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Linköping University Post Print

N.B.: When citing this work, cite the original article.

Original Publication:

Lena Swedberg, Hans Michelsen, Eva Hammar Chiriac and Ingrid Hylander, On-the-job training makes the difference: healthcare assistants perceived competence and responsibility in the care of patients with home mechanical ventilation, 2015, Scandinavian Journal of Caring Sciences, (29), 2, 369-378.

<http://dx.doi.org/10.1111/scs.12173>

Copyright: Wiley: 12 months

<http://eu.wiley.com/WileyCDA/>

Postprint available at: Linköping University Electronic Press

<http://urn.kb.se/resolve?urn=urn:nbn:se:liu:diva-118849>

Title

On-the-job training makes the difference: Health care assistants' perceived competence and responsibility in the care of patients with home mechanical ventilation.

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Abstract

Objectives: To describe and analyse perceived competence and perceived responsibility among health care assistants (HC assistants), caring for patients with home mechanical ventilation (HMV) and other advanced caring needs, adjusted for socio-demographic and workplace background factors.

Design: A cross-sectional study was conducted including 128 HC assistants employed in Stockholm County, Sweden.

Methods: The HC assistants responded to a study-specific questionnaire on perceived competence and perceived responsibility, provided socio-demographic and workplace background data, as well as information on the patient characteristics for the understanding of their work situations. Descriptive statistics and logistic regression analyses were performed.

Results: Eighty percent of the HC assistants rated their perceived competence as high and fifty-nine percent rated their perceived responsibility as high. Fifty-five percent lacked formal healthcare training and only one in five of the HC assistants had a formal training equivalent with a licensed practical nurse (LPN) exam. Males lacked formal training to a greater extent than females and rated their competence accordingly. On-the-job training was significantly associated with high ratings on both perceived competence and perceived responsibility, and clinical supervision was associated with high rating on perceived responsibility.

Conclusions: HC assistants with limited formal training self-reported their competence as high, and on-the-job training was found to be important. Also, clinical supervision was found important for their perception of high responsibility. In Sweden, HC assistants have a 24-hour responsibility for the care and safety of their patient with HMV and other advanced caring needs. The study results point out important issues for further research regarding formal training requirements as well as the needs for standardised workplace training and supervision of HC assistants. The consequences of transfer of responsibility by delegation from healthcare professionals to paraprofessionals within advanced home care also need further study.

Keywords:

Home mechanical ventilation (HMV), advanced home care, health care assistants, paraprofessionals, training needs, competence, responsibility.

Word count: old: 4720 **new:** 4990

Introduction

Despite studies highlighting lack of competence as a major challenge for tomorrow's increasingly advanced home care (1), there is little knowledge on the caregivers' own perception of competence. Employed caregivers in home care are often described as paraprofessionals, defined as carers with limited formal healthcare training not being members of a profession and working semi-autonomously under the direction from health care professionals (2-3). In Sweden, patients in need of 24-hour home care due to home mechanical ventilation (HMV) and other advanced caring needs are often cared for by paraprofessionals employed by the local municipality or a private agency. The Swedish system for financing home care is supported by national social welfare laws, offering different care solutions dependent on factors such as patients age (4-6). A variety of job titles are used describing similar work functions: Personal assistant, carer and nurse assistant (7-8). In this study, the common title health care assistant (HC assistant) will be used. Many patients with HMV acquire double staffing leading to workgroups up to 20 HC assistants. These workgroups are organised by local municipalities or private agencies. Currently there are no formal competence requirements or qualifications for HC assistant working with patients requiring HMV and other advanced care needs issued by the Swedish National Board of Health and Welfare (7-8). However there are recommendations (1) that HC assistants should have training equivalent with the national secondary school program in health and social care for a licensed practical nurse (LPN) exam (9). Therefore, there is no complete Swedish registry for HC assistants (1), and hence no data base regarding their work organisation or competence levels. In recent years recommendations have been outlined for specific groups of HC assistants active within care of the elderly (10) and the functionally disabled (11). However, these are recommendations only, and problems with lack of formally trained HC assistants within home care are recognized (12-13).). Although not regulated, HC assistants usually receive some informal training by the care providers. HMV training programs are usually offered at local HMV-clinics or referring hospital clinics. Some training by the employer, municipality or private agency, may include general topics such as ergonomics and

hygiene. Due to the lack of regulations and registry, large geographical differences may exist, in training content as well as in length.

Tasks related to HMV and medication administration are delegated from health care professionals such as HMV-clinics and district nurses (14-15). A delegated task has to be clearly defined, individually given and limited to one year and must be withdrawn immediately if compromised. Moreover, the delegating nurse has to make sure the HC assistant has the appropriate knowledge prior to delegation (14). The delegation of medication administration to HC assistants are described as problematic by the district nurses, mentioning heavy workload with limited time for training and evaluation of the HC assistants, thus having a significant impact on patient safety and the quality of care (16).

Patient safety is currently monitored closely and the Health and Social Care Inspectorate Annual Report emphasizes lack of competence within the health care sector as one major area in need of improvement (17). However, reported adverse events in the Annual Reports are not detailed enough to allow further analysis at the level of specific patient- or workgroup to link adverse events within care of HMV-patients to lack of competence (17). Interestingly, studies concerning patient and family experiences on advanced home care, point out insufficient caregiver competence as one of the most concerning issues (18-19).

