Which work environment challenges are top of mind among eldercare workers and how would they suggest to act upon them in everyday practice? Process evaluation of a workplace health literacy intervention

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ABSTRACT

The purpose of this study was to identify challenges and action plans from 2.497 structured communication sessions between employee and supervisor and to gain insight into the processes of a quasi-experimental stepped wedge clustered intervention, which implemented workplace health literacy for reducing musculoskeletal pain among eldercare workers.

Most challenges concerned staffing (17%), organisation of tasks (15%) and team work (14%). Most action plans concerned communication (18%), team-work (16%) and handling residents (14%). Half of the plans were solved at another level in the organisation than the challenge appeared. Actions planned on the individual level had the highest implementation rate (52%).

The results underline the advantages in considering solutions to work environment and health challenges broadly at all levels in the organisation and the relevance of involving both the employee and the organisation/management in identifying and implementing solutions.

1. Introduction

Currently many high-income countries face a shortage of healthcare workers jeopardizing the capacity to deliver the eldercare needed (Campbell et al., 2013). The demographic shift with increasingly more elderly people, will lead to increased demands on the health care sector, for example with a need of more eldercare workers (Hussain et al., 2012). To uphold the same quality and standard in the healthcare system, it is essential to maintain health professionals in the sector. One way to do that is to prioritize initiatives to improve and adjust the work environment, so it fits the health level of the eligible workforce. Several initiatives have therefore been introduced to try to improve the work environment for the eldercare workers during the past decades in Denmark and other countries (Miranda et al., 2015; Clausen et al., 2012; Aust et al., 2010; Kongstad et al., 2015).

However, despite these efforts, implementation and improvement in work environment and health remains a challenge. While improving individual employee health and resources have proved doable, employee-targeted interventions do not build a work environment that can include less resourced workers such as aging workers or workers with functional limitations (i.e. back pain). Meanwhile organisational level interventions addressing the work environment more systematically have proved hard to implement (Aust et al., 2010; Montano et al., 2014). Also, systemic interventions may address important overall factors, however, everyday challenges with work environment and health for the individual employee may be so diverse, that they cannot be handled from the top down.

Therefore, we developed an intervention that targeted both the individual employees' health situation and their abilities to navigate work environment improvements and the organisational level (targeting management and implementing structured communication between employees and supervisors), that we called a workplace health literacy intervention (Larsen et al., 2015). An effect evaluation showed that the intervention was feasible and that it decreased the overall employees' musculoskeletal pain by 7%, with an accentuated effect among employees with pain levels >3 (on a numeric rating scale from 0 to 10) (Larsen et al., 2019). However, knowledge of what happens during the intervention is crucial to determine why the intervention worked or did

not work (Linnan, 2002; Kristensen, 2005; Oakley et al., 2006). Therefore, what exactly happened from the meetings between employees and supervisors to an improvement in musculoskeletal pain remains to be investigated. The structured communication between employee and supervisor was supposed to address the employee's most current challenge, and therefore, investigating the topics of the communication may give new insights into what types of challenges that are top of mind among eldercare workers.,.

We conducted a quasi-experimental stepped wedge clustered workplace health literacy intervention trial consisting of four elements; 1) a preparation phase, 2) courses, 3) structured communication and 4) maintenance. The aim of the intervention was to increase individual, interpersonal and organisational health literacy and reduce pain and consequences of pain among eldercare workers (see Fig. 1).

The aim of this study is to identify challenges and action plans from the structured communication sessions between employee and supervisor and to gain insight into the processes of the intervention. To illuminate the overall aim of the study we investigated the following research questions:

1) Which work environment challenges do the eldercare workers experience?
2) What solutions (action plans) do employees and their supervisors decide upon to overcome the challenges?
3) Are the action plans founded at the same organisational level as the challenge?
4) What characterize action plans with a high implementation success?

2. Material and methods

This study is based on data from a workplace intervention in nursing homes (Larsen et al., 2015). In short, the intervention aimed to strengthen workplace health literacy (building knowledge, competences and structures for communication and action) to prevent and reduce pain.

The initial part of the intervention was a thorough formative evaluation of each workplace. Based on this, we developed courses tailored to employees and supervisors at each workplace. The courses were based on cognitive behavioural training, and the aim was to build common knowledge about pain management and communication. Furthermore the courses emphasized the participatory approach and allowing the needs and perceptions of each employee to steer the communication sessions. Next step was introducing structured communication regarding work environment and health. Every third week each employee and his/her supervisor met and briefly discussed the work environment and current challenges for the employee and together they identified a plan for action. Information regarding challenges and plans for action were registered on a tablet and uploaded making it possible for the researchers to track challenges and plans for action and thereby

gain knowledge about why and how the intervention worked.

This study focuses on the structured communication between employees and supervisors. This is described further in the section regarding the intervention. The Danish Data Protection Agency (Journal number 2014-38/28350-3) approved the trial. The trial was reported to the local ethical committee (Protocol H-1-2013 FSP) and was conducted in accordance with the Helsinki declaration.

