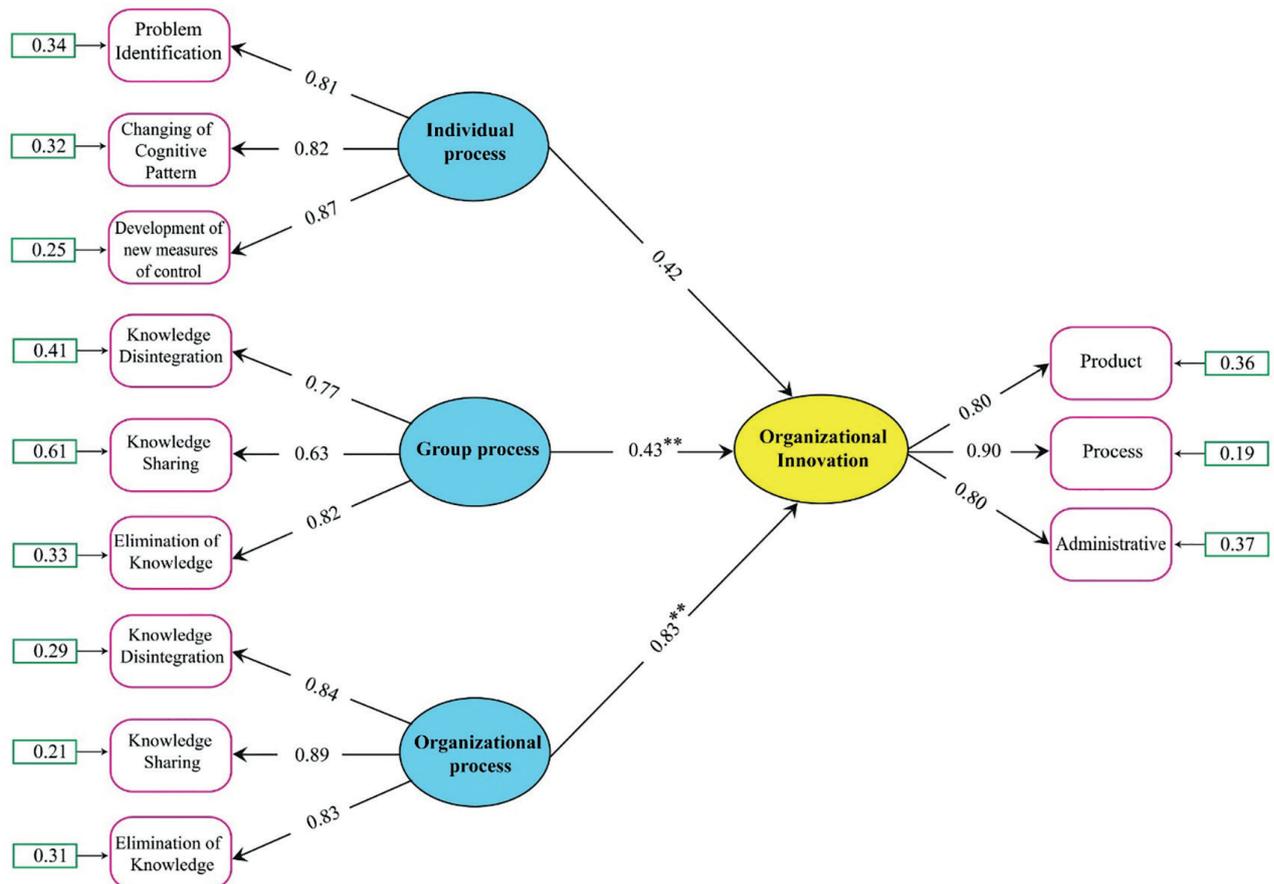| Organizational innovation	N	Mean±SD
Product	431	3.30±0.92
Process	431	3.34±0.89
Administrative	431	3.23±1.12
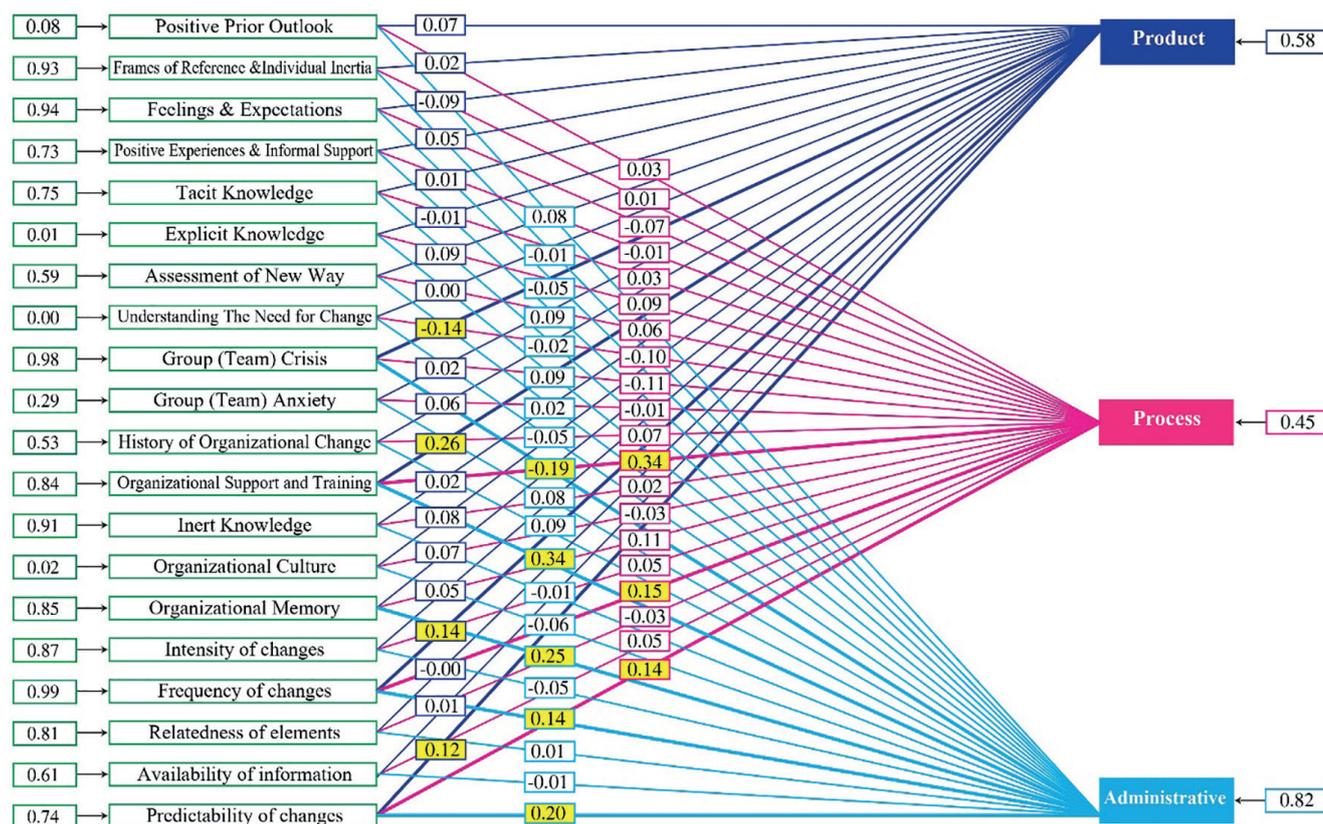
Chi-square=368/58, df=3, P value=0.000, RMSEA=0/545