Unauthorized and with no formal responsibility, the HC assistants working in advanced home care assume a considerable amount of responsibility for the direct care and safety of their patient. With health care professionals, who have the formal responsibility, located on a distance, the HC assistants have to cope with complicated care situations and handle emergency situations much by themselves. In a previous qualitative study (20), HC assistants in 24-hour home care experienced lack of support from health care professionals, particularly in case of emergencies related to the homecare technology or if the patient got acutely ill. When working alone with no colleagues, this exposed condition was accentuated. Homecare technology, particularly when life-support ventilators are involved, calls for the need of caregiver training on technical knowledge, specific care procedures and skills to manage emergencies in order for patient, family and the caregivers to feel secure and satisfied (21-22).

Two previous qualitative studies by Swedberg et al. (20, 23) described how patients in 24-hour home care and their HC assistants used strategies when striving for safe home care. The patients, when experiencing lack of competence among HC assistants, actively selected competent HC assistants and instructed the new HC assistants in their efforts to establish safe

care (23). The HC assistants, when experiencing lack of competence, supervision and support, used self-learning techniques, named “day-by-day learning”. The HC assistants compensated their competence gap by identifying self-learning situations themselves or with the help from colleagues (20). All learning situations took place in the actual setting, namely in the home in front of the patient and parallel with the daily care activities, well in line with how Lave and Wenger (24) describe the characteristics of situated learning; learning that takes place in the same function, context and culture in which it occurs and with social interactions and collaboration as essential components. The HC assistants’ strategies to search for situations of practical skill-training has been described by others (25-26) and corresponds to well-established concepts of learning, originating from Dewey’s (27) “learning by doing” as well as to Schons’ (28) definition of “reflection-in-action”, sometimes described as “thinking on our feet”, including the use of own experiences and feelings in building new understandings of unfolding situations.

Patients living in Sweden with HMO and other advanced care needs usually have several care providers as county councils and municipalities are jointly responsible for the home care organisation. The importance of collaboration between care providers in order to obtain continuity is well known. However, lack of continuity is described as a major barrier to safe and efficient home care, especially when patients have complex needs (12-13). When experiencing poor continuity of care, patients and their carers, family members as well as employed caregivers, may feel a need to navigate themselves by maintaining all contacts and coordinating the care themselves. The assumption of a navigating role by patients and/or HC assistants, thus taking on large responsibility for the care, is supported by previous studies (19-20, 23).

In summary, literature describes an increased number of caregivers giving 24-hour home care to patients with HMO and other advanced caring needs (29-30). In Sweden, these increased needs collide with the fact that the caregivers mostly are paraprofessionals with limited formal healthcare training. Support from health care professionals, such as district nurses, is often limited, leaving the HC assistants alone with the 24-hour responsibility for the patient. In a previous qualitative study (20), the HC assistants used strategies to overcome a perceived lack of training, supervision and support. These results, particularly the HC assistants own perception of competence and responsibility, needed to be further investigated.

The aim of this study was to describe and analyse perceived competence and perceived responsibility among health care assistants, working with patients in need of 24-hour home care due to H MV and other advanced caring needs, adjusted for socio-demographic and workplace background factors.

Materials and methods

Study design

The study has a cross-sectional design and was performed in Stockholm County, Sweden.

Participants and procedure

Criteria for study inclusion were; HC assistants working with: 1) adult patient (> age 18 with no upper limit) enrolled in a clinic due to H MV and, 2) patient dependent on 24-hour home care from employed HC assistants. To meet these criteria, firstly, suitable patients were selected. The heads of two university hospital clinics, one in the south and one in the north of Stockholm County and specialised in H MV, gave the approval for obtaining patient lists with the help of a clinic-based contact person. A combined list from both clinics was obtained including 43 patients. The list contained the patients' first name, and telephone number to a contact person (a supervisor at the local municipality, a private agency or the patient). If the contact person gave permission, written information was sent to supervisors and HC assistants. Based on the aim of the study and the knowledge that every patient had their own workgroups of HC assistants, the definition "workplace" was chosen to describe the patients' home. Of the possible 43 workplaces, 28 approved their participation, four did not answer the phone call, three did not respond back after the first contact, four patients did no longer need 24-hour home care, three patients verbally declined participation and one patient had been admitted to the hospital. The number of possible respondents had to be estimated as the contact persons could not give a definite number of ordinary and temporary HC assistants in each workplace. Out of the collected information of approximate numbers, an average total number of possible respondents were estimated to 215. Ten workplaces chose to have the first author on a staff meeting informing and distributing questionnaires and 18 chose posted questionnaires. 215 questionnaires and information letters were distributed to the workplaces over a period of three months followed by two reminders. A first reminder was e-mailed and a second reminder e-mailed and by additional questionnaires via mail. 128 respondents (60 %) returned a completed questionnaire.

