

Participatory Ergonomic Improvement in Nursing Home

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Abstract: The number of nursing home has increased largely in Japan since 1990. The Long-term Care Insurance in 2000 has accelerated the increase of nursing homes. The care giving and cooking in nursing homes have high risk factors of muscle-skeletal diseases (MSDs). However, the working conditions have not yet been improved. Thus, the incidence of low back pain and cervico-brachial disorder is very high among the care workers and cooks. Therefore, it is important to prevent the MSDs among the care workers and cooks. This study has been conducted to make a model of the participatory improvement focusing on low back pain in a nursing home for three years. As a result of the study, many improvements have been implemented and the incidence of low back pain has been reduced.

Key words: Nursing home, Low back pain, Ergonomics, Improvement, Participation

Introduction

In Japan the aged population is increasing at a rapid rate. In 2000, 17.4% of the Japanese population was over 65 years old. (22.04 million). The ration is estimated to increase to 27.8% (34.56 million) in 2020. The ration of the persons who need care in the older is estimated about 10%. The number of nursing homes has increased largely since the 1990s¹⁾. The Long-term Care Insurance in 2000 has accelerated the increase of nursing homes. About 540,000 care workers (matrons, nurses, etc) worked in nursing homes, hospitals, etc in 2001¹⁾. About 82,000 cooks work in nursing homes, hospitals, etc. They have health problem of muscle skeletal diseases (MSDs). The care giving and cooking in the nursing home have high risk factors of MSDs. The care working includes work with 1) manual material handling, 2) bending posture, and 3) mental stress etc. The cooking also involves 1) manual material handling and 2) bending posture. However, the working conditions have not yet been improved sufficiently. The incidence of low back pain and cervico-brachial disorders (CBDs) is very high among the caregivers and cooks. Therefore, it is important to prevent

the MSDs among these workers. This study is conducted to make a model of the participatory ergonomic improvement of working conditions focusing on low back pain in the nursing home for three years.

Methods

We have conducted an ergonomic project in a middle size nursing home for 3 yr. We have applied a participatory ergonomic improvement model, implemented by a small working group, and focusing on practical, simple, low-cost measures. The purpose of the project is to plan and implement ergonomic measures to prevent mainly work-related low back pain from occurring in the workers in this home. This home has about 117 staff members, including 67 care workers, 13 cooks, 10 nurses, and others. When we started this project, the prevalence of low back pain was very high among care workers and cooking staffs. Therefore, we were asked to plan and implement ergonomic measures.

This project has 4 steps to improve work conditions. In the 1st step, first the author conducted a 2 h meeting in the April 2002 to educate all staff members on; 1) the main cause of low back pain, 2) main practical ergonomic principles to reduce low back pain, 3) examples of improvement, etc. Before the meeting, the author asked

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Table 1. Education program

a) The structure and function of the low back.
b) The main causes of low back pain in the workplace.
1) The handling of heavy materials.
2) Poor low back posture: i.e. bending forward, squatting, and bending backward and sideways.
3) Sitting in a restricted posture for long periods of time.
4) Vibration of the whole body, etc.
c) The main practical ergonomic principles to reduce low back pain:
1) Reduce the load of heavy materials handled.
- Minimize the transport and handling of heavy materials.
- Minimize heavy lifting and improve its efficiency.
- Change heavy materials to lighter ones.
- Use carts/put wheels on containers and equipment.
- Move materials at working height.
- Use mechanical aids for more efficient and safer lifting.
2) Reduce the load being handled while bending forward and/or squatting.
- Change work height (height of work or worker) to work at elbow height.
- Keep working position close to a body.
- Use a chair for work rather than a bending posture.
- Place materials in special storage units, not on the floor.
- Use multi-level racks.
- Use mechanical aids to avoid a bending posture.
d) Prioritizing the ergonomic measures.
- Focus on practical, simple, low-cost improvement.
e) Information on example of improvements.
- Provide examples of improvements made in other workplaces.
f) Method of evaluating the improvements.
- Provide a simple method of self-evaluation.
g) Group work and participation.
- Educate the necessity of group discussion of improvement actions.
- Facilitate workers in making the improvements by themselves.
- Present their proposals and improvements to their department.

the secretary-general to prepare a few photographs depicted the heavy work burdening the low back, which the nursing home staffs selected. The author showed the pictures and explained the reason why the works were a burden to the low back. The lecture and the pictures of the workplace motivated the staffs to improve the workplace condition.

After the first meeting, we continued to reeducate the staffs in small meetings during the monthly patrol.