2.1. Study population

Six nursing homes participated in the study and all permanent staff at the nursing homes were part of the intervention and invited to be a part of the evaluation. A total of 509 employees (primarily nurses' aides) participated in the intervention. The six nursing homes were located in the Eastern region of Denmark, in two different municipalities. See Larsen et al., 2019 for further characteristics of the employees enrolled at baseline.

2.2. The intervention

The intervention was conducted as a quasi-experimental stepped wedge cluster trial with six clusters (Larsen et al., 2015). Fig. 1 illustrates the intervention elements (preparation phase, courses and structured communication) and the outcome objectives (short, intermediate and long term).

The first nursing home stepped into the intervention in October 2013 and the last nursing home initiated the intervention in January 2015. Courses were held within the first months and then the structured communication was initiated.

2.3. Structured communication

The purpose of the structured communication was to facilitate flow of information about work environment and health challenges from employees to supervisor and making it possible for supervisors to support employees in handling the challenges. For example by supplying information about opportunities for actions at the workplace. The structured communication had three primary aims: 1) To generate a space where the employee felt comfortable to discuss work and health related challenges, 2) To provide the supervisor with tools for facilitating a constructive communication focused on identifying possible solutions and 3) To identify current work or health challenges for each employee and use knowledge from the courses (step one) to generate a plan for specific, realistic and effective actions. A tablet-based guide was developed and used to facilitate and focus the communication on work environment and health challenges and on identifying solutions. In the structured communication sessions employees were asked to identify their current biggest challenge at work, i.e. a situation or factor during work, that impacted negatively on their health (i.e. for a worker with
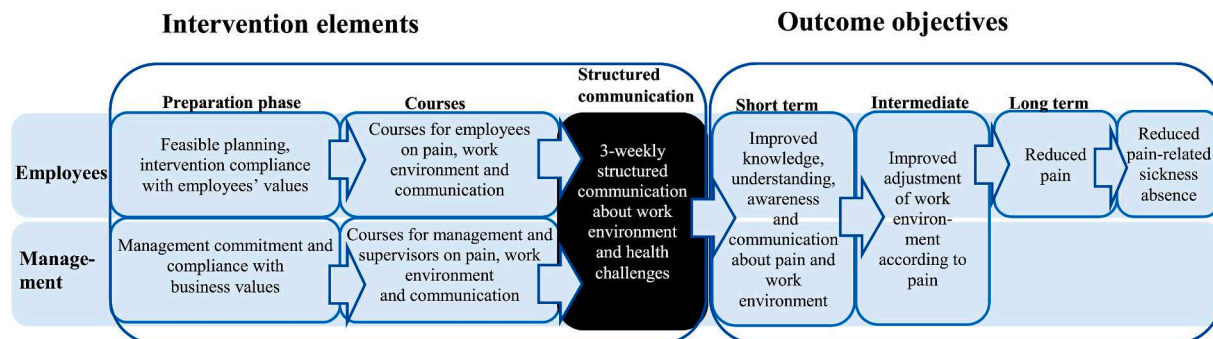

Fig. 1. The program logic of the intervention aiming to reduce pain and pain-related sickness absence. The intervention elements (preparation phase, courses, structured communication (the black box) and the maintenance effect on the short, intermediate and long term outcomes. Since this study focuses on the structured communication this element is highlighted.

back pain a specific situation at work may be perceived a challenge, whereas for a worker without pain the same work situation may not be considered a challenge). To overcome the specific challenge the employee in collaboration with the supervisor developed a plan for action (defined solution). The plan could involve everything from ergonomics (e.g. lifting equipment or changes in the organisation of the work) to health-promoting initiatives such as physical or cognitive training or a combination of these. A log-on system ensured that only information about one specific employee was available on the tablet at a time. Finally, an email to remind employees and supervisors about the plan and that they had to fulfil it before the next session was sent.

2.4. Data collection

In the communication sessions, the supervisor and the employee logged into the tablet-based guide and were asked: "Think about you workday and a situation that is challenging. Please write the challenge" (open-ended). The next question was: "Write a plan (keywords are ok)" (open-ended). The plan was registered in the guide. At each of the following communication sessions the first question was: "On a scale from 0 to 10, to what degree, have you fulfilled the action plan from the last session? (0 being not implemented and 10 being fully implemented). The registration was uploaded to a web-interface, available to the researchers. If the structured communication was not held as planned, an omission was registered. Workplace supervisors then received a monthly report with their implementation rate for each supervisor (number of structured communication sessions held compared to the expected). The first structured communication session was held the December 16, 2013 and the last session was held the April 21, 2016.

Based on the data from the communication sessions we developed a dataset consisting of a row for each communication session with a unique number per session, a unique number for the employee, information about the date of the communication session, workplace, the work environment or health challenges and the action plan to overcome the challenge.