Measurements

A study-specific questionnaire was constructed in two steps. Firstly questions were derived from results from previous qualitative studies (20, 23) and secondly, two HC assistants with experience from home care and patients with HMV were asked to complete the pilot questionnaire and provide comments followed by two registered nurses who read the revised questionnaire carefully. Six questions from the questionnaire were grouped into two indexes; *Perceived competence* included four questions: 'I have the health care knowledge needed to work here', 'I have enough knowledge to use the home ventilator in a safe manner', 'I have enough knowledge to use other home care technology used here' and 'If the home ventilator breaks down, I do know how to act'. *Perceived responsibility* included two questions: 'I think I take more responsibility for the patient than others do' and 'If needed I take the role as a coordinator here'. The respondents were asked to rate their answers on a four-point Likert scale, which ranged from 'totally agree' to 'totally disagree'. Internal consistency was calculated using Cronbach's alpha, 0.71 for perceived competence and 0.65 for perceived responsibility. HC assistants' socio-demographic and workplace background data was included as well. In order to understand the HC assistants working situation, eight additional questions were attached with questions on patient characteristics, i.e. the patients' socio-demographic and caring need data. The questions' on patient characteristics were included only for the understanding of the HC assistants' work situation and are described under methods only.

Description of patient characteristics as reported by the respondents

Of the 128 respondents, the majority (80%) reported working with a male patient, and with patients in the age of either under 30 or over 50 years of age (< 30 years, n=38, 30-50 years, n=4, >50 year, n=84). The patients were living in a house or an apartment, either alone or with other family members. All patients were reported being in need of HMV, and a majority needed their ventilator 24-hours a day due to a complete lack of own respiration. Most common was the need of a tracheostomy, an opening in the neck where the ventilator tubing is attached, and less common was the use of a facial mask attached to the ventilator. The use of suction devices (to clear the airways), cough assist and nebulisation devices were used frequently. Moreover, the majority of the respondents (89%) also reported physical impairments of the patient with the need of full care needs and the use of electric beds and wheelchairs as well as hoists. The use of tube feeding and communicative tools was also reported. A majority of the patients (91%) had the need of double-staffing, i.e. two HC

assistants on duty, for whole or parts of the day. The workgroups assigned to each patient varied in size, between 1-22 of ordinary staff (mean 8.6) and 1-24 of temporary staff (mean 4.4). The respondents were asked to describe how the patients' care was organised. All the patients had several different contacts with health care professionals, with primary as well as specialist care. General health issues were provided by a primary health care centres where the district nurse was located and specialist care was provided by several hospital-based clinics. All patients' were signed up to one HMO-clinic for the care related to the home ventilator and some had contact with diagnosis specific clinics, often within neurology.

Data analysis

Descriptive statistics (frequencies, percentages) were calculated for the socio-demographic and workplace background variables. The sum scores were calculated for the two indexes *perceived competence* (scores 1-16) and *perceived responsibility* (scores 1-8). The distribution of the two indexes were skewed and they were dichotomized at the 75th percentile, using 1 as 'high' to describe respondents perceived high level of competence and responsibility and 0 as 'low' for their perceived low level of competence and responsibility. The associations between the independent variables (socio-demographic and workplace background data) and perceived competence and perceived responsibility was calculated, using χ^2 -test, with confidence interval calculated at 95%. Data was analysed using logistic regression models with perceived competence and perceived responsibility as outcomes and with control for selected socio-demographic and workplace background data (sex, age, educational level, formal healthcare training, on-the-job training and clinical supervision) by estimating odds ratios (OR) with 95% confidence intervals (CI). Reduced models were calculated by selecting significant variables ($p < 0.1$ for perceived competence and $p < 0.05$ for perceived responsibility). The goodness of fit for perceived competence was 0.41 for the full model and 0.58 for the reduced model. The goodness of fit for perceived responsibility was 0.46 for the full model and 0.82 for the reduced model. Data were analysed using Stata software, version 11 (31).

Results

Of the 128 respondents, the majority were females (72%) with a high percentage not born in Sweden (41%). Two thirds had at least completed secondary school. More than half (55%) lacked formal healthcare training exceeding 30 days. Of the respondents' with reported formal

healthcare training (45%), only 24 (19%) had courses or programs exceeding 2 years, equivalent with a licensed practical nurse (LPN) exam or a foreign or incomplete Swedish registered nursing degree. Males lacked formal healthcare training to a greater extent than females. Half of the respondents had 1-5 years of work experience with home ventilators and their employments were evenly divided between local municipalities and private agencies. Nearly half of the respondents reported having an assigned workplace manager, and one-third reported working alone more 50% of their time. A majority of the respondents (84%) reported having received, at least at one time, on-the-job training on the home ventilator. Nearly half reported having clinical supervision at their workplace (Table 1).

Insert Table 1 approx. here

A majority of the respondents rated their perceived competence as high (80%) and slightly more than half rated their perceived responsibility as high (59%). Perceived competence was associated significantly with sex (females rated higher than males) and on-the-job training (respondents with reported on-the-job training rated higher). Perceived responsibility was associated significantly with age (younger respondents rated lower than the other age groups) as well as on-the-job training and clinical supervision (respondents with reported on-the-job training and clinical supervision rated higher)(Table 2).

