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EFFECTIVENESS OF SAFE PATIENT HANDLING INTERVENTION ON MUSCULOSKELETAL DISORDER AMONG GOVERNMENT NURSES IN ELDERLY CARE HOMES WEST COAST MALAYSIA: STUDY PROTOCOL

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ABSTRACT

Background: Health care worker are susceptible to develop musculoskeletal disorder (MSD). Nurses in nursing home setting exposed with physical and psychological stressors and they are prone to develop MSD due to these conditions (Simon et al., 2008). Manual handling while handling elderly patient involved awkward posture which lead to MSD among nurses. Therefore safe patient handling intervention is important in reducing prevalence of MSD among nurses.

Materials and Methods: The cluster pre-test and post-test with control group quasi experimental study will be done involving 8 government elderly care homes in West Coast Malaysia. Total 256 nurses and assistant nurses will be involved in this study. Four home care will be in the intervention group. While another 4 home care will be in the control group. Safe patient handling intervention program will be conducted. During health education, health belief model theory will be used to increase the knowledge and subsequently change the practice to safe patient handling.

Result: Prior to intervention program, module intervention and health education material will be developed. The health education and training will be given according to module provided. Outcome measurements are musculoskeletal disorder, knowledge and practice of safe patient handling. These outcomes will be measured through self- administered questionnaires. Data will be analysed using SPSS version 22. To measure the association, Chi-square test, Mann Whitney U test, independent t test, dependent t test and Wilcoxon signed rank test will be used and for multivariate analysis, the Generalized Estimating Equation (GEE) will be used.

Conclusion: Health education on safe patient handling is important in order to reduce the MSD among nurses in elderly care homes.

Keywords: Safe patient handling intervention, musculoskeletal disorder, nurses, elderly care home

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1.0 Introduction

1.1 Backgound

Musculoskeletal disorder (MSD) affected all type of occupations and workers in health care among the susceptible group to develop MSD (Amin, Nordin, Fatt, Noah, & Oxley, 2014; Hou & Shiao, 2006; Reed, Battistutta, Young, & Newman, 2014). Now days, Malaysia is facing an increase burden of elderly services as Malaysia becoming aging population (Tengku Azian, 2015). Same goes with the services in elderly care homes where the numbers of care homes increasing in 5 years duration. The numbers of government elderly care homes increased from 11 to 14 homes in year 2011 till 2016 (Department of social welfare, 2016). Nurses in nursing homes also prone to develop MSD as their work tasks are physically demand tasks and it involve manual handling while assisting the elderly resident (Kim et al., 2010; Feng, Chen, & Mao, 2007). Prolonged exposures of manual handling lead to consequences of MSD which are the workers need to seek treatment and get sick leave. Nurses among the highest worker that need sick leave due to MSD complaints (53%) followed by doctors (12.1%) and 9.1% of support staff (Emmanuel et al., 2012).

Many studies have shown that evidence base of safe patient handling program is proven to reduce the MSD among the nurses (Nelson et al., 2006; Nelson, 2008 & Folami, 2010). Health education intervention base on health belief model theory important to increase the knowledge and change the practice toward safe patient handling among nurses (Stevens, Rees, Lamb & Dalsing, 2013 & Caspi et al., 2013). Many studies on safe patient handling intervention have been done among nurses in hospital (Chancai et al., 2016; Salah, Mahdy & Mohamed, 2012; Steven et al., 2013,). However only several intervention studies done in nursing homes setting (Kamioka et al., 2011; Rasmussen, Holtermann, Mortensen, Sogaard & Jorgensen, 2013). In Malaysia, none intervention study of safe patient handling has been done among nurses in hospital as well as elderly care home setting. According to (Collins, Nelson & Sublet, 2006, Nelson, 2008 and Tullar et al, 2010) intervention on manual handling technique alone was ineffective to reduce MSD among nurses. Therefore multidimensional strategies of safe patient handling intervention are needed (Dawson et al., 2007; Nelson, 2008 & Tullar et al., 2010). Multifactorial approaches included patient & device assessment, protocol of safe patient handling, algorithm of handling patient (Nelson et al., 2008). Many multi-faceted intervention studies not base on theory even they were trying to change the behaviour of nurses (Black, Shah, Busch, Metcalfe & Lim, 2011; Nelson et al., 2006 & Steven et al., 2013).