Figure 1: The multivariable regression model of unlearning antecedents and organizational innovation
Normed Fit Index (NFI)=0.99; Parsimony Normed Fit Index (PNFI)=0.0016; Comparative Fit Index (CFI)=0.99; Incremental Fit Index (IFI)=0.99; Root Mean Square Residual (RMR)=0.0017; Standardized RMR=0.0018; Goodness of Fit Index (GFI)=0.98

positive and significant predictor of the process; and predictability of changes (β=0.14, P<0.001) was the positive and significant predictor of the process. Group crisis (β=-0.19, P<0.001) was the negative and significant predictor of the administrative dimension of organizational innovation. Also, organizational support and training (β=0.34, p<0.001) was the positive and significant predictor of the administrative dimension; organizational memory, as one of the dimensions of organizational antecedents (β=0.25,P<0.001), was the positive and significant predictor of administrative dimension. Also, frequency of changes (β=0.14, P<0.001) was the positive and significant predictor of the administrative dimension, and predictability of changes (β=0.20, P<0.001) was the positive and significant predictor of the administrative dimension. For determination of the fitness of the above model, the LISREL 8.54 was used and different values were calculated for fitness. It can be understood that based on the high level of fitness index, NNFI=0.99 (normative fit index), CFI=0.99 (comparative fit index), IFI=0.99 (incremental fit index), and GFI=0.98 (goodness of fit index) and the low of error index SRMR=0.0018

(Standardized Root Mean Square Residual error), the above model has a goodness of fit.