Insert Table 2 approx. here

Tables 3 and 4 show the results from logistic regression models for perceived competence and perceived responsibility and the associations with selected background variables. In the full model, the odds of a high score for perceived competence were three times higher (OR=3.1; CI= 0.9-10.3) for respondents who reported on-the-job training than those who did not, and over two and a half times higher (OR= 2.6; CI=0.9-7.4) for females than for males. The significances remained in the reduced model (Table 3). In the full model, the odds of a high score for responsibility were more than thirteen times higher (OR=13.7; CI=2.4-78.8) for respondents who reported on-the-job training than those who did not, and over three times higher (OR=3.2; CI=1.3-7.7) for respondents who reported clinical supervision than those who did not. Finally, the odds of a high score for perceived responsibility were more than three times higher (OR=3.4; CI=1.0-11.6) for respondents in the age group 30-50 years than for the respondents under the age of 30. The significances remained in the reduced model (Table 4). No significant associations were found between perceived competence or perceived responsibility, respectively, and the background variables educational level, formal healthcare training and prior experience, respectively.

Insert Table 3 and 4 approx. here

Discussion

This study focused on a specific group of HC assistants, working in the homes of patients with HMO and other advanced caring needs. As many as 55% of the 128 HC assistants in the study lacked formal healthcare training. A majority of the HC assistants rated their perceived competence as high, with no association found between their educational level, formal healthcare training or prior experience. On-the-job training was found to be important both for the HC assistants' perceived competence and their perceived responsibility. Finally, clinical supervision was found to be associated with the HC assistants' perceived responsibility.

Our results showed relatively low numbers of formal healthcare trained HC assistants, 45% had some training and only 19% had formal training equivalent with a licensed practical nurse (LPN) exam. These results are well in line with other studies on low caregiver competence within advanced home care (1, 32). A majority of the HC assistants (80%) rated their perceived competence as high. Explanations for the perceived high competence despite lack of formal training could have several causes. Firstly, the HC assistants in the study might not be fully aware of their own lack in knowledge. This is consistent with a recent study by From et al. (33) on care of elderly, where the registered nurses felt less safe and less prepared for their work in comparison with the less trained nurse assistants and LPNs. It is also in line with Kuhn (34), who described that the more we learn, the more we realise that we are lacking in knowledge. Secondly, the currently used formal healthcare training in Sweden might not prepare the HC assistants for their work to a sufficient degree, thus not affecting their perception of competence. Although some had homecare-specific courses, most had completed courses dedicated mainly to hospital and nursing home work. These programs might not prepare the HC assistants to the very specific working conditions as seen in the home of a patient with HMO and other advanced caring needs. The discrepancy between formal education and actual needs is also described by Raunkiari and Timm (35) on the specific competence needs for caregivers in community palliative care. Finally, by working with a patient in the patient's home, the HC assistants could learn the individual needs of the patient without being interrupted by other tasks, thus enhancing their perception of competence. This possible effect is supported by a study of Suhonen et al. (36) where perceived individualised care was rated higher among caregivers in homecare settings compared to caregivers working in nursing homes. The results in this study are based on the

respondents self-rated perception of competence only. This must be contrasted with earlier findings from a patient and family perspective where caregiver incompetence is one major stressor in the care of HMV (18-19) and further research is therefore needed.

The study results indicated that the workplace activity on-the-job training was significantly associated with high ratings on perceived competence and a majority of the HC assistants' reported, at least on one occasion, on-the-job training on the home ventilator. Informal workplace training usually takes place in the home of the patient and/or at a HMV-clinic, often with the patient present as well. Earlier research also shows that workplace training is beneficial. Brooks et al. (25) described in their study how HMV-patients' as well as their caregivers rated individualised workplace training as more important than formal training. Lopez et al. (37) found a positive impact of a workplace training program on direct care Workers' job satisfaction, and White and Cadiz (38) described significant effects on an individual as well as organisational level of workplace training for direct care workers who afterwards felt more competent and eager for additional education. These findings supports earlier studies on day-by-day learning at the workplace (20) as well as the concept of situated learning as described by Lave and Wenger (24). However, workplace training may also involve training from co-workers who themselves may have insufficient training. This may cause inappropriate training thereby perpetuating poor care practice (39). To maintain high quality of care it is therefore critical to retain experienced and competent HC assistants to assure an adequate level of workplace training. To have appropriate training programmes, ideally a combination of formal and standardised workplace training, is therefore of outmost importance and several studies have emphasised training needs to primary carers, paraprofessionals and family, when caring for patients with HMV and other advanced care needs (25-26). However, most studies only describe local projects without results on evaluation, thus more research is needed on how workplace training, content and quality measures, should be organised in order to benefit the care of patients' with HMV.

The index *perceived responsibility* was derived from the questions: 'I think I take more responsibility for the patient than others do' and 'If needed I take the role as a coordinator here', thus rating the HC assistants' perception of taking more responsibility than others. The HC assistants' perceptions were therefore related to their colleagues and external factors, such as workgroup size, might have affected their answers. The results of the HC assistants' level of perceived responsibility were evenly distributed between high and low, with significant

associations with age, on-the-job training and clinical supervision. The younger HC assistants reported taking less responsibility than the older ones. Support from health care professionals was limited and the HC assistants were much left alone with the responsibility for the care and safety of the patient. To take on the responsibility may require a maturity on the individual level. This finding is consistent with the results from previous qualitative studies (20, 23) describing the role of the experienced HC assistant as the navigator between the patients' different health care professionals. The experienced HC assistants also took on the roles as collegial trainers and informal leaders with overall responsibility for the workplace (23). Experienced HC assistants are described as important by others as well. Devlin and McIlfatrick (39) studied home-care workers in palliative care and suggested that experienced home-care workers could be used as preceptors for untrained colleagues. Further, the importance of a workplace manager received equivocal answers in the present study and it is suggested that the importance of other formal or informal leadership be studied in further detail.