2.5. Categorization of challenges and action plans

The categorization of challenges and action plans was inspired by the grounded theory and an open coding (Foley and Timonen, 2015). Two researchers coded the challenges and action plans following six steps.

First step - overview; two researchers independently read through the data regarding challenges and plans for action with special attention to similarities, differences and trends in the challenges and plans to get an overview of the data and identify different overarching themes for the challenges and action plans respectively. The overarching themes were discussed between the researchers.

Second step – categories; the aim of this step was to turn the themes into categories. Based on the identified themes in step one, a first draft of the categorization was developed in collaboration between the researchers. Then overall categories were defined along with subcategories. We made short explanations of the different sub-categories.

Third step – test and category adjustment; 50 randomly selected structured communication sessions were coded according to the first draft of the categorization by the two researchers. We performed a statistical analysis (Cohen's Kappa) to test for agreement between the two researchers. The agreement ranged from 0,09 to 1,00 (see Table 1 for a detailed evaluation). Based on the experience from the first coding and the results from the Cohen's kappa analysis, the sub-categories were discussed. During the discussion new sub-categories were allowed to arise. Based on the discussion, an extended and adjusted description of the sub-categories was developed.

Fourth step – test and finally category adjustment; 50 new randomly selected structured communication sessions were coded according to the adjusted sub-categories by the same two researchers. We performed a statistical analysis (Cohen's Kappa) to test for agreement between the

Table 1
Statistical analysis (Cohen's Kappa) to test for agreement between the two researchers in step three and four. For each sub-category the agreement is presented for both the first and the second test, and for the final agreement between the two researchers for all 2.497 communication sessions.

Challenges			First test (n = 50)	Second test (n = 50)	Final test (n = 2.497)
		No challenges	–	1,00	0,92
		Without explanation	0,37	1,00	0,54
	Individual	Work task	0,38	0,48	0,43
		Handling residents	1,00	0,70	0,81
		Physical challenges	0,34	0,91	0,87
		Private circumstances/ challenges	1,00	1,00	0,78
	Team Management/ organisational	Team work	0,65	0,85	0,76
		Staff	0,81	1,00	0,89
		Physical work environment	0,66	0,79	0,58
		Communication	–	1,00	0,43
		Organisation of tasks	0,78	0,76	0,67
Action plans		No action plan	0,41	0,88	0,82
	Individual	Self-management of physical challenges	0,09	0,59	0,74
		Self-management of psychosocial challenges	0,37	0,50	0,57
		Handling residents	0,88	0,73	0,60
		Work task	[a]	0,23	0,36
	Team Management/ organisational	Team work	0,58	0,60	0,62
		Staff	–	1,00	0,85
		Upgrading of qualifications	0,88	0,66	0,71
		Organizing workplace	0,25	0,59	0,41
		Communication	0,73	0,64	0,65

[a] The category did not exist in the first test.

two researchers. The agreement ranged from 0,23 to 1,00 (see Table 1 for a detailed evaluation). Based on the results from the second statistical test, a discussion and a final adjustment of the sub-categories were carried out. One column for each of the final subcategories within both the challenges and action plans, were then added to the dataset.

The overall categories for the challenges and action plans were divided into three overall levels in the organisation (individual, team and management/organisational), or no challenge, challenge without explanation or no action plan. Each of the overall levels consisted of a number of sub-categories (challenges: nine different sub-categories within the three overall categories. Plans: eight different sub-categories within the three overall categories).

In Table 2, the final type of challenges and actions is presented with a description of the category and the level in the organisation.

Fifth step – coding; two researchers coded the structured communication sessions independently, according to the sub-categories. For each structured communication session, it was possible to code more than one challenge and action plan if more than one challenge and/or action plan were identified in the structured communication session. The agreement on the 2.497 communication sessions ranged from 0,36 to 0,92 (see Table 1 for a detailed evaluation).

Table 2
Type of challenge and action, description and level in the organisation.