1.2 Research questions

What is the effect health education of safe patient handling on MSD, knowledge, practice and health belief model construct within both intervention and control group at baseline and 6 months post intervention.

1.3 Objectives

The primary objective is to develop, implement and evaluate the effectiveness of health belief model (HBM) based educational intervention on the safe patient handling among nurses at

government elderly care home in West Coast Malaysia. The secondary objectives are to compare the proportion of MSD, the level of knowledge and practice safe patient handling, the health belief model constructs (perceived benefit, perceived barriers, perceived severity, perceived susceptibility, self-efficacy and cues of action) between and within both intervention and control group at baseline and after 6 months of intervention.

1.4 Theoretical framework for health education

For this study the intervention program will be conducted according to health belief model (HBM) in order to change the behaviour to implement the safe patient handling in their daily practice (Edward, S., 2012 & Sharafkhani, Khorsandi, Shamsi, Ranjbaran, 2014). The HBM is widely used in health intervention program as it explained the reason on why the people take action to prevent & control disease by addressing the relationship between person belief and behaviour (Glanz & Viswanath, 2008). Same goes to health promotion in workplace. Study by Edward (2012) found that the strongest predictor in the program of manual handling intervention are the perceived benefit and perceived barrier. There are five main constructs in health belief model. The construct are perceived susceptibility, perceived severity, perceived barrier, cues of action and self-efficacy.

2.0 Materials and Methods

2.1 Study location

In all over Malaysia, there are 14 government elderly care homes. The study will be conducted in West Coast Malaysia and eight elderly care homes will involve in this study. The home cares are Rumah Seri Kenangan Kangar Perlis, Rumah Seri Kenangan Bedong Kedah, Rumah Seri Kenangan Taiping Perak, Rumah Seri Kenangan Ulu Kinta Perak, Rumah Seri Kenangan Cheras Selangor, Rumah Ehsan Kuala Kubu Bharu, Rumah Seri Kenangan Cheng Melaka and Rumah Seri Kenanagan Johor Bharu. These locations are selected as more than 50% home care in Malaysia are located in west coast area and majority of the dependent residents are in the Rumah Sri Kenangan Uu Kinta, Rumah Seri Kenangan Bedong Kedah and Perak.Rumah Ehsan Kuala Kubu Bharu.

2.2 Study design

For clinical intervention research, the randomized control trial is considered as gold standard. However for introduction of control group that not receiving any intervention in workplace setting can hamper the implementation by organization (Rasmussen et al, 2013). Therefore in this study the cluster pre-test and post-test with control group quasi experimental study design will be used because of practical and logistical reason. There are only one elderly care home located in each state with total 8 elderly care homes in West Coast Malaysia except for Selangor. There are two elderly care home in Selangor which is Rumah Ehsan Kuala Kubu Bharu and Rumah Seri Kenangan (RSK) Cheras. After discussion with Headquarters Welfare Department Putrajaya, the intervention is easier to be held in RSK Cheras. RSK Cheras is known as an excellent centre for elderly care in Malaysia and better to include the RSK Cheras in the intervention group. The facilities for elderly including the room for training on

staff is well complete as compared to other RSK. The RSK Melaka, Rumah Ehsan Kuala Kubu Bharu and RSK Ulu Kinta are selected for another intervention group because it located near to RSK Cheras. If the staff is invited to RSK Cheras to attend the course, staff from RSK Melaka, Rumah Ehsan Kuala Kubu Bharu and RSK Ulu Kinta are able to come and going back in the same day due to short distance journey as compared to other RSK where they need to leave their work at least 2 days to attend the course and it will disrupt their services to the elderly during the course period. The training course need to be done every week for 8 weeks and they cannot bear with the service disruption for long distance journey. That is why quasi experimental is chosen for this study. Even this is quasi experimental study, the internal validity still take into account in the quality control. This study will measure the outcome of musculoskeletal disorder (MSD) prevalence, knowledge and practice on safe patient handling between control and intervention group. The result will be compared between before and 6 month after intervention to look for effectiveness of the intervention.