Respondents reported clinical supervision was yet another activity closely associated with high ratings of perceived responsibility. The results in this study did not include how the supervision was organised or on variations between the care teams. However, just the fact that regular clinical supervision existed could be a sign of a well managed workplace, with increased possibilities for the HC assistants' to strengthen their roles, thus making them more confident in taking on responsibility for the patient and the workplace. Also, by receiving clinical supervision, they could feel well supported by the management. The importance of supervision combined with workplace training within care of the elderly is outlined by others (40-41), but further knowledge is needed on how to organise clinical supervision for the best for this specific group of HC assistants; by whom, how often etc. The HC assistants' role and responsibilities in 24-hour care for patients with HMC and other advanced care needs and the impact on the use of delegation of advanced tasks from health care professionals need further study. Difficulties with delegations from district nurses to HC assistants on advanced care procedures are also outlined by Bystedt et al. (15) and Craftman et al. (16).

Of the 128 respondents, 28% were males. This is a higher percentage compared with Swedish national statistics for municipality paraprofessionals, where approximately 15 % are males (42). However, one explanation of the difference might be that males in our study to a larger extent worked for private agencies, statistics not covered by the national system (42). The males lacked formal healthcare training to a significantly greater extent than the females.

Only one third (33%) had formal healthcare training and of them only three had formal training equivalent with a licensed practical nurse (LPN) exam. However due to small sample sizes, these results might be discussed as tendencies. Known factors such as low status and pay might influence males more than females to see the work as a HC assistant as a temporary position, therefore with less ambition to complete any formal training (43). In contrast to the overall result of this study, the odds for males to rate their competence as high were significantly lower than for the females. This finding supports the importance of formal healthcare training and suggests the needs for further exploration. There were no significant differences between males and females on perceived responsibility.

It has been argued that there is a gap between level of care performed at home and level of staff competence, and municipalities and councils in Sweden are required to take actions to increase the overall educational level (1). However, in the present study, on-the-job training was found most important. Practical skills, critically important for the HC assistants to learn in order to handle their daily work (27), may be easier to self-report than theoretical knowledge and may have affected the results. However, it can be argued that a deeper theoretical knowledge within nursing care subjects, such as ethics, communication skills and psychological reactions, may be important for the overall quality of patient care and should be considered when organising workplace training. Also, with clinical supervision, the HC assistants' may get the opportunity for reflection, not only "in-action" but also "on-action" as outlined by Schon (28). Questions arising from this study include the need for further research regarding formal training requirements as well as the needs of standardised workplace training and supervision for HC assistants. Also, studies relating the occurrence of reported adverse events and quality of care to competence are needed.

Methodological considerations

To the best of our knowledge, this is the first Swedish survey study of HC assistants, working in home care with patients with HMMV and other advanced caring needs, on their perceived competence and responsibility. However, the study has several limitations. Firstly, the selection of the study group was based on lists of patients enrolled at two HMMV-clinics, this due to a known lack of a central registry of employed HC assistants. By collecting information from contact persons at each workplace, an approximate number of eligible respondents were estimated. The response rate, 60%, is therefore a calculation based on those assumptions. Based on the difficult process of finding and obtaining respondents information,

i.e. correct number of employees per workplace, the response rate may be considered acceptable. Further, patients and respondents accepting the study were promised confidentiality, meaning that no answers should be traceable to any specific patient and his/her care team. Therefore, it is not possible to know how many respondents completed the questionnaire from each workplace, nor if there were respondents from all 28 workplaces who accepted participation in the study or not. This was a necessary restriction in order to perform the study. The study is performed in a Swedish context regarding laws and regulations on the home care organisation, therefore perhaps difficult to generalize to other countries. Also, by choosing one large city in Sweden with more specialized care and several municipalities compared to other regions, the findings might be best applicable to similar-sized areas. However, the recruitment from two HMTV-clinics resulted in participating workplaces that were well spread within the selected geographical area, which is a strength. The questionnaire, however not validated, was based on previous results from qualitative studies by Swedberg et al. (20, 23) on HC assistants' as well as their patients' experience of advanced home care which is a strength. Competence, difficult to measure, was here studied as a self-reported perception which contributes to interesting results, regardless the respondents actual competence. However, self-reporting might be difficult and respondents may react differently to a self-rating questionnaire. The question used for reported "on-the-job training" was asked as a "at one time occasion", thus the amount of continuous training is not covered. The question relating to the presence of a workplace manager was asked to require a "yes" or a "no" answer, without addressing whether this person was an external supervisor or an internal team leader. Moreover, the question used for reported "clinical supervision" was asked only as a regular activity with no further information on type, leader competency or frequency. These are limitations and further studies with more in-depth questions, preferable with a multi method approach, are therefore needed.