Type of challenge	Description	Level in the organisation
No challenge	Blank dialog box or a positive challenge including words as: happy, satisfied or no challenges.	N/A
Staffing	Temporary workers, the quality of the temporary worker, sickness absence among colleagues, understaffing or duty roster (general or according to holidays).	Management/ organisational[a]
Organisation of tasks	Organizing and planning of work tasks, challenges which covers the employees' lack of influence at own work, the experience of feeling busy, time pressure and disruption.	Management/ organisational[a]
Team work	Lack of or bad communication or misunderstanding between colleagues, challenging work relationship or partnership. It also includes colleagues' lack of work, the quality of the performed work or the performance.	Team[b]
Handling residents	Relates to the resident, new-, heavy or a demanding resident. It could be a specific work task, but it also cover communication, miscommunication or disagreement between the employee and the resident or relatives.	Individual[c]
Physical challenges	Physical demands, reduced movement, pain and/or work posture.	Individual[c]
Physical work environment	Physical work environment, physical distance, lack of equipment (for person lifting and moving or IT-systems) or inappropriate workspace.	Management/ organisational[a]
Work task	Challenges on the individual level. It could be daily work tasks as documenting, administrative, laundry or computer tasks.	Individual[c]
Communication	Lack of communication or bad communication between employee and management or between departments.	Management/ organisational[a]
Private circumstances	Challenges not related to any work challenges. Examples could be "then I bring my private life to work".	Individual[c]
Without explanation	Challenges without explanation, no causes, unspecified or unclear. Examples could be: "every day is a challenge" or "it is a challenge to meet at work".	N/A
Type of action		
Communication	Better or improved communication/ relations between employees and the management or between teams. Further it also covers the quality of the management and a supportive management.	Management/ organisational[a]
Team work	Better or improved communication within the team. Furthermore it also includes social events and networking among team-colleagues.	Team[b]
Handling residents	Plans for work tasks related to the resident or communication between the employee and the resident or relatives.	Individual[c]
Organizing workplace	Structure or organisational changes. It includes reorganisation of work tasks, new procedure, and responsibility. Change of physical work environment, changing the workplace of the surroundings and new equipment.	Management/ organisational[a]
No plan		N/A

Table 2 (*continued*)

Type of challenge	Description	Level in the organisation
Self-man. of physical challenges	Blank dialog box, or words/sentences as: "no plan", "think about it" or "continue". Self-management of the individuals' action plan to handle pain or other physical challenges. Examples could be: contact the physiotherapist, use existent assistive devices or ask for help.	Individual[c]
Self-man. psychosocial challenges	Self-management of the individuals' action plan to psychosocial challenges. Examples could be: Enjoy the holiday, work independent or ask for help.	Individual[c]
Staffing	Management tasks covering staffing. All plans including temporary workers, new employees, duty roster during holidays or sickness absences and management/employee ratio.	Management/ organisational[a]
Upgrading of qualifications	Covers a plan which upgrades permanent and temporary workers. The plan covers introduction, further training, training in correct use of assistive devices e.g.	Management/ organisational[a]
Work task	Daily or specific work tasks. It could be action plans as: Close the door, continue working with or documenting.	Individual[c]

N/A = not applicable.

[a] The challenge/action plan was related to the management level or concerned the organisational structure at the workplace i.e. the coordination or communication with the management and or other teams or departments.

[b] The challenge/action plan concerned something that would impact on both the individual worker but also the colleagues (i.e. related to the procedure of a task performed by several colleagues in a team or an issue related to coordination between colleagues).

[c] The challenge/action plan concerned only the individual worker.

Sixth step – agreement; all categorized challenges and action plans were compared to assess whether there were agreement or disagreements between the two researchers' categorizations. If there were any disagreement, the challenge and/or plan was discussed between the researchers, until agreement was reached.

2.6. Rating of implementation success

To investigate the implementation success the following classification was used, based on the question about to what degree the action plan had been fulfilled (scale from 0 to 10): the values 0-2 were defined as "no or low implementation success", the values 3-7 were defined as "partly implementation success" and the values 8-10 were defined as "high implementation success".

2.7. Statistical analysis

To test the agreement between the two researchers a simple Cohen's Kappa was performed. Cohen's Kappa measures the percentages of data values within each of the sub-categories and adjusts for the amount of agreement that could be expected by chance alone (Cohen, 1960). The purpose of the Cohen's Kappa in our study was to gain insight into the agreement/disagreement between the researchers in the classification of the challenges and action plans within each of the sub-categories. We were guided by the Fleiss' Kappa Benchmark Scale (<0.40 were defined as poor agreement, 0.40 to 0.75 as intermediate to good agreement and >0.75 as excellent agreement (Gwet and Advanced Analytics, 2014)) in the development of the sub-categories to evaluate whether the category needed further adjustment to aim for a high agreement between the two

researchers. In sub-categories with poor or intermediate to good agreement we made further adjustment of the sub-categories.

Descriptive statistics was used to illustrate the distribution of the challenges and plans across the overall categories. Analyses of the plans to overcome the challenge were based on the overall categories (individual, team and management/organisational) and therefore performed without the sub-categories: no challenges, challenges without explanation and no action plans. Analyses were performed using IBM SPSS Statistics version 24.

3. Results

3.1. Structured communication

During the period from December 16, 2013 to April 21, 2016, a total of 2.497 structured communication sessions were held between employees and supervisors. A total of 412 employees participated in the structured communication. For each employee between 1 and 19 structured communication sessions were held, with a mean of 5,24 (standard deviation: 4744) sessions per employee. For further details about the organisational and employee characteristics and intervention activities see Larsen et al., 2019.

3.2. Work environment challenges and suggested solutions to overcome the challenges

85% of the 2.497 challenges from the structured communication sessions was coded into one of the sub-categories, no challenge or without challenge category. In the remaining 15% of the sessions more than one challenge was identified and the challenges were therefore coded into more than one of the sub-categories, which resulted in 2.919 identified work environmental or health challenges.

