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Stepping up in practice: registered nurses' and nursing assistants' competence development through two-level internal training – A mixed method study

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Abstract

Background

The increasing complexity of healthcare requires managers to ensure continuous competence development among nursing staff. While formal education provides a foundation, internal training plays a critical role in meeting the specific demands of emergency care. For registered nurses (RNs) and nursing assistants (NAs), structured internal programmes at different levels offer opportunities to enhance both theoretical knowledge and practical skills necessary for high-quality, person-centred care. This study investigates the effects and experiences of self-assessed competence among registered nurses (RNs) and nursing assistants (NAs) before and after completing internal training at two levels: basic and advanced.

Methods

A mixed-methods retrospective descriptive design was used, combining quantitative analysis of pre- and post-training web surveys with qualitative content analysis of open-ended responses. Participants were RNs and NAs working in somatic care settings at a university hospital in Sweden. The internal training programmes were profession-specific and structured according to themes aligned with learning outcomes, pedagogical activities, and clinical relevance. Data were analysed using chi-square tests, t-tests, and Fisher's exact test for statistical comparison. Krippendorff's method was used to guide the qualitative content analysis.

Results

A total of 62 participants (57 NAs, 5 RNs) completed both pre- and post-training surveys. Quantitative findings indicate a significant increase in self-assessed competence across several domains, particularly in clinical reasoning, symptom recognition, and documentation. Qualitative analysis revealed that participants experienced increased confidence, knowledge integration, and a greater understanding of person-centred care. Challenges included limited time for reflection and varying digital learning conditions due to COVID-19.

Conclusion

The results suggest that internal training at both basic and advanced levels contributes positively to self-assessed competence among RNs and NAs. Profession-specific content combined with structured pedagogical design can enhance clinical readiness and support competence planning in healthcare organisations. Leadership engagement and protected time for learning remain crucial to maximise training outcomes.

Trial registration

Clinical trial number: not applicable.

Background

Given the rising complexity and specialisation of modern healthcare systems, there is an increasing need for managers to effectively secure and enhance competence in emergency healthcare. In addition to formal professional education, internal training is crucial to meet the specific demands of emergency care, ensuring that healthcare professionals can

perform tasks efficiently and safely (Woo et al., 2017). Competence development encompasses not only personal and professional skills but also the integration of ethics and subject-specific knowledge. Internal training programmes for registered nurses (RNs) and nursing assistants (NAs) provide both foundational and advanced theoretical education, as well as practical competencies essential for delivering person-centred care across various medical fields (Woo et al., 2017). In Sweden, there are two different professional categories that work closely with patients and provide care: RNs and NAs. In Sweden, RNs have completed a university education that includes a professional qualification, as well as an academic degree at Bachelor's level. NAs, on the other hand, have completed a vocational education at Upper secondary level or through adult education.

The ongoing professional development of RNs and NAs is a key element in improving healthcare quality. However, there are several barriers to RNs and NAs engaging in continuous learning. These include personal factors, such as family obligations, stress, and work-life balance challenges, as well as systemic issues like financial constraints, lack of employer support, and insufficient staffing (Caporiccio et al., 2019, Hegney et al., 2010). Additionally, many RNs are unaware of self-directed learning opportunities, feel powerless to influence care protocols, and perceive that educational activities do not meet their specific professional needs, leading to decreased motivation (Khomeiran et al., 2006).

RNs' perceptions of continuing education in clinical settings are shaped by cultural attitudes, learning definitions, and the visibility of educational programmes. These factors reflect the underlying values of clinical staff, highlighting a strong desire for a learning culture that fosters growth (Govranos & Newton., 2014). Positive triggers for learning include patient-specific concerns, workplace changes, self-awareness of knowledge gaps, and direct clinical experience (Jantzen 2019; Caporiccio et al.2019). RNs often learn through informal channels, such as engaging with colleagues, questioning peers, and learning from practical experience. The support of colleagues is highly valued as it facilitates professional development and motivation (Jantzen, 2019; Caporiccio et al., 2019).

Despite these opportunities for growth, lack of leadership support for professional development remains a significant barrier. Issues such as fragmented staff development plans, unclear career progression pathways, inadequate job descriptions, and understaffing persist within healthcare organizations (Beal &Riley, 2019, Caporiccio et al., 2019). Additionally, societal, cultural, and political support for professional growth is often inadequate (Usberg et al., 2021). Generational differences and varying levels of support throughout a nursing career further complicate the landscape of professional development (Bowles et al., 2019).

Of equal concern is the limited access to essential resources for professional development, such as relevant literature, technological tools, educational materials, time for practice, and financial support (Abebe & Bender, 2018, Beal & Riley, 2019; Bowles et al., 2019; Caporiccio et al., 2019). RNs often report feeling unsupported by colleagues, physicians and managers, further hindering their professional development (Caporiccio et al., 2019).