2.3 Study population

Nurses will be the participant in this study. A total 296 nurses and assistant nurses in eight elderly care homes. They are chosen as their daily work involve in handling and taking care of elderly. This work tasks predispose them to develop musculoskeletal disorder. Eligible participants are the permanent or temporary nurses who have been working and handling elderly more than 1 year duration. The exclusion criteria to the study are unwillingness to participate in the study, nurses who are in training, long leave or in medical leave, pregnant, who had MSD symptoms due to trauma or accident and having rheumatological diseases or spine diseases diagnosed by doctor.

2.4 Recruitment of the study population

The first contact with headquarters of Social Welfare Department Putrajaya was established by doing a meeting with director and assistant director of elderly unit in Social Welfare Department Putrajaya. The objectives and the benefits of the study have been explained to them. The list names of the elderly care homes and nurses is gathered from this elderly unit. Subsequently a meeting is done with director of each elderly care homes involve in the study and content activities of the project is described in overall term. The possibility of enrolment in the study is discussed.

After the formal collaboration has been done with the elderly unit in Social Welfare Department Putrajaya and elderly care homes, the control and intervention group is divided according to clustering sampling of geographical location from north to south. The intervention group include the nurses from Rumah Ehsan Kuala Kubu Bharu, Rumah Seri Kenangan Cheras Selangor, Rumah Seri Kenangan Ulu Kinta Perak and Rumah Seri Kenanagan Cheng Melaka while nurses from Rumah Seri Kenangan Kangar Perlis, Rumah Seri Kenangan Bedong Kedah, Rumah Seri Kenangan Taiping Perak and Rumah Seri Kenangan Johor Bharu will be in the control group as shown in figure 1. A total 256 nurses will be involve in the study.