In 24% of the 2.919 work environmental or health challenges, no challenge was identified (either uncompleted challenge or a positive statement). Among the most frequent challenges, 17% were related to staffing, 15% to organisation of tasks and 14% related to teamwork.

In 58% of the structured communication sessions action plan was coded into one of the sub-categories or no plan category. In the remaining 42% of the structured communication sessions, more than one action plan was identified, and the action plans were therefore coded into more than one of the sub-categories, which resulted in 3.848 identified action plans (data not shown). Among the most frequent action plans (n = 3.848), 18% were related to communication, 16% to teamwork and 14% to handling residents.

Fig. 2 shows the distribution of the challenges, which are top of mind among eldercare workers and the action plans suggested by the employees and supervisors to handle the challenges experienced by the employees.
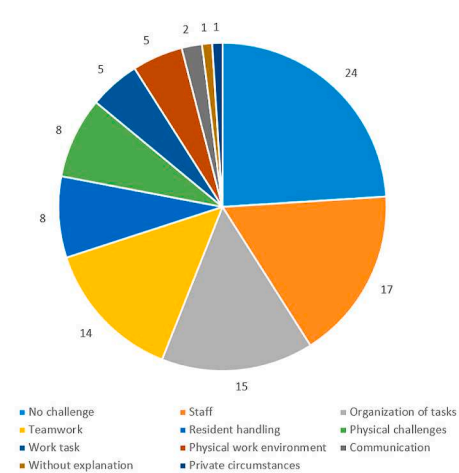
3.3. Are the plans for action related to the same level in the organisation as the challenges?

Table 3 illustrates the distribution of actions plans to overcome the challenge. Of the 2.497 communication sessions, 1.300 (52%) of the sessions had an action plan on the same level in the organisation as the challenges occurred (data not shown).

Of the 1.062 challenges at the individual level, 50% of the challenges were handled with an action plan on individual level, 12% on team level and 38% on management/organisational level. For the 728 challenges on team level, 24% of the challenges were handled with an action plan on individual level, 33% on team level, and 43% on management/organisational level. Finally, 1.744 challenges were identified on management/organisational level. Of those, 31% had an action plan on individual level, 14% on team level and 55% on management/organisational level (Fig. 3).

Table 3 shows in detail the challenges and the distribution of the

What challenges in the work environment are top of mind among eldercare workers?

- No challenge
- Staff
- Organization of tasks
- Teamwork
- Resident handling
- Physical challenges
- Work task
- Physical work environment
- Communication
- Without explanation
- Private circumstances

What solutions do employees and supervisors suggest to handle everyday work environment challenges in eldercare?

- Communication
- Team work
- Resident handling
- Organizing workplace
- No plan
- Self-management of physical challenges
- Self-management of psychosocial challenges
- Staffing
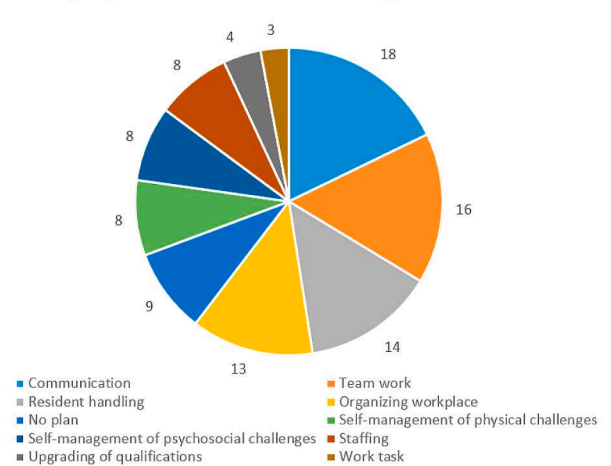- Upgrading of qualifications
- Work task

Fig. 2. Overview of the work environment and health challenges that are top of mind of the eldercare workers (n = 2.919), and the solutions by the employees and supervisors to overcome the challenge (n = 3.848) (distribution shown in percent).

corresponding action plans. E.g. the 235 challenges categorized in the category "work task", resulted in action plans at all levels at the organisation, including 17% with an action plan related to organizing workplace and 20% related to communication on management/organisational level.

Overall most of the action plans were identified as plans related to "communication" at the management/organisational level. Between 12% and 32% of the plans for all challenges lead to a plan regarding communication.

The same analyses were conducted on structured communication sessions with only one challenge (2.123 sessions) and sessions with authentication key (2.213 sessions). These analyses supported the overall trend in the distribution shown in Table 3.

3.4. Implementation success

In 2.252 of the communication sessions (90%), the employee and supervisor rated the implementation of the action plans. No or low implementation success was found in 15% of the action plans, partly implementation success was found in 41% of the action plans and high implementation success was found in 44% of the action plans (data not shown).

Table 3

Decided action plans to overcome the challenge. For each sub-category the absolute number and percentages for the suggested action plans can be seen.