Additional challenges to continuous professional development include disruptions in workflow, an aging workforce, and increasing patient complexity (Cusack & Verdonk, 2020). Moreover, there is often a disconnect between educational activities and practical application, highlighting the need for more leadership and interprofessional education (Bowles et al., 2019; Sommerfeldt, 2013). An example of effective, continuous professional development is a supportive workplace environment that encourages the integration of learning into daily practice (Beal & Riley, 2019, Jantzen, 2019). Factors that facilitate continuous professional development include a positive work climate, strong collegial relationships, and access to innovative educational programmes (Fowler et al., 2015, Jantzen, 2019). In Sweden, the Government Offices have identified significant competence gaps among NAs, particularly in documentation, care and nursing knowledge, medical skills, diagnostic knowledge, and professional conduct. These gaps not only affect daily operations but also pose risks to overall care quality and patient safety (SOU, 2019:20).

Caparicco et al. (2019) argue that despite the recognised importance of continuous professional development, current practices in nursing often fail to meet the evolving needs of the workforce. RNs engage in continuous professional development with varying goals and strategies, but they frequently face structural barriers that limit their access to necessary resources and support. There is an urgent need to develop skills that facilitate the translation of new knowledge into practice and to strengthen leadership in nursing to enhance continuous professional development outcomes. Exemplary nursing practice is a shared responsibility among RNs, employers, and educational institutions, requiring robust collaboration to meet these challenges. However, such collaboration is often insufficient, contributing to gaps in continuous professional development support.

In response to the increasing demand for enhanced competence, healthcare organizations must secure the necessary competencies for RNs and NAs to ensure the delivery of high-quality, safe care. It is essential for managers to recognise the strong link between individual professional development and overall quality improvement within a healthcare setting. Strategic competence planning and education should therefore be actively incorporated at all levels of decision-making within the organization (Törstad & Björk, 2007). This study aims to explore the impact of internal training on self-assessed competence among RNs and NAs, before and after completing basic- and intermediate-level programmes. Using a mixed-methods approach, the study seeks to provide a comprehensive understanding of the barriers and facilitators to professional development in nursing from the perspective of managers. Ultimately, the goal is to inform the development of educational strategies that can improve both nursing practice and patient care outcomes.

Method

Aim

This study investigates the effects and experiences of self-assessed competence among registered nurses (RNs) and nursing assistants (NAs) before and after completing internal training at two levels: basic and advanced.

Design

This study conducted a retrospective descriptive review to explore the use of mixed methods, specifically combining quantitative analysis of survey data with qualitative content analysis of open-ended responses (Dolan et al., 2023). In healthcare research, mixed methods refer to the integration of different research strategies to collect and analyse data within a single study. In this study, quantitative methods were used to analyse structured survey data, providing an overarching view of the research question, while qualitative methods were employed to analyse open-ended responses through content analysis. This combination of methods allows for both a broad, quantitative understanding and a deeper, more nuanced insight into the underlying phenomena through qualitative data. By triangulating these different data sources, we can ensure that the results are both reliable and valid, thereby strengthening both validity and reliability. In this way, mixed methods offer a more comprehensive and nuanced understanding of the complex phenomena under investigation.

Setting and participants

RNs and NAs working within the operational areas of Medicine, Geriatrics, Emergency Department, and Infection at Sahlgrenska University Hospital and who were embarking on internal training at basic and advanced levels were identified through educational programme registration. Before the start of their educational programmes, potential participants received information about the study and a link to a web-based survey via email. A reminder was sent one week afterwards, and another email immediately after the educational programmes had ended, with a reminder one

week after that. The questions in the web survey concerned knowledge and understanding, as well as how skills were applied and performed. In the survey, participants were asked to self-assess their response options with the possibility of free-text responses (Table 1–2).

Educational programme background and content

The educational programmes were held at Sahlgrenska University Hospital, within the operational areas that care for patients with somatic disease conditions. The patients seeking care and receiving treatment are often elderly, frail, and suffer from multiple diagnoses. The programmes have been adapted to the professional needs of RNs and NAs, with internal training consisting of two levels: basic and advanced level. The course is divided into various themes that follow a logical pedagogical structure and constructive alignment with course objectives, learning activities, examinations and assessment criteria. The first level for RNs consists of five themes, and for NAs, four themes. The advanced level for RNs consists of five themes, and for NAs, six themes.

All learning topics should be linked back and contain relevant competency areas for the care assignments of the operations. The knowledge obtained is person-centred (Ekman et al. 2011) to provide the patient with good care that utilises the patient's resources and abilities. In the person-centred field of knowledge, care should be provided from an age-, gender-, social-, and cultural perspective.

Through their education, RNs and NAs should gain basic and continued knowledge and understanding about theoretical and practically applicable competence in person-centred health and medical care within specified competency areas.

The education addresses questions about how we utilise the patient's resources and abilities based on different disease conditions, examinations, and treatments. It also discusses how care should be planned, performed and evaluated together with and in agreement with the patient. The teaching can be interprofessional, where both theoretical and practical skills in person-centred health and medical care are highlighted and processed during the course.