Conclusion

HC assistants', with limited formal healthcare training, self-reported their competence as high and on-the-job training was found to be important. Also, clinical supervision was found important for their perception of high responsibility. In Sweden, HC assistants have a 24-hour responsibility for the care and safety of their patient with HMTV and other advanced caring needs. The study results point out important issues for further research regarding formal training requirements as well as the needs of standardised workplace training and supervision for HC assistants working in this special area of care. The consequences of the transfer of

responsibility by delegation from healthcare professionals to paraprofessionals within advanced home care also need to be further studied.

Acknowledgements

We wish to thank the contact persons helping with the name lists of eligible workplaces and all the HC assistants for their cooperation. Special thanks to Lena Törnkvist for the help of revision of the manuscript and Sven-Erik Johansson for the statistical assistance.

Author contribution

Lena Swedberg, the corresponding author, was involved in study development and design, data collection and analysis as well as drafting of the manuscript. Ingrid Hylander, the supervisor of the study, and Hans Michélsen were involved in the design of the study, data analysis, and drafting and revision of the manuscript. Eva Hammar Chiriac was involved in the development of the study and the revision of the manuscript.

Funding

The study was conducted with support from the Regional Agreement on Medical Training and Clinical Research (ALF) between Stockholm County Council and the Karolinska Institutet (ref.no. 20100060).

Ethical approval

Return of a completed questionnaire was considered to represent informed consent because the information letter that all the respondents had received stated that participation was voluntary and that all responses would be treated as confidential. The study was approved by the regional Research and Ethics Committee at Karolinska Insitutet, Sweden (Reg. no. 2011/5:7).

Conflict of interest

No conflict of interest has been declared by the authors.

References

1. Swedish National Board of Health and Welfare. Tillståndet och utvecklingen inom hälso- och sjukvård och socialtjänst -Lägesrapport 2013 (Health and social welfare: A status report 2013). 2013, National Board of Health and Welfare, Stockholm.

2. Wallach VA, Mueller CW. Job characteristics and organizational predictors of psychological empowerment among paraprofessionals within human service organizations. *Adm Soc Work*. 2006; 30: 95-115.
3. Kubiak C, Sandberg F. Paraprofessional and caring practice: negotiating the use of self. *Scand J Caring Sci* 2011; 25: 653-660.
4. HSL (1982:763). Hälso- och sjukvårdslagen (Swedish Code of Statutes, Health act). The Ministry of Health. Printing works of the government offices, Stockholm.
5. SoL (2001:453). Socialtjänstlagen (Swedish Code of Statutes, Social Services). The Ministry of Health. Printing works of the government offices, Stockholm.
6. LSS (1993:387). Lag om stöd och service till vissa funktionshindrade (Swedish Code of Statutes, Act concerning support and service for disabled). The Ministry of Health. Printing works of the government offices, Stockholm.
7. Swedish National Board of Health and Welfare. Vård- och omsorgsassistenters kvalifikationer (Caregiver qualifications). 2006, National Board of Health and Welfare, Stockholm.
8. Swedish National Board of Health and Welfare. Personlig assistans som yrke (Personal assistant as a profession). 2007, National Board of Health and Welfare, Stockholm.
9. The Swedish National Agency for Education. 2012, Gymnasieskolans kurs- och läroplaner (Curriculum for the upper secondary school). Available at <http://www.skolverket.se>. Accessed 2014-06-02.
10. SOSFS (2011:12). Grundläggande kunskaper hos personal som arbetar i socialtjänstens omsorg om äldre (Qualifications for caregivers within social care of the elderly). 2011. National Board of Health and Welfare, Stockholm.

11. SOSFS (2014:12). Kunskaper hos personal som ger stöd, service eller omsorg enligt SoL och LSS till personer med funktionsnedsättning (Qualifications for caregivers within social care, service and support to persons with functional disabilities). 2014. National Board of Health and Welfare, Stockholm.
12. Swedish National Board of Health and Welfare. Borta bra men hemma bäst? En nationell granskning av hemsjukvården i Sverige (A national quality survey of the home care in Sweden). 2005, National Board of Health and Welfare, Stockholm.
13. Swedish National Board of Health and Welfare. Hemsjukvård i förändring. En kartläggning av hemsjukvården i Sverige och förslag till indikatorer (Home care in change. A survey of home care in Sweden and proposed quality indicators). 2008, National Board of Health and Welfare, Stockholm.
14. SOSFS (1997:14). Delegering av arbetsuppgifter inom hälso- och sjukvård och tandvård. (Delegated tasks within the health care and dental sector). 1997, National Board of Health and Welfare, Stockholm.
15. Bystedt M, Eriksson M, Wilde-Larsson, B. Delegation within municipality health care. *J Nurs Manag* 2011; 19:534-541.
16. Craftman AG, von Strauss E, Rudberg SL, Westerbotn M. District nurses' perceptions of the concept of delegating administration of medication to home care aides working in the municipality: A discrepancy between legal regulations and practice. *J Clin Nurs* 2012; 22: 569–578, doi: 10.1111/j.1365-2702.2012.04262.x.
17. Health and Social Care Inspectorate. Tillsynens viktigaste iakttagelser verksamhetsåret 2013 (Inspectorates report 2013). 2014. Inspektionen för vård och omsorg (IVO), Stockholm.
18. Ballangrud R, Bogsti WP, Johansson IS. Clients experiences of living at home with a mechanical ventilator. *J Adv Nurs* 2009; 65: 425-434.
19. Dybwik K, Tollåli T, Nielsen EW, Brinchmann BS. 'Fighting the system': Families caring for ventilator-dependent children and adults with complex health care needs at home

BMC Health Serv Res 2011; 11:156. doi:10.1186/1472-6963-11-156.