All communication sessions included (2.497)			Action plan																	
				Individual				Team						Management/organisational						
Challenge	No plan		Self-man. of Physical challenges		Self-man. of psychosocial challenges		Work task		Handling residents		Team work		Staffing		Upgrading of qualifications		Organizing workplace		Communication	
	n	%	n	%	N	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
No challenge	270	27	49	5	86	9	121	12	22	2	133	13	32	3	29	3	98	10	148	15
Without explanation	4	11	2	6	4	11	7	20	0	0	5	14	2	6	1	3	4	11	6	17
Individual																				
Work task	2	1	11	5	14	6	75	32	4	2	29	12	1	0	11	5	40	17	48	20
Handling residents	8	2	35	9	32	8	69	17	58	14	64	16	12	3	23	6	40	10	68	17
Physical challenges	10	3	165	42	24	6	17	4	4	1	33	8	4	1	7	2	61	16	66	17
Private circumstances	1	2	2	4	16	33	4	8	0	0	6	13	1	2	0	0	5	10	13	27
Team																				
Teamwork	10	1	21	3	64	9	82	11	6	1	240	33	12	2	26	4	82	11	195	26
Management organisational																				
Staffing	20	3	39	6	36	5	75	11	5	1	74	11	231	50	42	6	88	13	81	12
Physical work environment	4	2	26	11	14	6	40	17	4	2	30	12	0	0	10	4	65	27	49	20
Communication	2	2	3	3	12	10	15	13	0	0	28	23	5	4	2	2	15	13	38	32
Organisation of tasks	20	3	43	6	74	10	143	19	8	1	108	15	30	4	25	3	139	19	147	20

Self-man. = self-management.

*n for the challenges at the overall category (including all the subcategories) and the action plan.

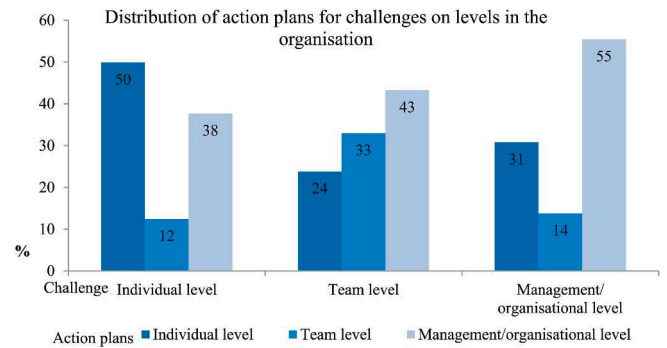**% distribution within the same overall challenge level.

Distribution of action plans for challenges on levels in the organisation

Challenge	Individual level	Team level	Management/organisational level
Action plans Individual level	50	24	31
Action plans Team level	12	33	14
Action plans Management/organisational level	38	43	55

Fig. 3. Action plans to the identified challenges. The distribution of action plans for the challenges on the levels in the organisation are shown in percent (individual, team and management/organisational).

Of the 789 action plans on the individual level, 52% had a high implementation rate. Of the 377 action plans on team level, 45% had a high implementation rate and of the 1086 plans on management/organisational level, 39% had a high implementation rate (Fig. 4).

See appendix for examples of challenges and action plans and examples of plans with high, partly and no/low implementation success (appendix, Table 1).

4. Discussion

This study aimed to gain insight into the process of a workplace intervention in nursing homes that was effective in reducing employee pain. A central component of the intervention was 3-weekly structured communication sessions. Through categorization of the 2.497 sessions, 2.919 challenges and 3.848 plans for action were identified. These data provided insight into the employees' perception of work environment and health challenges, possible solutions to overcome these challenges and the level of success in the implementation of the plans.

The majority of the challenges were categorized as challenges related to staffing, organisation of tasks and teamwork, and most action plans were categorized as plans related to communication, team-work and handling residents. Half of the plans were solved at another organisational level than the challenge, indicating a complexity in the challenges where solutions at other organisational levels are relevant. Thus, for example challenges at the individual level were solved with action plans on both the individual, team and management/organisational level. The same diversity was found for challenges on team and management/organisational level. The highest implementation rate was found among actions planned on the individual level (52%), actions planned on team and management/organisational level were implemented at a lower rate (45% and 39%).

Implementing success at each level in the organisation

	Individual level	Team level	Management/organisational level
No or low implementation success	11	13	18
Partly implementation success	37	42	43
High implementation success	52	45	39

Fig. 4. The distribution of no or low, partly and high implementation success in percentages for individual, team and management/organisational level.