The basic educational programmes for NAs comprise five course days with the following learning objectives: 1) Person-centred care and Symptoms and signs, 2) Basic Care, 3) Basic hygiene routines, blood contamination and multi-resistant bacteria, as well as working methods for sampling and cultures, Clean Intermittent Catheterisation (CIC) and catheter à demeure, (4) Care of the elderly patient, Activities of Daily Living (ADL).

The advanced educational programmes for NAs comprise four course days with the following learning objectives: 1) Care in acute coronary syndromes, heart failure and chronic obstructive pulmonary disease, 2) Care in stroke, thrombosis and pulmonary embolism, 3) Care in liver and intestinal diseases, 4) Care in diabetes, 5) Care in infectious diseases: sepsis, respiratory infections, soft tissue infections and gastroenteritis, 6) Care of palliative patients.

The basic educational programmes for RNs comprise six half-days of learning with the following objectives: 1) Person-centred care, Symptoms and signs, 2) Documentation, 3) Patient safety and care injuries, healthcare-related infections, falls, malnutrition, oral care, pressure sores, catheter à demeure, Central venous catheter, 4) Acute situations, allergic reactions, anaphylaxis, emergency bag, national early warning score, Mobile intensive care group, Situation, background, assessment and recommendation (SBAR) and blood transfusion, 5) Care planning, coordinated planning and nursing referral.

The advanced educational programmes for RNs comprise seven half-days of learning with the following objectives: 1) Care in acute coronary syndromes, Heart failure, chronic obstructive pulmonary disease and electrocardiogram (ECG) interpretation, 2) Care in stroke, diabetes, Deep vein thrombosis, pulmonary embolism and haematological diseases, 3)

Care in liver and intestinal diseases, 4) Care for patients in need of palliative care, 5) Care in acute infections, such as sepsis and respiratory infections.

Examples of learning activities are lectures, workshops, seminars, and exercises in practical skills. Following assessment criteria and an examination, the course leaders should be able to determine whether the course participants can practically carry out care measures according to the course plan.

In order to pass the examination, course participants should complete the documentation for and orally present the task “Link care measures to a specific disease condition and identify a risk factor”. This takes place in the group on the last afternoon of the course. The participants are at liberty to choose their own patient, the identity of whom should not be revealed in the presentation.

If course participants are absent on the day of examination, they may may complete the individual examination as a written submission. Planning for this is done in consultation with the educational programmes responsible and the care unit manager.

Data collection

During the period 2019–2023 data was collected from four basic training programmes and two advanced training programmes for NAs (with responses from 57 participants) and from three basic training programmes and one advanced training programme for RNs (with responses from five participants). In total, 100 NAs and 25 RNs participated. The collected data shows that 57 NAs and five RNs responded to the web survey before and after the educational programmes. Only responses from participants submitted before and after the educational programmes were included in the study (Table 3–4), (Fig. 1). In 2020, two internal course programmes for NAs and four internal course programmes for RNs did not generate any data due to the Covid epidemic, which led to all internal training being interrupted. Two of the RN course programmes provided no data as no RNs responded to the web survey before or after the courses (Table 5–6). For gender, age, basic degree, principal education, or years in the profession for NAs, please see Tables 7–8. For gender, age, basic degree, university, or years in the profession for RNs, please see Tables 9–10. In this study, the questions for NAs and RNs are the same for both the basic and advanced educational programmes. The advanced course is more focused on diagnoses, but the topics addressed by the questions are still included, integrated into the education as components within the relevant diagnosis.

The emergence of the Covid-19 pandemic during the data collection period impacted the educational programmes, some even having to be terminated before completion, and this resulted in missing data from these programmes. When it was possible to deliver a complete course, certain lectures were delivered digitally and organised as half-day sessions instead of the usual full-day format. These half-day sessions were held in the afternoons, following the participants’ regular morning work shifts.

Analysis

The primary method of analysis was the chi-square test for independence, utilizing Pearson’s chi-square to identify significant variances between two groups (responses at the commencement and conclusion of the educational programs). The chi-square test investigates the correlation between categorical variables. This model was selected due to its resilience and appropriateness for the data. Descriptive statistics were employed to examine background traits. To contrast background variables between the two groups, the independent samples t-test was utilised for continuous variables and Pearson’s chi-square test for independence for categorical variables. The independent samples t-test contrasts the average score of a continuous variable for two distinct groups of individuals. Fisher’s exact test was also employed for binary variables. All statistical tests were two-tailed and a p-value of less than 0.05 was deemed

significant. The statistical analysis was conducted using SPSS 22 (SPSS Inc., Chicago, IL, USA SPSS version 28.01.1 (15)).