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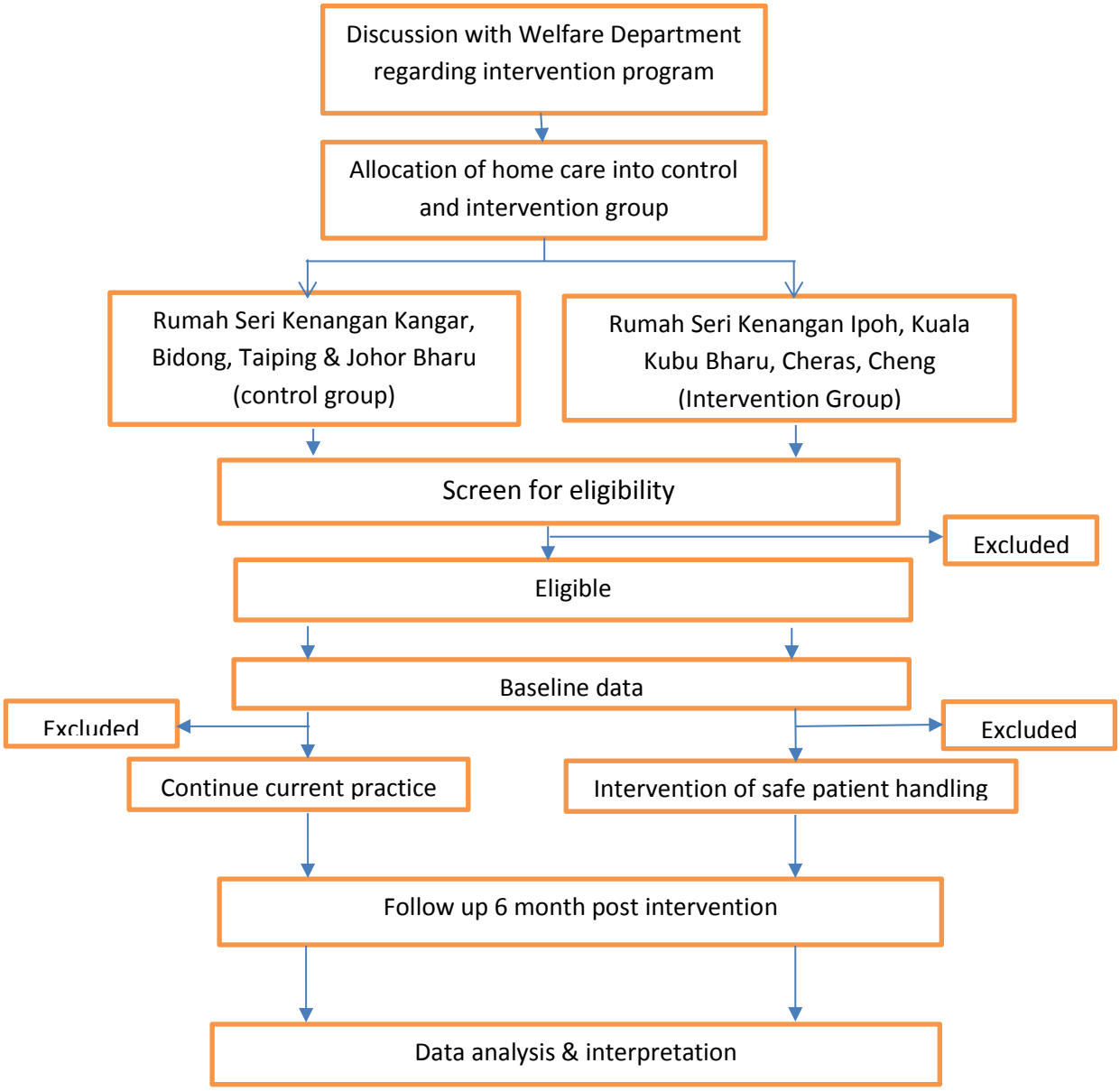

Figure 1: Diagram for participant recruitment

2.5 Inclusion and exclusion criteria of respondent

2.5.1 Inclusion criteria

The nurses is a Malaysian, permanent or temporary staff who had been working more than 12 month duration and directly manage the elderly residents.

2.5.2 Exclusion criteria

The nurse who are pregnant, long leave, medical leave, having spine or rheumatologic diseases or who are having MSD symptoms due trauma or accident.

2.6 Sample size calculation

For sample size calculation is calculated by using two proportions formula hypothesis testing by Lwanga and Lemeshow (1991). The sample size calculated for proportion of low back pain (Chancai et al., 2015). The standard error associated with 95% confidence interval was 1.96, a power of 0.80 and intracluster correlation coefficient of 0.05 (Rasmussen et al, 2013). Therefore the design effect for cluster sampling is 2.6. With the drop-out rate 20% and 90% respondent eligibility, the total sample size will be 232 participants with minimum cluster is 7 cluster. However 8 clusters will be involved with sample size 256 participants. Four cluster will be in intervention group and another 4 cluster will be in control group.

2.7 Data collection method

The instrument will be used is a self-administered questionnaire that consists of 6 sections. The sections are section A: socio-Demographic factors, section B: individual (BMI status, exercise, smoking habit), section C: work condition (job title, work shift, duration of service, duration of work per week, and equipment devices)**,** section D: musculoskeletal disorder symptoms, section E: knowledge of safe patient handling, practice of safe patient handling, section F: perception on safe patient handling according to health belief model construct (perceived susceptibility, perceived severity, perceived barrier, cues an action, self-efficacy and psychological factors). The questionnaire will be distributed for baseline before intervention and 6 month post intervention.