20. Swedberg L, Hammar Chiriac E, Törnkvist L, Hylander I. From risky to safer home care: health care assistants striving to overcome a lack of training, supervision, and support. *Int J Qual Stud Health Well-being* 2013; 8: 20758 - <http://dx.doi.org/10.3402/qhw.v8i0.20758>.

21. Lindahl B. Patients' suggestions about how to make life at home easier when dependent on ventilator treatment. *Scand J Caring Sci* 2010; 24: 684-692.

22. Ingadottir TS, Jonsdottir H. Technological dependency. The experience of using home ventilators and long-term oxygen therapy: Patients' and families' perspective. *Scand J Caring Sci* 2006; 20: 18-25.

23. Swedberg L, Hammar Chiriac E, Törnkvist L, Hylander I. Patients in 24-hour home care striving for control and safety. *BMC Nurs* 2012; 11:9. doi: 10.1186/1472- 6955-11-9.

24. Lave J, Wenger E. Situated Learning. Legitimate peripheral participation. 1991, University Press, Cambridge.

25. Brooks D, Gibson B, DeMatteo D. Perspectives of personal support workers and ventilator-users on training needs. *Patient Educ Couns* 2008; 71: 244-250.

26. Maddox C, Pontin D. Paid carers' experiences of caring for mechanically ventilated children at home: Implications for services and training. *J Child Health Care* 2013 17: 153-163.

27. Dewey J. How we think. 1933, D. C. Heath, New York.

28. Schon D. The reflective practitioner - How professionals think in action. 1983, Temple Smith, London.

29. Midgren, B. Home mechanical ventilation: A growing challenge in an aging society. *Respir Med* 2007; 101:1066-1067.

30. Swedevox andningssviktregister Årsrapport 2012 (Swedevox annual report 2012). Available at: <http://www.ucr.uu/swedevox/index.php/arsrapporter>.
31. StataCorp. Stata Statistical Software, Release 11. 2009, College Station, Texas.
32. Stone RI. The direct care worker: The third rail of home care policy. *Annu Rev Public Health* 2004; 25:521-537.
33. From I, Nordström G, Wilde-Larsson B. Caregivers in older peoples' care: perception of quality of care, working conditions, competence and personal health. *Scand J Caring Sci* 2013; 27: 704-714.
34. Kuhn TS. The structure of scientific revolution. 1996, Univ. of Chicago press, Chicago.
35. Raunkiaer M, Timm H. Interventions concerning competence building in community palliative care services - a literature review. *Scand J Caring Sci* 2012; 27: 804-819.
36. Suhonen R, Charalambous A, Stolt M, Katajisto J, Puro M. Caregivers' work satisfaction and individualised care in care settings for older people. *J Clin Nurs* 2011; 22: 479-490.
37. Lopez C, White DL, Carder PC. Direct care worker's perceptions of job satisfaction following implementation of work-based learning. *J Appl Gerontol* 2014; 33: 97-120.
38. White D, Cadiz DM. Efficacy of work-based training for direct care-workers in assisted living. *J Aging Soc Policy* 2013; 25: 281-300. doi: [10.1080/08959420.2013.816124](https://doi.org/10.1080/08959420.2013.816124).
39. Devlin M, McIlfatrick S. Providing palliative and end-of-life care in the community: The role of the homecare worker. *Int J Palliat Nurs* 2010; 16: 195-203.
40. Häggström E, Bruhn Å. Caregivers' attitudes to education and supervision in work with older people in a nursing home. *Nurse educ today* 2009; 29: 850-854.

41. Fläckman B, Fagerberg I, Häggström E, Kihlgren A, Kihlgren M. Despite shattered expectations a willingness to care for elders remains with education and clinical supervision. *Scand J Caring Sci* 2007; 21: 379-389.
42. Swedish Association of Local Authorities and Regions. Personalstatistik för kommuner (Staff statistics for municipalities). 2012, Sveriges kommuner och landsting (SKL). Available at: http://www.skl.se/vi_arbetar_med/statistik/statistik-personal/kommunal-personal/kommunal-personal-2012.
43. Kaye HS, Chapman S, Newcomer RJ, Harrington C. The personal assistance workforce: Trends in supply and demand. *Health Aff* 2006; 25:1113-1120.

Table 1. Socio-demographic and workplace background data ($n = 128$), and comparison (χ^2) between males and females.