Also, the processes (individual, group and organizational) of unlearning are the significant predictors of organizational innovation in Hamedan Hospitals and medical centers. Figure 2 deals with the relationship between unlearning processes and organizational innovation of Hamedan hospitals in the form of a structural equation model. In this model, the processes of unlearning are considered as the predictor variable and organizational innovation is considered as the criterion variable. The results showed that the dimension of individual processes were the positive and significant predictor of organizational innovation (β=0.42, P<0.001). Also, the dimension of group processes was the positive and significant predictor of organizational innovation (β=0.43, P<0.001). Furthermore, the dimension of organizational processes was the significant and positive predictor of organizational innovation (β=0.83, P<0.001). In the variable of individual processes of unlearning, the dimension of new actions with the factor load of 0.87, the change of cognitive patterns with a factor load of 0.82, the dimension

Chi-square=194.84, df=48, P value=0.000, RMSEA=0.085

Figure 2: The model for the relationship between the processes of unlearning and organizational innovation
Normed Fit Index (NFI)=0.98; Non-Normed Fit Index (NNFI)=0.98; Parsimony Normed Fit Index (PNFI)=0.71; Comparative Fit Index (CFI)=0.98; Incremental Fit Index (IFI)=0.98; Relative Fit Index (RFI)=0.97; Critical N (CN)=157.61; Root Mean Square Residual (RMR)=0.035; Standardized RMR=0.034; Goodness of Fit Index (GFI)=0.93

of problem identification with a factor load of 0.81 had respectively the highest and lowest explanation power. In the variable group processes, the dimension of elimination of knowledge with a factor load of 0.82, knowledge disintegration with a factor load of 0.77, knowledge sharing with a factor load of 0.63 had respectively the highest and lowest explanation power. In addition, in the variable of organizational processes, the dimension of knowledge sharing with a factor load of 0.89, knowledge disintegration with a factor load of 0.84, knowledge elimination with a factor load of 0.83 had respectively the highest and lowest explanation power. The numbers (on the right) connected to the dimensions of innovation (product, process and administrative) represent the estimated error rate. And the numbers (on the left) attached to the dimensions of antecedents and processes represent the estimated error rate. For determination of fitness of model, in LISREL 8.54, different values were calculated. It is obvious that based on the high fitness indexes of NNFI (Normed Fit Index) =0.98, CFI=0.98, IFI=0.98, and GFI=0.98 and low error

index of Root Mean Square Error of Approximation (RMSEA)=0.085 and Root Mean Square Residual (RMR)=0.035, fitness of this model was confirmed. This is a model that is appropriate to the parameters of the research population and the its results can be generalized to Hamedan hospitals. Based on this model, organizational performance and innovation can be significantly promoted in hospitals by fostering positive antecedents (organizational support and training, organizational memory, etc.) and positive processes (problem identification, knowledge sharing, change of cognitive patterns, etc.).

Discussion
The aim of the present study was to investigate the relationship between antecedents and processes of unlearning and organizational innovation in Hamedan hospitals based on the combinational framework of unlearning process. The findings of the study showed that the individual, group, organizational and environmental antecedents of unlearning had a role in the prediction of organizational innovation in

the hospitals of Hamedan. Based on negative role of group crisis on organizational innovation, perhaps, in the crisis conditions, the health personnel mostly think of solving the crisis and not using new ideas and innovation. It can be concluded that innovation usually takes places after the crisis and increases with more experience. The results of this study are in line with those of the studies carried out by some researchers who have confirmed the negative role of crisis in the reduction of innovation (14, 15). The studies carried out by Medrano Saez et al. and Glodzinski and Marciniak also confirm the negative role of crisis in the reduction of innovation (14, 15). Also, due to the positive impact of organizational support and training on organizational innovation, supportive role of hospital administrators can lead to increased innovation among the personnel and provide the conditions for new ideas. The results of the study conducted by Altunoglu and Gurel, and also Farooq et al. also showed the positive and significant role of organizational support and training on fostering the organizational innovation (16, 17). Based on the positive role of the frequency of changes on organizational innovation, perhaps the turbulent environmental conditions and continuous changes with proper timing and planning in the health and medical services can lead to an increase in innovation in the organization. The studies done by Mukhtar et al., and Ko and also Tan confirmed the positive and significant role of the environmental turbulence dimension and changing environmental conditions in promotion of organizational innovation (18, 19).

Based on the positive role of the predictability of the changes in organizational innovation, it can be concluded that predictable changes and existence of a specific pattern for change in the domain of health and medical services will result in innovation in medical centers. A study carried out by Tsuja and Marino also confirms the positive and significant role of he predictability of the changes in the promotion of innovation in the organization (20). Finally, due to the positive impact of organizational memory on organizational innovation, it can be concluded that the awareness of the personnel of their job duties and the performance of other hospitals and also awareness of the medical errors in the health centers can result in an increase in innovation in these centers. The results of the present study are in line with those of Camison and Villar Lopez; and Cegarra-Navarro et al.'s studies (21, 22). Despite the results of the present study, Wang and Lin concluded that the effect of organizational memory was not significant on the administrative innovation (23).