2.8 Analysis plan

The musculoskeletal disorder will be measured as primary outcome. The knowledge and practice of safe patient handling will be measured as secondary outcomes. Data will be analysed on descriptive and inferential statistic using SPSS version 22. Analyses regarding effectiveness of intervention towards of primary outcomes and secondary outcomes will be performed after six month of intervention. For bivariate analysis, the chi square test for between group and Mc Nemar's test for within group analysis will be used to analyse categorical data such as MSD symptom. The independent t test for between group and paired t test for within group analysis will be used to analyse continuous data such as knowledge, practice of safe patient handling and HBM construct.

For multivariate analysis, generalized linear model of Generalized Estimating Equation (GEE) will be used. The GEE able to analyse the interaction effect of within and between group for all the continuous and categorical dependent variable. The character of GEE is it able to control and adjust the covariate and clustering effect of the nurses in each home care. The clustering effect and interaction of intervention over times is the main effect in cluster design (Edre, Hayati, Salmiah, Sharifah & Azmi, 2016).

2.9 Quality control

2.9.1 Content validity

Expert person in the field will assess the content of the questionnaire and module intervention. The expert person are supervisor and co-supervisors from occupational safety and health division, physiotherapist and nursesnin elderly care home. Content validity ratio for each question is calculated using formula, CVR = (2ng / N) – 1 and the value would be lied between -1.00 to +1.00. For the content of intervention module, patient education materials assessment tool (PEMAT) and user guide will be used. The expert in the field with end user which is nurses involve in content validity of module.

2.9.2 Face validity

Face validity will be assessed by expertise in occupational safety and health and lay person. They will go through all the questions and look into construct of the questions. Pre testing of the questionnaire will be done among 30 nurses in Desa Bina Diri Mersing, Johor.

2.9.3 Internal validity

As this is quasi-experimental study, several steps will be taken to control internal validity such as history effect, instrumentation, statistical regression, testing effect, contamination design, selection bias and experimental mortality.

2.9.4 Reliability of questionnaire

For reliability of the questionnaire, it will be validated through 30 nurses in Desa Bina Diri Mersing, Johor. Cronbach alpha for likert scale will be calculated to look internal consistency of the question.The test re-test of the questionnaire will be done in two weeks apart to look into temporal stability of the questions.

2.10 Operational definition

2.10.1 Musculoskeletal disorder

It is define as symptoms of pain, numbness, tingling, aching, stiffness, or burning for at least one day duration. The intensity of symptoms is at least moderate or score at 3 base on 5 point pain scale. It is also consider as MSD if the nurses need to get treatment or sick leave even the symptoms less than 3 score (Alexopaulos et al, 2006 & Amin et al, 2014).

2.10.2 Knowledge of safe patient handling

The knowledge will be assessed via 15 questions regarding the information of safe patient handling. There will be a total 26 scores and it will be analysed via GEE to look into improvement intervention after 6 intervention.

2.10.3 Practice of safe patient handling

The practice will be assessed via 9 questions through their frequency of practicing safe patient handling. The answer will be given through likert scale of 'none, rare, sometimes, often and always'. There will be a total 36 scores for each respondent and it will be analysed via GEE to look into improvement intervention after 6 intervention.

3.0 Intervention strategies

3.0.1 Intervention module development

Studying the relevant literature and consulting the expert in occupational safety and health especially in ergonomic field is conducted to identify the current practice of safe patient handling. Study on the musculoskeletal disorder among elderly care homes workers has been conducted to identify the predictor of MSD among the workers (Eriyani & Azuhairi, 2016). Work place visit at elderly care homes also has been conducted prior to intervention development to identify current practice and barrier on practicing the safe patient handling among the workers. The health education given according health belief model as being discussed in the theoretical concept before.

Training module will be given to every peer leader who involve in the training programme and module also will be distributed to each hostel in elderly home care where the elderly staying in. The purpose of the module is for their references whenever the peer leader plan to do training in the future. The module consist of general information on the training such as introduction on musculoskeletal disorder and safe patient handling, importance of safe patient handling, principal of safe patient handling and practical session on technique of safe patient handling. The module and pamphlet is designed with text and pictures to improve their understanding of the information. Video also has been developed for the practical session on safe patient handling. A part from that the health education material will be given in the form of lecture notes and pamphlet as the summary of the information of the module intervention.