In the 2nd step, high-risk works were thoroughly checked by small working groups from October 2002 to April 2003. The group members consist of roughly 10 persons selected from 5 departments of the nursing home, the cooks, the care workers for the heavily and lightly disabled persons, the day shift care workers, and the nurses. The occupational physician, the secretary-general and the director became the

advisers for the groups. They discussed high risk works involved in their departments, and took pictures of the high-risk works that caused low back pain. Thereafter, the meeting developed into an official safety and health meeting and has been held every month since April 2005. In the 3rd step, the prevalence of low back pain was investigated by a low back examination between Autumn 2002 and Autumn 2004. The examination includes tests on tenderness, pain on movement, leg straight rising test, distance between finger tip and floor, back power, sensory test, reflex of patella and Achilles tendon, etc. In the 4th step, the small working groups have discussed and conducted improvements at the workplace in earnest from July 2003 to September 2004. Before conducting the improvements in earnest, we held a participatory ergonomic improvement meeting in the nursing home in May 2003 to train the staffs for the improvement. We invited a group including doctors, nurses, hygienists and others working in hospitals experienced in participatory improvements. These members helped train the staff members to work in groups towards an improvement of the work condition. The staffs attended the workplace patrol and the group discussion. At first, the project only promoted the participatory improvement in the cook work, but soon, the improvements spread to the care work.

Results

The small group selected the high-risk work for low back pain focusing on the following criteria: 1) handling heavy material over 12 kg for women, or 24 kg for men, or 2) static bending or squatting posture over 30 degrees of angle from vertical line, or 3) both handling material and static bending/ squatting posture work.

In the care work, the high-risk tasks are as follows: 1) transferring patients between a washing-body stretcher and a bed (Fig. 1), 2) transferring patients between a wheelchair and a bed in a narrow area (Fig. 2), 3) transferring patients between a wheelchair and a bed in a spacious area (Fig. 3), 4) washing patient's body in a bending posture (Fig. 4), and 5) pushing two wheelchairs in a bending posture (Fig. 5), etc.

In cooking, high-risk tasks are as follows: 1) washing vegetables in a bending posture (Fig. 6), 2) handling a heavy rice-cooker (Fig. 7), 3) mixing side dish in a bowl in a high position (Fig. 8), 4) a bad arrangement of a sink and a dishwasher (Fig. 9), etc.

In Fig. 5, all patients go together to the dining room at once at meal time. A care worker pushes two wheelchairs at once to transfer the patients speedily.

In Fig. 9, the place to return dishes is too far from the sink to return them easily. The sink is so deep that workers have to wash dishes in a bending posture. The sink is separated into two parts, and they are not directly connected



Fig. 1. Transferring a patient between a washing-body stretcher and a bed.



Fig. 2. Transferring a patient between a wheelchair and a bed in a narrow area.



Fig. 3. Transferring a patient between a wheelchair and a bed in a spacious area.



Fig. 4. Washing patient's body in a bending posture.



Fig. 5. Pushing two wheelchairs in a bending posture.



Fig. 6. Washing vegetables in a bending posture.

with the dishwasher. Therefore, they transfer the dishes from the first sink to the second one and then from the second sink to the dishwasher.

For 3 yr, many improvements have been conducted at the workplace. Figures 10–15 show the main improvements.

Figure 10 shows the improvement in transferring patients between a wheelchair and a bed in a small place. By using a sliding board, the load of lifting patients is reduced.

Figure 11 shows the improvement in transferring patients between a wheelchair and a bed in the spacious place. By



Fig. 7. Handling a heavy rice-cooker.



Fig. 10. Improvement in transferring patients by using a sliding board.



Fig. 8. Mixing side dish in a bowl in a high position.



Fig. 11. Improvement in transferring patients by using a care lift.



Fig. 9. A bad arrangement of a sink and a dishwasher.

using a care lift, the load of lifting patients is reduced.

Figure 12 shows the improvement in body washing. By using knee pads, the bending posture is changed to a kneeling posture. The low back load is reduced.

Figure 13 shows the improvement in washing vegetables. By making a washing plate, and putting it in the sink, the work height in washing is raised and the workers' posture



Fig. 12. Improvement in the bending posture while washing a patient's body by using knee pads.

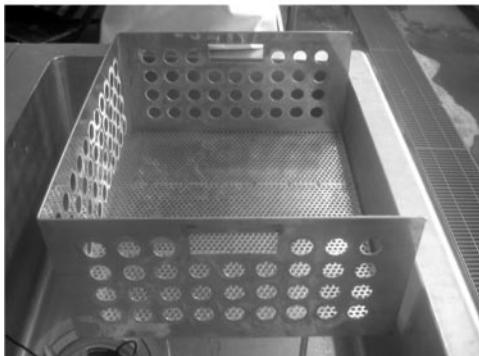


Fig. 13. Improvement in workers' posture while washing vegetables by using a washing plate.

is improved.

Figure 14 shows the improvement in mixing food. By cutting the stove legs by 7 cm and lowering the stove, the working height in mixing is lowered, and the shoulder load and the low back load by leaning backward is reduced.

Figure 15 shows the improvement of the returning dish sink. By shortening the distance between the place to return dishes and the sink, the patients can return the dishes into three boxes (dishes, bowls and teacups) in the sink. Thereby, the load coming from a bending posture when picking the dishes from the sink bottom to sort them out is reduced. By shallowing the depth of the sink, the posture while washing is improved. By using boxes, the transferring of the dishes becomes easier than before. The separated two sinks are



Fig. 14. Improvement in mixing food by cutting the stove legs by 7 cm and lowering the stove.