The other results of this study indicated that the individual, group and organizational processes of unlearning are the positive and significant predictors of organizational innovation. Due to the positive role of problems identification, changing of cognitive patterns and new actions on organizational innovation, it can be concluded that identification of the problems by the health personnel and their attention to the patients; provision of proper conditions for changing the incorrect behavior, attitudes and mental models of the health personnel by the administration; and the open view of the managers and their desire for cooperation with the health personnel in the solution of the problems lead to an increase in innovation in medical centers. The results of the present study about the dimension of problem identification are in line with those of the study conducted by Lendel and Varmus based on the positive and significant role of identification of problems and provision of ideas and new guidelines by the personnel for the solution of the problems for the increase of innovation in the organization (24). The results of the present study in the dimension of changing of cognitive models are in line with those of the studies of Cegarra-Navarro et al. and Yannopoulos et al. that showed a positive and significant relationship between the change of mental models and cognitive structures of the personnel with organizational innovation (22, 25). Also, the results of the study in the dimension of new actions are in line with those of the studies of Cuevas-Vargas et al; and Sarros et al. that showed the positive and significant role of adaption with new methods, open view of mangers and the supportive role of managers on promotion of organizational innovation (26, 27). On the other hand, the dimensions of knowledge disintegration, knowledge sharing and knowledge elimination as the dimensions of group and organizational processes of unlearning are the positive and significant predictors of organizational innovation. Based on the positive impact of knowledge disintegration on organizational innovation, it is concluded that identification of old knowledge and providing new ideas by the health personnel will result in an increase in innovation in the above centers. The study carried out by Antonacopoulou et al. also confirmed the positive and significant role of knowledge disintegration on increase in the organizational innovation and improvement of organizational performance (28). Also, based on the positive role of knowledge sharing on organizational innovation, it can be said that the transfer of knowledge from an individual to the people of hospital departments and to the whole hospital being

commonplace of knowledge sharing in the medical centers will result in the promotion of innovation in these centers. The studies done by Atif and Bilal; Ghorbani et al.; and Radaelli et al. also emphasize the positive and significant role of knowledge sharing on strengthening the organizational innovation (29-31).

Finally, due to the positive role of knowledge elimination on organizational innovation, it is concluded that the supportive and supervisory role of the hospital administrators for elimination of obsolete knowledge?? in medical centers will result in innovation enhancement in these centers. Studies done by Leal Rodriguez et al. and Huang et al. also confirm the positive and significant role of knowledge elimination and supportive role of managers in elimination of useless knowledge for improving organizational innovation (32, 33).

Conclusion

In this study, it was found that antecedents and processes of unlearning play an important role in the prediction of organizational innovation in medical centers in Hamedan. Thus, it is suggested that hospital administrators based on the effect of each factor on innovation in the educational centers should support the health personnel and provide the proper conditions for change, unlearning and finally increasing and promotion of innovation in the mentioned centers. For example, since crisis leads to reduction of innovation in the hospital, administrators should prepare the health personnel for facing crisis and provide them with necessary trainings for dealing with critical conditions. On the other hand, with training courses in the field of the duties and occupational responsibilities of the health personnel and supporting them in the provision of new and innovative ideas will help the strengthening of innovation in these centers. The health personnel should be aware of different medical errors that happen in a hospital, so such awareness lessens the repetition of those errors and as a result the innovation in the hospitals will be increased. On the other hand, people should be informed about the results of the changes and administrators should prepare the conditions for the acceptance of change in the hospital. In fact, changes should become acceptable by specific patterns and processes, proper planning and correct timing for the health personnel. On the other hand, the authorities should help the health personnel to identify the problems and find their solutions and provide the conditions for them in a way that they become responsible toward their duties and be satisfied of their working conditions so that

they can play a role in the promotion of innovation in their hospitals. For promoting innovation in any organization including hospitals, it is necessary that managers look through a positive and open view for the changes and new ideas. Finally, it is necessary that managers of the hospitals provide a space by their behavior so that the health personnel including doctors, nurses, midwives, experts and even patients easily share their knowledge and use the knowledge of other personnel. On the other hand, proper context for unlearning should be provided in those centers so that individuals identify the old knowledge and put it aside and play an important role in promotion of innovation in the teaching hospitals.

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