3.0.2 Intervention program development

3.0.2.1 Organisation commitment

Prior to intervention development, formal discussion has been done with Welfare Department in Putrajaya. The finding of cross sectional study on prevalence of musculoskeletal disorder among worker in government elderly care homes has been presented. These findings explaining the importance of safe patient handling need to be implemented in their elderly care homes. To obtain the organizational commitment, committee in each elderly care homes willbe formed. The committee consist of chairman (the director of the home cares), researcher, local therapist (occupational therapist and physiotherapist as coordinator) and supervisor of the nurses. The committee will ensure the intervention is implemented in elderly care home.

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To increase awareness of the committee, several weeks before implementation, the researcher will sit together with the committee members and discuss on the implementation plan. During the meeting the intervention module on safe patient handling will be introduced to the member. The benefit and the purpose of the intervention will be explained to the committee members.

3.0.2.2 Unit based peer leaders

In each ward the peer leader will be appointed. The peer leader will be selected among the nurses where they are working together and not base on hierarchical relationship. They will receive the training of safe patient handling before other nurses attend the course. In the course, the importance and benefit of the intervention will be emphasized to them. This peer leader will play a role as worker ambassador by motivating the colleagues to participate in the study. They will also do monitoring to ensure the continuity of the implementation.

3.0.2.3 Implementation of intervention (education phase)

The duration of education will be held for 2 months and follow up post intervention will be done after 6 month. The health education will be given according to the module intervention. The informations on musculoskeletal disorder and safe patient handling will be covered in health talk which will be held for 4 hours duration followed by 4 hours of practical session. The informations including burden on MSD among nurses, anatomy and body mechanic principal, pathophysiology of disorder and injuries, consequence of MSD towards the workers, ergonomic equipment assessment, patient handling assessment criteria and guidelines on safe patient handling. To change the practice on safe patient handling, the practical session will be included. Video on the task on lifting and transferring patient with correct technique and equipment will be provided. Hands on session will be done for each respondent who attended the course.

3.0.2.4 Maintenance phase and monitoring of intervention program

Activities to sustain the implementation is very crucial. To get compliance from the worker is challenging especially among low educated worker (Rasmussen et al, 2013). Cooperation from employee and support from organization is very important. The nurse must have sense of ownership in this intervention program. Therefore supervisor and peer leader play an important role. They need to encourage the nurses to implement all the knowledge that had been given in the training. Project coordinator, supervisor and peer leader will meet at least once a month to identify any obstacles and find the solutions. Therefore the intervention will be implemented smoothly. Monitoring will be done by filling up the log book. It will be done by peer leader and they need to fill up this book every day. The peer leader also need to do video recording while they are handling the elderly and send to project coordinator as a proof.

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4.0 Discussion

As compared to the other type of health care worker, nurses among the highest group to developed musculoskeletal disorder (Yasobant & Rajkumar, 2014). Many studies have shown that nurses who worked as assistant nurse among the most affected with MSD as they had more time in handling elderly such as lifting, transferring, assisting in dressing or bath activities (Eriyani et al., 2016; Pompeii, Lipscomb, Schoenfisch & Dement, 2009; Smith et al., 2006). Managing the elderly involved with manual handling tasks (Alexopoulos, Burdorf, Kalokerinou, 2006; Dockrell, Johnson, Ganly, & Bennett, 2011; Elin, Hanneke, herald, Miedema & Alex, 2012 & Feng et al., 2007,). Therefore safe patient handling intervention very important and it needs changing in work culture (Janet M.L, 2014 & Nelson. et al., 2006). Many studies has shown that safe patient handling intervention able to reduce MSD and musculoskeletal injuries among worker in elderly home (Jensen et al.,2006; Flomi, F., 2010; Black et al, 2011; Salah, Mahdy & Mohamed et al, 2012; Steven et al., 2013; Caspi, E.C. et al., 2013; Rasmussen et al., 2015 & Chanchai, 2016).