Fig. 15. Improvement of the returning dish sink. Before improvement (top)—the sink is separated into two parts and are not directly connected to the dishwasher. After improvement (bottom) two separated sink is connected into one and the end of the sink is connected to the dishwasher.

Table 2. Change of the grade of low back pain in 3-yr examination from 2002 to 2004.

2002	No.	0	I	II	III
Care W	57	25 (43.9)	19 (33.3)	7 (12.3)	6 (10.5)
Cook	13	9 (69.2)	4 (30.8)	–	–
Total	70	34 (48.5)	23 (32.9)	7 (10.0)	6 (8.6)
2003	No.	0	I	II	III
Care W	60	27 (45.0)	22 (36.7)	8 (13.3)	3 (5.0)
Cook	13	11 (84.6)	2 (15.4)	–	–
Total	73	38 (52.1)	24 (32.9)	8 (11.0)	3 (4.1)
2004	No.	0	I	II	III
Care W	61	46 (75.4)	11 (18.0)	4 (6.6)	–
Cook	12	12 (100)	–	–	–
Total	73	58 (80.2)	11 (14.5)	4 (5.5)	–

Care W: Care worker, (%).

connected into one sink, and are directly connected to the dishwasher. The cooks can slide the boxes close to the dishwasher without lifting. Thus, the low back load is reduced.

The problem of pushing two wheelchairs at once is solved by using two dining rooms near the patients' rooms. Other improvements are as follows: by using a small chair on a tatami floor, the low back load from the sitting posture on the tatami when advising the patient in his/her house is reduced. By using a high-pressure spray, manual washing of the gratings of the gutter in a squatting posture is reduced.

The problem in transferring the patients between the stretcher for bathing and a bed is not solved. The introduction of an adjusting stretcher is discussed.

These improvements have reduced the prevalence of low back pain. Table 2 shows the change in the grade of low back pain on care workers and cooks in the 3 yr examinations. This table shows the data collected from 64 care workers. Three of them were excluded who were working in a separate branch of the nursing home, starting from 2003. The data collected in each Grade is as follows. Grade I: the subjective complaints of the low back. Grade II: a few tender points in the region of the low back. Grade III: the extensive tender points, symptoms of low back including radiculitis.

From 2003 to 2004, the prevalence of low back pain reduced dramatically in care workers.

Discussions

The care workers and cooks in the nursing home are high-risk group. Since the 1990s, as the aged population increases, the number of nursing homes and the caring and cooking staff working there has increased dramatically. It is reported

that the prevalence rate of the work related low back pain is high in these workers³). However, the measurements for the nursing home have not been conducted sufficiently. Thus, many workers have to retire because of low back pain⁴). Therefore, it is necessary to take countermeasures against work-related diseases in the nursing home.

To solve the problem of low back pain in care workers and cooks, we have applied ergonomic measurements for the nursing home. The ergonomic measurement is the most effective for the work-related diseases in the all. The ergonomic field approach⁵) has been proven to be effective when they focus on: (1) locally-achieved good examples, (2) the multifaced aspects of the existing problem, and (3) the direct participation of local people. In particular, the participatory style has become increasingly important in implementing ergonomic measures in the workplace and other real-world settings.

Based on the above point of view, we applied the participatory improvement method to the health problem in the nursing home, using small groups and focusing on practical, simple, low-cost measures. Since the industrial doctor is responsible for ergonomic measures in this nursing home, the project team formed to deal with this problem was organized with the industrial doctor, nurses, care workers, cooks and the secretary. The project team acted as facilitators, and encouraged the workers to design ergonomic measures.

In order to promote participatory improvements, we stressed that practical, simple, low-cost measures should have priority over all others because the practical and immediately realized improvements stimulated the workers' motivation for improvement⁶⁻⁷). We presented to the workers successful low-cost examples of improvements in other workplaces⁸). In one of those examples, the back support belt was provided for

the workers⁹⁾. It helped them to avoid bending forward, in addition to reducing low back pain.

The other important point to be dealt with in the nursing home is the problem of physical contact, therefore, we discussed with the workers about physical contact with the patients. Some workers think physical contact is very important in caring, thus manual treatments are better than those using mechanical aids. This viewpoint often retards development of some improvements including those with mechanical aids. We think physical contact is important, and this is the biggest difference point between improving working conditions in a care facility and in an industry dealing with materials. However, we think that physical contact is not lost in the improvements. By using mechanical aids, we create the time and opportunity to talk and interact with the patients.

The average numbers of meals provided each day per cook in the 3 yr are as follows; 65.1 (2002), 66.5 (2003) and 66.1 (2004). The numbers are almost the same. Therefore, implementation of the previously mentioned improvements related to cooking, should be considered to reduce the prevalence of low back pain among cooks.

Due to a user increase of the short stay service, the number of care workers increased, by 5 in 2002. From September 2002, the fixed number of care workers has been constant and the number of users has also become stable. Therefore, the implementation of the previously mentioned improvements, related to care work, should be also considered to reduce the prevalence of low back pain among care workers from 2003 to 2004.

Conclusions

We realized that the participatory improvement is effective

to reduce low back pain in a nursing home. We intend to apply this program to other nursing homes.

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