4.1. Work environment challenges experienced by the eldercare workers

Overall, our study found that eldercare workers experienced work environment and health challenges founded at all levels in the organisation. Thus, our finding are in line with previous research emphasizing the complexity of work environment challenges and that multiple factors at work can influence employee health and therefore encouraging complex initiatives (Rasmussen et al., 2017; da Costa and Vieira, 2010; Burton et al., 2005). In our study most challenges were related to staffing and organisation of work tasks, such as for example lack of influence at work, feeling busy, time pressure and disruption during work. These factors are previously found to be associated with employee health and turnover. For example high workloads were found to be related to turnover and turnover intentions among nursing staff (Hayes et al., 2012). Further Clausen et al., 2014 found that low influence at work was a reason for resigning a position in the Danish eldercare services. Also low and medium influence at work has shown to be a predictor for LBP among female eldercare workers (Clausen et al., 2013). To maintain the same quality and standard in the healthcare system, it is important to find solutions and develop plans for action to overcome these challenges and improve the work environment (Clausen et al., 2014).

4.2. Solutions (action plans) to overcome the challenges

Some challenges lead to more than one plan for action underlining the need for targeting challenges with multiple solutions at several levels. The overall variety of solutions indicates that multiple interventions are necessary to meet the challenges at the nursing home workplaces and supports the notion that tailored solutions maybe more effective than one-size-fits-all solutions compared technique training or single factor interventions (Rasmussen et al., 2017). Most action plans were categorized on the management/organisational level in the organisation (48%). A previous study also found that most solutions to challenges regarding low back pain among eldercare workers, were found at the organisational level (54%) (Rasmussen et al., 2017). In the present study most plans made by employees and supervisors were at the individual or management/organisational level and seldom at the team level. This may be explained by the structure of the communication sessions, that only the employee and the supervisor (and not colleagues) participated. To capture the advantages of team-based solutions, future interventions may benefit from integrating a focus on solutions at the team level.

4.3. Half of the challenges lead to solutions at another level in the organisation

We found that challenges at one level in the organisation could lead to action plans at all levels in the organisation. The discrepancies between the organisational level of the challenge and the action plans match the findings by Rasmussen et al., 2017), who found that different risk factors for low back pain also were solved on different levels in the organisation. These results highlight the importance of considering solutions at all levels of the organisation even though the challenge is identified at a specific level in the organisation.

4.4. Implementation of solutions

Overall, we found that 44% of all rated plans had a high implementation success, and 37% were partly implemented. Previous studies have reported that the percentage of solutions that were implemented to a high degree ranged between 33% and 38%, while other studies have pooled partially and full implementation and reported about 60% (Rasmussen et al., 2017; Anema et al., 2003; Loisel et al., 2001; Pehkonen et al., 2009).

These studies had between 3 and 6 months of follow-up time. Thus, in the present study we found a higher degree of implementation even though the time for implementation was shorter. This could be due to several reasons. It could be explained by the set-up in the sessions with only the employee and the supervisor (and not the team or colleagues) placing the full responsibility for executing the plan on these two persons and not on a group where each individual may not have the same degree of ownership (May et al., 2007). The relatively high degree of implementation of the action plans may be explained by the development of skills among employees and supervisors (through the courses) to communicate and make plans that comprised small adjustments in the work environment and were realistic to integrate in the existing routines. Finally, an email was sent to remind employees and supervisors about the action plan and that they had to fulfil it before the next session and this follow-up may have facilitated the implementation.

4.4.1. The lower the level in the organisation – the higher the degree of implementation

We found that the action plans on the individual level led to a higher degree of implementation (52%) compared with action plans on team (45%) and management/organisational level (39%). The evaluation of the completion happened at the next session approximately 3 weeks after the action plan was generated which was a narrow time frame compared to other studies (Rasmussen et al., 2017; Driessen et al., 2010). The variety in the content of the action plans meant that different plans required different efforts to reach implementation success. Plans at the individual level primarily involved the individual and adjustments in his or her daily routines, whereas plans at the organisational level could involve changing systems or structures at the workplace and often involved more than one individual. These differences between plans at the different levels and the short follow-up period may explain the varying degree of implementation within the different levels in the organisation. This is in line with previous studies suggesting that some ergonomic solutions such as acquisition of or better use of assistive devices were hampered because the solutions were too comprehensive to implement within the study duration of three months (Rasmussen et al., 2017; Driessen et al., 2010). Furthermore, a previous study has found that changes in the systems and routines can be difficult to integrate into health care organisations (Scott-Cawiezell et al., 2005).

4.5. Strengths and limitations

A strength of the present study is the huge dataset including 2.497 structured communication sessions from more than 400 eldercare workers continuously throughout up to 28 months. Data regarding challenges and action plans was entered directly into the tablet in the communication sessions, which allowed the researchers to access the exact wording of the challenges and action plans. Data from the sessions were analysed using a systematic stepwise approach, with two researchers going through each step and using statistical test of agreement to support development of independent and robust categories.

Previous studies have pointed at the limitations in the literature indicating that studies are more effective in emphasizing the problem (for example stress among nurses) than identifying solutions and therefore studies must focus on involving the workers in the process and start moving from discussion to action (Happell et al., 2013). The solutions identified in this study contribute with important knowledge regarding types of possible initiatives to improve the work environment and health for this job group and to what degree the employees and supervisors succeed in implementing the different categories of solutions.