Krippendorf's method (Krippendorf, 1980) of qualitative content analysis was utilised to systematically examine the free text responses from the participants. A comprehensive review of all questionnaires was conducted by two authors (KU and KK), leading to a discussion about the fundamental content. This led to the creation of a protocol specific to the study, which was segmented into several main themes. Subsequently, units of meaning were pinpointed and simplified into textual interpretations. These interpretations were then categorised within each theme, and further divided into subcategories when deemed necessary. Every category and subcategory in the protocol was highlighted, tallied, and summarised. The interpretation was a collaborative effort, with both authors engaging in regular discussions until a mutual agreement was reached (Table 11).

Results

Most NAs participating in the basic educational programmes were women aged 21–40 who had been working in the profession for three to four years (Table 7). In the advanced educational programmes, the majority of NAs had more than five years of experience (Table 8). The group of RNs primarily consisted of women aged 21–30 who had been working in the profession for one to three years (Table 9).

Basic educational programmes for Nursing Assistants

Before starting the basic educational programmes, the NAs expressed expectations that included a desire to acquire new knowledge, strive for further development, and a willingness to validate existing knowledge. Additionally, they articulated an ambition to share and exchange experiences, with the intention of actively engaging in learning practices, despite generally having low confidence in their abilities. The NAs' exhibited a positive and optimistic attitude towards the educational programmes, and had high hopes and goals for further knowledge acquisition. Some also emphasised the importance of meeting and interacting with other professionals to exchange experiences and build networks. Some expressed uncertainty about completing the training (Table 12).

"Learn new things and/or apply what I already know to provide good care." (participant 16)

"Meet others in my profession and exchange experiences." (participant 2)

"Being put in the hot seat and feeling that people expect you to know more than you do. Being looked down upon when you don't know certain things". (participant 1)

Prior to commencing the basic educational programmes, the NAs either expressed low self-efficacy as a concern, or no concerns at all (Table 13).

"I don't think so – attending the course will be fun." (participant 2)

The analysis indicates that the NAs' expectations were met after completing their educational programmes. They described experiencing joy of knowledge, hope for the future, gratitude, but also a sense of being overqualified. Within the category of joy of knowledge, interesting aspects such as fulfilled expectations, increased possession of knowledge, joy in learning, and partially fulfilled expectations of the educational programmes were identified. The participants also expressed hope for the future, wishing to share their experiences, participate in additional educational programmes, and have the opportunity for internships. Some participants also expressed appreciation for the education provided (Table 14).

“Yes, my expectations were met and with great joy. It was wonderful to meet professionals from other fields and share experiences.” (participant 2)

The NAs experienced no concerns after the educational programmes (Table 15).

Advanced educational programmes for Nursing Assistants

The NAs expectations of the advanced educational programs were to acquire new knowledge, deepen their existing knowledge base, validate their expertise, and develop their professional role. Additionally, there was an expectation to apply their learning and exchange experiences. The participating NAs also emphasised the importance of acquiring additional knowledge and deepening existing competencies to enhance their professional confidence. Some participants also expressed joy and gratitude for the opportunity to participate in the educational programmes, but some expressed self-efficacy (Table 16).

“Being able to gain new knowledge that I can regularly apply in my profession and implement at my workplace, as well as sharing the new knowledge with other colleagues." (participant 37)

“That I am not as knowledgeable as I need to be”. (participant 43)

Some NAs had developed a more academic language in relation to the basic educational programmes.

“Being able to access new research findings and update my knowledge to provide better care for the patient” (*participant 36*).

After the programme, most of the NAs felt that the course had been good and largely fulfilled their expectations. However, a few felt disappointed that some of their expectations had not been met, resulting in a lack of learning and less joy in knowledge acquisition. Only a handful of participants pointed out that certain desired content details were missing in the teaching, or that they felt they already had sufficient knowledge of the presented material (Table 17).

“My expectations were met and more, thank you.” (participant 26)

Prior to the advanced educational programmes, most NAs felt no concerns, and only a small number described having low confidence in their ability to learn (Table 18).

“I have no concerns about the course.” (participant 34)

After the educational programmes, they had no concerns (Table 19).

“No, it wasn’t as difficult as I had thought.” (participant 39)

Basic educational programmes for Registered Nurses

Prior to the basic educational programmes, the RNs’ expectations centred around gaining a deeper understanding of and validating their knowledge. Participants also expressed a desire to acquire increased knowledge and to develop in their professional roles (Table 20).

“To increase my knowledge.” (participant 2)

After the course, participants felt that their expectations had been met regarding updating their knowledge and the ability to prioritize. They also appreciated the interprofessional discussions that took place during the programme, indicating that these had been relevant to the profession (Table 21).

“Very good course.” (participant 2)

The RNs had no concerns before or after the course (Table 22–23).

“No concerns.” (participant 5)

Advanced educational programmes for Registered Nurses

Only one participant responded with feedback for the advanced educational programme for RNs.

Prior to the course, the RNs expectations included learning more, as in desiring deeper knowledge (Table 24).

“Deeper knowledge of person-centred care.” (participant 3)

After the course, the RNs felt that their expectations had been met (Table 25).