Characteristic	Total <i>n</i> (%)	Male <i>n</i>	Female <i>n</i>
Socio-demographic background			
Sex			
Male	36 (28.1)	-	-
Female	92 (71.9)	-	-
Age			
<30	43 (33.6)	17	26
30-50	47 (36.7)	11	36
>50	38 (29.7)	8	30
Country of birth			
Sweden	75 (58.6)	22	53
Other	53 (41.4)	14	39
Educational level			
Compulsory	15 (11.9)	2	13
Secondary	83 (65.9)	25	58
University	28 (22.2)	9	19
Formal healthcare training			
Yes	58 (45.3)	9	49*
<i>Length of training: 1 month-2 years</i>	34	6	28
<i>> 2 years</i>	24	3	21
No	70 (54.7)	27	43*
Work experience (with home ventilator)			
<1 year	25 (19.7)	9	16
1-5 years	67 (52.8)	17	50
>5 years	35 (27.5)	10	25
Workplace background			
Employment			
Municipality	65 (51.6)	11*	25*
Private company	61 (48.4)	25*	36*
Assigned workplace manager			
Yes	52 (40.6)	13	39
No	76 (59.4)	23	53
Working alone			
>50%	43 (33.6)	14	29
<50%	85 (66.4)	22	63
On-the job-training (home ventilator skills)			
Yes	108 (84.4)	29	79
No	20 (15.6)	7	13
Clinical supervision			
Yes	57 (45.2)	15	42
No	69 (54.8)	21	48

* = P-value: < 0.01

Table 2. Perceived competence and perceived responsibility, tested (χ^2) towards socio-demographic and workplace background data ($n=128$).

Variables	Perceived competence <i>n</i> High/Low	p-value	Perceived responsibility <i>n</i> High/Low	p-value
<i>Socio-demographic background</i>				
Sex		0.04		0.84
Male	25/11		18/17	
Female	75/13		41/42	
Age		0.45		0.005
<30	36/6		13/29	
30-50	38/9		29/15	
>50	26/9		17/15	
Country of birth		0.32		1.00
Sweden	61/12		36/36	
Other	39/12		23/23	
Educational level		0.19		0.25
Compulsory	8/5		5/9	
Secondary	68/14		38/41	
University	22/5		15/9	
Formal healthcare training		0.23		0.35
Yes	47/8		28/23	
No	53/16		31/36	
Work experience (with home ventilator)		0.58		0.34
<1 year	22/3		8/14	
1-5 years	52/14		35/30	
>5 years	26/7		16/14	
<i>Workplace background</i>				
Employment		0.75		0.46
Municipality	51/11		27/30	
Private company	48/12		32/27	
Assigned workplace manager		0.34		0.71
Yes	44/8		24/26	
No	56/16		35/33	
Working alone		0.72		0.42
>50%	33/7		20/16	
<50%	67/17		39/43	
On-the-job training (home ventilator skills)		0.04		0.000
Yes	88/17		57/43	
No	12/7		2/16	
Clinical supervision		0.72		0.02
Yes	45/12		33/20	
No	53/12		26/39	
<i>Index score (total)</i>	<i>n (%)</i> High: 100 (80.6) Low: 24 (19.4)		<i>n (%)</i> High: 59 (50) Low: 59 (50)	

Table 3. Odds ratios (OR) with 95% confidence intervals (CI) for perceived competence, adjusted for socio-demographic and workplace background data (n=128).

Variables	Perceived competence: Full model OR (CI)	Perceived competence: Reduced model OR (CI)
Sex		
Male	1 (Reference)	1 (Reference)
Female	2.6 (0.9-7.4)*	2.4 (1.0-6.2)*
Age (years)		
< 30	1 (Reference)	
30-50	0.4 (0.1-1.6)	
> 50	0.3 (0.1-1.1)*	
Educational level		
Compulsory	1 (Reference)	
Secondary	2.2 (0.5-9.8)	
University	2.8 (0.6-14.4)	
Formal healthcare training		
No	1 (Reference)	
Yes	2.1 (0.7-6.6)	
On-the-job training		
No	1 (Reference)	1 (Reference)
Yes	3.1 (0.9-10.3)*	2.9 (1.0-8.5)*
Clinical supervision		
No	1 (Reference)	
Yes	0.8 (0.3-2.1)	
Goodness of fit (p-value)	0.41	0.58

*= P-value: < 0.1

Table 4. Odds ratios (OR) with 95% confidence intervals (CI) for perceived responsibility, adjusted for socio-demographic and workplace background data (n=128).

Variables	Perceived responsibility: Full model OR (CI)	Perceived responsibility: Reduced model OR (CI)
Sex		
Male	1 (Reference)	1 (Reference)
Female	0.5 (0.2-1.4)	0.5 (0.2-1.3)
Age (years)		
< 30	1 (Reference)	1 (Reference)
30-50	3.4 (1.0-11.6)*	4.1 (1.5-11.2)**
> 50	2.8 (0.8-9.6)	3.1 (1.0-9.0)*
Educational level		
Compulsory	1 (Reference)	
Secondary	2.0 (0.5-8.4)	
University	3.4 (0.7-16.7)	
Formal healthcare training		
No	1 (Reference)	
Yes	1.3 (0.5-3.9)	
On-the-job training		
No	1 (Reference)	1 (Reference)
Yes	13.7 (2.4-78.8)**	12.8 (2.4-68.3)**
Clinical supervision		
No	1 (Reference)	1 (Reference)
Yes	3.2 (1.3-7.7) **	3.0 (1.3-7.0) **
Goodness of fit (p-value)	0.46	0.82

*= P-value: < 0.05, **= p-value: <0.01