The structured communication sessions requires an open and trustful relation between the supervisor and employee. A possible limitation in this study is therefore the set-up in the structured communication session. The communication and development of an action plan is highly dependent on the relation between the supervisor and the employee, and the supervisors' abilities to facilitate the communication and support the employee in developing a plan and the trust and confidence between the

employee and supervisor. However, the intervention approach with courses for employees and supervisor and the use of the tablet-based guide in the sessions, was supposed to strengthen the starting point for constructive development of specific and effective action plans.

A limitation to the study is that all involved workplaces belong to the same geographical location in Denmark, which might limited the external validity of the study. Further we also experienced some methodological and technical limitations in the rating of the implementation of the plans. The methodological limitation covered the disadvantage related to the measurement of the degree of implementation, which was measured by a question posed in the guide in the following session and therefore, all participants had at least one missing measurement of implementation success. Furthermore, a system error in the program downloading data from the communication sessions led to missing information regarding identification number and workplace in 284 sessions (11%).

5. Conclusions

This workplace intervention, shown effective in reducing pain among employees in nursing homes, was successful in implementing a high number of small actions to improve the work environment and health among employees. The structured communication sessions revealed which challenges the eldercare workers experienced with most challenges identified at the management/organisational level. The majority of the plans for action were also related to initiatives at the management/organisational level. Further, we found that challenges on one level (on individual, team or management/organisational level) could lead to action plans on all levels (on individual, team and management/organisational level).

This study contributes to the knowledge base regarding what kind of work environment initiatives could be introduced to improve the work environment for employees in eldercare. We found that employees experienced various challenges, which naturally resulted in various solutions and pointing at the importance of considering the specific challenges of each individual, and identifying relevant solutions for this challenge and specific employee. Furthermore, this study underlines the advantages in considering solutions to work environment and health challenges broadly at all levels in the organisation. Additionally this study points at the relevance of involving both the employee and the management/organisation identifying and implementing solutions. Finally, action plans were rarely settled at team level, indicating that possibly other actions than structured communication between supervisor and employee is needed to mobilize team level initiatives.

Abbreviations

Not applicable.

Ethics approval and consent to participate

The trial was approved by the Danish Data Protection Agency (Journal number 2014-38/28350-3) and reported to the local ethical committee (Protocol H-1-2013 FSP). The trial was conducted in accordance with the Helsinki declaration.

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated and analysed during the current study are available from the corresponding author on reasonable request.

CRediT authorship contribution statement

Pernille Kold Munch: contributed to the design of the study, coded the data, did the analyses, drafted the first version of the manuscript, and wrote the final version of the manuscript. read and approved the final manuscript. **Charlotte Diana Nørregaard Rasmussen:** acquired funding for the project, participated in discussions around the study, and critically revised the manuscript. read and approved the final manuscript. **Marie Birk Jørgensen:** acquired funding for the project, designed the original study (the dataset the study is based on), and critically revised the manuscript. read and approved the final manuscript. **Anne Konring Larsen:** acquired funding for the project, designed the study and participated in discussions around the study, and critically revised the manuscript. read and approved the final manuscript.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix

Table 1
Examples of challenges at different levels in the organisation and sub-category, including the action plan for each challenge (and the implementation success).

Challenge		Action plan		
Individual (I)	Team (T)	Individual (I)	Team (T)	Management/ organisational (M/O)

(continued on next page)

Table 1 (*continued*)

Challenge			Action plan		
Individual (I)	Team (T)	Management/ organisational (M/ O)	Individual (I)	Team (T)	Management/ organisational (M/O)
		Management/ organisational (M/ O)			
		When you feel that you do not have the time to do your work tasks (M/O organizing workplace)	Prioritize the most important work tasks first and keep a sense of perspective. Do less important work tasks the day after (I - self-management physical)		
		When there are unsettled work tasks. When there is a lack of communication (M/O -communication and organizing workplace)		Improved planning the day before including distribution of tasks. Especially at events (T - team)	
		There are many sick notes in the team(M/O - staff)			Review of sick absence for each employee in the team. Conversations when needed! (M/O communication)
	When the distribution of work tasks within the team is not equal (T - team)	When the distribution of work tasks within the team is not equal (M/O organizing workplace)		Employee: talk to the colleague about problem (T - team)	Supervisor: Wait for response if a meeting is necessary (M/O - communication)
When the relatives are visiting the resident, the resident has fallen, and the relatives are worried (I – resident)			Ask the relatives to leave the room, while we are lifting (I- Resident) Use the assistive devices/ ceiling hoist (I – Self-management of physical challenges)		If possible, participate in the manual handling training, so we can learn how to use the new ceiling hoist (M/ O – upgrading)
	Lack of staff (M/O staff)				Lower resident/staff ratio
High implementation success		Partly implementation success		No/low implementation success	

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