“Yes, they were.” (participant 3)

Basic educational programme for Nursing Assistants: survey responses

For this survey, the participants answered the same questions before and after their course. Their responses indicated increased knowledge and understanding of certain aspects of the training after the course. This was evident in their approach to theoretical and practical aspects of person-centred care, with a significant p-value of < .001 (Table 26, Question 1). This topic included philosophy, practical exercises, and the application of person-centred care. A similar result, with a p-value of < .001, was found when NAs were asked about their application of nursing interventions based on the patient’s Activities of Daily Living (ADL) abilities, such as mobility and personal hygiene (Table 26, Question 9). The education on normal aging and the care of elderly patients showed a p-value of .001 (Table 26, Question 5).

In regard to basic hygiene routines, including hand disinfection, the use of disposable gloves in appropriate situations, and the use of disposable plastic aprons during patient contact, the survey revealed an increase in knowledge with a p-value of .044 (Table 26, Question 4). This module also covered handling patients with bloodborne infections, following hygiene regulations, and caring for patients with multi-resistant bacteria. Additionally, knowledge on performing various sampling techniques, such as venipuncture, measuring blood pressure, pulse, and oxygen saturation, and collecting cultures to identify microorganisms from urine and blood, improved with a p-value of .006 (Table 26, Question 6).

However, for some training modules, there was no significant increase in knowledge and understanding. This included knowledge about the patient’s resources and abilities, meaning the patient’s capacity to manage and cope with their life situation, as well as recognizing the patient’s symptoms and signs, which are both subjective experiences and objective indications of disease that can be measured. No significant increase in knowledge was observed in the assessment of oral health and interventions to improve it, or in how NAs should act when there is a risk of a patient falling and/or developing pressure ulcers. Moreover, knowledge about different types of wounds, their treatment, and where to find wound care information remained unchanged (Table 26, Questions 2, 3).

Finally, the survey responses showed no significant increase in knowledge regarding how NAs performed and applied Clean Intermittent Catheterization, placed indwelling catheters (Foley catheters), measured temperature, Electrocardiogram, blood pressure and pulse, administered oxygen, or performed airways suctioning on the patient. Handling stomas, documenting fluid balance charts, entering patient data into medical records, and applying Situation-Background-Assessment-Recommendation also showed no significant change (Table 26, Questions 7, 8).

Advanced educational programme for Nursing Assistants: survey responses

The analysis of survey responses from the advanced educational programme for NAs, which included the same questions as the basic educational programme, indicated that the participants' knowledge and understanding of how to identify patients' resources, abilities, symptoms, and signs increased significantly, with a p-value of .008 (Table 27, Question 2). Similar results were found for the NAs' knowledge and understanding of patients' oral health, risk of falls, and the management of wounds and pressure ulcers, with a p-value of .037 (Table 27, Question 3). Participants' knowledge of how to apply and perform various sampling techniques and cultures also showed a significant increase, with a p-value of .003 (Table 27, Question 6). Additionally, their knowledge and understanding of Clean Intermittent Catheterization (CIC) and catheter placement increased, with a p-value of .038 (Table 27, Question 7).

However, there was no significant improvement in participants' knowledge and understanding of patients' resources related to person-centred care in theory and practice, basic hygiene routines, bloodborne infections, multi-resistant bacteria, and care of the elderly (Table 27, Questions 1, 4, 5). Moreover, there was no significant increase in knowledge regarding the application and performance of measuring temperature, ECG, blood pressure, pulse, administering oxygen, airway suctioning, handling stomas, documenting fluid balance charts, entering patient data into medical records, applying SBAR, and performing nursing interventions based on the patient's ADL abilities (Table 27, Questions 8, 9).

Basic and advanced educational programmes for Registered Nurses: survey responses

Neither the basic nor the advanced RN educational programme surveys yielded any results with significant p-values (Table 28–29). The questions pertained to the knowledge and understanding of how RNs work with the theory and practical application of person-centred care, as well as their understanding of patients' resources and abilities, i.e. the patient's capacity to manage and cope with their life situation. Implementing person-centred care involves establishing and documenting a care plan/health plan in dialogue with the patient. The course component, patient's symptoms and signs, addressed both the patient's subjective experiences and objective, measurable indicators of disease.

Discussion

Methodological considerations

Method Discussion

The methodology employed in this study involved a combination of quantitative and qualitative approaches to analyse the impact of internal educational programmes for NAs and RNs. The primary quantitative method used was Pearson's chi-square test for independence, chosen for its robustness in examining correlations between categorical variables. This test was crucial in identifying significant differences between responses before and after the educational programmes.

Multi-method research in healthcare science is a powerful strategy for exploring and understanding complex care-related phenomena. By combining various methods, researchers can obtain a more complete and nuanced understanding, which in turn can inform better decision-making and improve healthcare practices. The advantages of this approach lie in its ability to enrich data by providing a more comprehensive view of the research problem. Triangulation enhances credibility and validity by confirming results across multiple methods. The flexibility of this approach allows for addressing different aspects of a phenomenon. However, challenges include the necessity for

researchers to be proficient in multiple methods and capable of handling complex data collection and analysis processes. Additionally, the approach is both time-consuming and resource intensive.