Study design that will used in this study is cluster pre-test and post-test with control group quasi experimental study design. For the work place intervention study, cluster study design is the best option because this safe patient handling practice need to get full cooperation from all staff while handling the elderly. Therefore all nurses in the elderly care home need to practice the intervention with the knowledge given. Quasi experimental is chosen for the technical reason while implementing the health education course among the nurses.

The primary objective in this intervention program is to develop, implement and evaluate the effectiveness of health belief model (HBM) based educational intervention on the safe patient handling among elderly care home nurses. HBM consist construct of perceived susceptible, perceived benefit, perceived severity, perceived barrier, cues of action and self-efficacy. These constructs are explaining on how the people taking action to prevent and control the diseases (Glanz, Rimer & Viswanath, 2008). Factors associated with safe patient handling intervention include behavioural change, engineering control and administrative control. It is expected that these approaches will be effective because the evidence base practice integrated with technology and safety component is highly recommended to ensure the effectiveness of the intervention (Janet M.L, 2014 & Nelson. et al., 2006).

The educational intervention will be done by providing the guideline of safe patient handling. The training on the correct technique on handling elderly and using the appropriate ergonomic devices is according to the guideline provided. The education will be based on health belief model in order to change behaviour towards safe patient handling as explained before. The aimed is to increase the knowledge and practice of safe patient handling. For administrative control, management commitment is the pre requisite to ensure the successful of workplace intervention program (Work Safe Alberta, 2016). The main roles of organization are to develop safe patient handling team and also guideline safe patient handling, give training to the staff as well as monitoring of the implementation. All these elements must be incorporated to manage nurse's working behavior toward safety climate in work place (Lee, Faucett, Marion, Niklas, & Lynette, 2010). Engineering control need to be in place in safe patient handling intervention program. A study had proven that nurses whom attended ergonomic program had reduced in lost workdays by 86.7% (RR = 0.16, 95% CI [0.13, 0.18], $p<0.001$), workers compensation also reduced by 96.6% (RR = 0.12, 95% CI =0.09-0.15, $p < .001$) and

patient handling injuries came down to 59.8% (RR = 0.36, 95% CI [0.28, 0.49], p < 0.001 (Garg, & Kapellusch, 2012). In order to reduce musculoskeletal disorder and also injuries among nurses, the key component is to use the appropriate devices while lifting and transferring the patient (OSHA, 2009). The devices can be divided into small transfer aid such as transfer board, gait belt and slide sheet as well as mechanical lifting device.

5.0 Conclusion

Safe patient handling intervention is very important in order to reduce musculoskeletal disorder among nurses in elderly care home. In the effort to reduce the MSD among nurses, single intervention program had not improved the conditions. Multi component of intervention is needed. The components of intervention are training on the safe patient handling, involvement of correct devices in handing elderly patient, assessment of elderly and devices using algorithm, peer leader and supervisor support to implement the program. The knowledge is given via health education using health belief model theory. The behaviour theory will incorporate the concept of behaviour changes and informed practice. Theory grounded intervention program is important to change the behaviour of the nurses. Training for the correct technique on safe patient handling is given via video presentation and practical session to apply the correct technique. This study also able to assess the successful of the program as it compare the behaviour changes on safe patient handling intervention in intervention and control group. To ensure the sustainability of this intervention program, supervision from supervisor and involvement from peer leader to implement the program will applied in the monitoring phase.

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Declaration

The authors declare that:

i. The article mentioned above has not been published or submitted for publication in any other journal.
ii. We also declare that the authorship of this article will not be contested by anyone whose name is not listed here.

iii. We deck that we contributed significantly towards the research study ie, conception, design, analysis and interpretation of data and to drafting of the article or revising it critically for important intellectual content.
iv. There is no conflict of interest on this article

Author's contribution

Author 1: Carried out the research, analyse the data and prepare draft of manuscript.
Author 2: Supervised the research, data analysis and, edited draft and final of manuscript.
Author 3: supervised in this research.
Author 4: supervised in this research.
Author 5: supervised in this research.

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