Limitations and challenges

Choice of Statistical Tests

The chi-square test for independence was an appropriate choice for this study because it is well-suited to categorical data, which was the primary form of data collected through the web surveys. Its ability to determine the relationship between categorical variables made it an ideal tool for assessing the impact of the educational programmes.

Descriptive Statistics and Independent Samples t-Test

Descriptive statistics were effectively used to explore background characteristics, providing a foundational understanding of the sample demographics. The independent samples t-test allowed for a thorough comparison of continuous variables between two groups, enhancing the depth of analysis regarding background traits. Fisher's exact test for binary variables ensured that even small sample sizes were accurately analysed, which was essential given the limited number of respondents in some groups.

Use of SPSS for Statistical Analysis

Conducting the statistical analysis using SPSS 22 (and later SPSS version 28.01.1) ensured reliability and consistency in the data analysis process. SPSS is a widely recognised tool in social science research, known for its comprehensive suite of statistical tests and user-friendly interface, which added credibility to the findings.

Impact of the Covid-19 Pandemic

The emergence of the Covid-19 pandemic significantly disrupted the data collection process. While the pandemic did not affect the content presented in the conducted training sessions, it had a significant impact on how the instruction was organised. The educational programmes were either prematurely terminated or conducted in altered formats, which affected the continuity and comparability of the data. While necessary, the shift to digital half-day sessions could have influenced participants' engagement and responses, introducing a variable that was not present in pre-pandemic data. Research shows that having to instruct in this manner, under conditions of high workload and time constraints, can lead to increased stress and poorer learning outcomes (Gourlay & Murphy, 2019). Cognitive abilities such as attention, memory and problem-solving skills may deteriorate, directly affecting how individuals absorb new information during instruction (LeBlanc, 2009).

Previous research indicates that digital education can generally be as effective as classroom-based teaching. However, students' performance may decline if they are not provided with sufficient support or opportunities for interaction with teachers and peers (Bernard, 2004, Swan, 2001). It has also been shown to be crucial for educators to apply strategies in their teaching that promote students' ability to reflect on the presented content (Garrison, & Cleveland-Innes, 2005).

Sample Size and Response Rate

The study faced limitations in terms of sample size and response rate. Out of the total 125 participants, only 62 provided responses before and after the educational programmes. The low response rate, particularly among nurses, limited the generalizability of the findings. Additionally, the absence of data from several educational programmes due to pandemic interruptions further constrained the sample size, potentially affecting the statistical power of the analysis.

Some participants did not respond to the survey or participated only once. This attrition may be attributed to several factors. Time constraints and a lack of available time, combined with inadequate routines for regularly checking emails,

may have contributed to the non-response. This is consistent with the findings of Beal &Riley (2019), as well as Caporiccio et al. (2019), who identify inadequate job descriptions and understaffing as factors that negatively impact professional development. Additional factors that could have influenced the response rate include technical difficulties in accessing the survey, uncertainty regarding the survey's purpose or perceived relevance, and a belief that their responses would not impact the results.

For participants who responded only once, a possible explanation could be that they felt they had already sufficiently expressed their opinions and saw no need for further participation. It is also possible that some participants simply forgot to respond or did not perceive the questions as relevant to them.

To improve response rates in future surveys, it would be valuable to further investigate these potential barriers and to develop strategies for more effectively engaging and reminding participants. Previous research shows that response rates are often linked to participants' interest in the survey, how the survey was communicated, whether reminders were issued, and the possibility of receiving a reward for participation (Saleh & Bista, 2017).

Qualitative Analysis

Krippendorf's Method

Krippendorf's method of qualitative content analysis (Krippendorf, 1980) provided a systematic approach to examining free text responses. This method was beneficial in identifying key themes and patterns within the qualitative data, contributing to a more nuanced understanding of participant experiences and perceptions.

Collaborative Interpretation

The collaborative effort between two authors (KU and KK) in reviewing and interpreting the data ensured a rigorous and balanced analysis. Regular discussions and mutual agreements minimised bias and enhanced the reliability of the qualitative findings. However, this subjective element of qualitative analysis can still introduce potential biases despite efforts to mitigate them.

The methodological approach adopted in this study was comprehensive and well-suited to the research objectives. The combination of quantitative and qualitative methods provided a robust framework for analysing the impact of educational programmes on NAs and RNs. By triangulating these different data sources, we can ensure that the results are both reliable and valid, thereby strengthening both validity and reliability. In this way, mixed methods offer a more comprehensive and nuanced understanding of the complex phenomena under investigation.

Despite the challenges posed by the Covid-19 pandemic and limitations in sample size, the study's methodology was sound and appropriately addressed the research questions. Future studies could benefit from larger sample sizes and more stable data collection environments to further validate these findings.

Results discussion

Development opportunities and challenges in the employee's learning process and the role of the learning person

Increased learning

A key finding of this study was that both NAs and RNs reported increased learning after completing the training programme. Offering workplace-based, competence-enhancing education appears to be a sustainable approach to fostering learning among healthcare professionals. NAs in particular experienced significant learning advancements – a result supported by previous research from Bing-Jonsson et al. (2023). Their study demonstrates that workplace-based

education can promote lifelong learning, with methods such as blended learning (encompassing lectures, e-learning, supervision, and practical training) playing a crucial role in the success of such programmes.

Such enhanced knowledge is expected to positively influence both the professional development of staff and the quality of practical patient care. Furthermore, deeper knowledge can improve collaboration across professional categories and facilitate constructive dialogues with patients' relatives. Both NAs and RNs expressed a shared need to disseminate knowledge to colleagues and other relevant personnel. This aligns with the findings of Jantzen (2019) and Caporiccio et al. (2019), who noted that RNs frequently acquire knowledge through informal means, such as interacting with peers, asking questions, and learning from hands-on experience. The support provided by colleagues is greatly appreciated, as it plays a crucial role in fostering professional growth and enhancing motivation (Jantzen, 2019; Caporiccio et al., 2019).

Additionally, research by Kalisch et al. (2013) highlights that targeted training for RNs to develop skills for educating healthcare staff, such as role-playing to improve communication, understanding team behaviour, leadership development, and strategies to prevent lapses in care, can strengthen teamwork. These efforts have also been shown to reduce the incidence of missed care over time while enhancing team members' satisfaction with their work and increasing their knowledge of effective team collaboration.

Understanding the fundamentals and local applications of documentation involved understanding how the patient's medical record is documented according to established legislation and how it is applied within the organisation. This may involve the documentation of an appropriate care plan based on the patient's needs, such as establishing plans for wound care or nutrition. The topic of patient safety and healthcare-associated injuries addressed how care should be made safe so that patients do not suffer harm. One way to apply patient safety and prevent healthcare-associated injuries was to work with the Swedish Association of Local Authorities and Regions (SKR) action packages according to national guidelines, which include measures to prevent multi-resistant infections, working in a sterile and scrupulously clean manner, and practising practical hand hygiene.

Nurses should be able to explain and evaluate the causes of the symptoms and signs reported by the patient or other healthcare personnel, as well as how to investigate them. Moreover, they should be able to explain and evaluate symptoms and signs, and apply appropriate nursing interventions to care for patients in need of acute care. Finally, RNs should be able to explain and evaluate the patient's need for care planning, such as the need for medical interventions and/or nursing interventions after discharge from the hospital.

Increased understanding of the value of knowledge

The results indicated that NAs who had achieved the advanced level of their training began using a more academic language. They emphasised that the knowledge acquired during the internal training was intended to be applied in practical workplace settings, with the goal of improving patient care. A possible explanation for this is that any educational programmes the NAs may have previously attended could have contributed to an increased understanding of the value and potential of knowledge. Further, the connection between theoretical knowledge and practical work may have been enhanced, thereby strengthening the ability to integrate new insights into daily caregiving practices.

When NAs undergo educational programmes focusing on improving patient safety, the role of RNs in the care process is significantly enhanced, leading to an expanded knowledge base within the team of NAs and RNs. When NAs understand the language used by RNs, it becomes easier for RNs to lead and instruct them. Consequently, RNs can confidently delegate tasks, knowing that they will be carried out as desired. This results in improved patient care and understanding. A supportive work environment that encourages the integration of learning into daily practice can facilitate effective continuous professional development (Beal & Riley, 2019; Jantzen, 2019).

Several NAs expressed great joy at the opportunity to participate in the internal training programme and acquire new knowledge. A possible explanation for this could be the limited availability of educational opportunities for this professional group or uncertainty in their occupational roles due to a lack of knowledge. Previous research indicates that gaining new knowledge can contribute to feelings of joy, although the learning process may involve challenges before individuals recognise that the new knowledge leads to tangible progress. The joy of learning encompasses both the ability to influence one's own learning process and the experience of being positively influenced by external factors. It may also involve a sense of belonging to a community and an overall sense of well-being. Further, the joy of learning can be enhanced by an engaged and supportive instructor who structures and organises the learning process in ways that facilitate knowledge development (Cronqvist, 2024).

On both the basic and advanced educational programmes, some NAs expressed concerns that their knowledge levels might not be sufficient to meet the course requirements. They also described a fear of being negatively judged by other participants, if they failed to demonstrate mastery of the entire educational programme. In contrast, the results for RNs showed no such tendencies. Similar patterns are evident in research on medical students, where feelings of uncertainty and perceptions of insufficient knowledge and skills have been identified (Weurlander et al., 2019).

Difficulty in absorbing knowledge

The survey results indicated that NAs demonstrated a limited learning response during their basic training in specific areas, such as knowledge and understanding of resources, skills in recognising symptoms and signs, knowledge and understanding of oral health, fall risk, wounds and pressure ulcers, performing and applying clean intermittent catheterisation (CIC) and catheterisation, as well as performing and applying procedures like measuring temperature, electrocardiograms (ECG), blood pressure, pulse, suction and oxygen therapy, stoma care, fluid balance charts, documentation of measured values, and using the SBAR communication tool (Table 26, Questions Q2, Q3, Q7, and Q8).

Similarly, during the advanced educational programmes, NAs exhibited a limited learning response in areas including knowledge and understanding of person-centred care in theory and practice, knowledge and understanding of basic hygiene routines, bloodborne infections, and multidrug-resistant bacteria, knowledge and understanding of the older patient, and performing and applying procedures such as measuring temperature, ECG, blood pressure, pulse, suction and oxygen therapy, stoma care, fluid balance charts, documentation of measured values, and SBAR, as well as implementing nursing measures based on the patient's ADL (Activities of Daily Living) capacity (Table 27, Questions Q1, Q4, Q5, Q8, and Q9). For the specific question regarding performing and applying procedures such as measuring temperature, ECG, blood pressure, pulse, suction and oxygen therapy, stoma care, fluid balance charts, documentation of measured values, and SBAR, NAs demonstrated a limited learning process on both the basic and advanced courses (Table 27, Question Q8). These limited learning processes can be seen as barriers to engaging in continuous learning, as highlighted by Caporiccio et al. (2019) and Hegney et al. (2010). Personal factors, such as family responsibilities, stress, and challenges with work-life balance, alongside systemic issues like financial constraints, lack of employer support, and inadequate staffing, all contribute to these obstacles (Caporiccio et al., 2019; Hegney et al., 2010).

The only area in which NAs displayed competence, both in the basic and advanced training, was the performance and application of sampling techniques and cultures (Table 26, 27, Question Q6). This may be attributed to the opportunity to practice and perform these tasks during their formal training and in their roles as NAs.

One reason for the NAs' knowledge gaps in certain practical and theoretical areas of both the basic and advanced courses could be insufficient foundational knowledge acquired in their initial training, which may prevent them from assimilating new knowledge effectively. Interestingly, NAs on the basic programmes demonstrated better knowledge in areas such as person-centred care in theory and practice, basic hygiene routines, bloodborne infections, multidrug-resistant bacteria, understanding the older patient, and implementing nursing measures based on the patient's ADL

capacity than NAs on the advanced programmes (Table 26, 27, Questions Q1, Q4, Q5, and Q9). Possibly, this discrepancy could be due to the difficulty of applying theoretical knowledge in patient encounters, where real-life scenarios are often more complex than theoretical frameworks suggest, especially when certain foundational knowledge is lacking. In our study, the results for the RNs were not similar to that of the NAs.

The results from the basic educational programmes for NAs indicated that, upon completing the course, the participants were joyful and grateful for having acquired this new knowledge and were hopeful about the future, but that they also had a sense of being overqualified. The reporting of this sense of being overqualified is particularly noteworthy given that the survey results revealed limited learning responses in certain areas, such as Knowledge and understanding of resources, abilities, symptoms, and signs; Knowledge and understanding of oral health, fall risks, wounds, and pressure ulcers; Application and performance of ECG and catheterization; and Application and performance of tasks such as measuring temperature, ECG, blood pressure, pulse, suction, oxygen therapy, stoma care, fluid monitoring, documentation of measured values, and SBAR (Table 26, Questions Q2, Q3, Q7, and Q8). Similarly, some NAs on the advanced educational programmes reported already having sufficient knowledge of the presented material, even though the learning responses remained low for areas such as Knowledge and understanding of person-centred care in theory and practice; Knowledge and understanding of basic hygiene practices, bloodborne infections, and multidrug-resistant bacteria; Knowledge and understanding of elderly patients; Application and performance of tasks such as measuring temperature, ECG, blood pressure, pulse, suction, oxygen therapy, stoma care, fluid monitoring, documentation of measured values, and SBAR; and Application of nursing interventions based on the patient's ADL capabilities (Table 27, Questions Q1, Q4, Q5, Q8, and Q9).

In contrast, the results for RNs showed no such tendencies. Research on nursing students' learning indicates that their self-assessed competence sometimes deviates from the actual competence demonstrated during examinations (Forsman, 2020). Individuals may overestimate their abilities without fully recognising their actual limitations. However, training that incorporates practical components can enhance individuals' understanding of their own capabilities and limitations (Kruger & Dunning, 1999). To stimulate critical thinking, improve diagnostic reasoning, refine clinical judgment, and strengthen decision-making, it is essential to employ diverse teaching strategies, with the choice of strategies tailored to the skills being developed among the participants (Giuffrida et al., 2023).

Competence at the right level

In many other countries, the nursing staff comprise different groups of nurses, such as RNs and NAs and/or practical nurses with differences in educational levels and work tasks (Bragadóttir & Kalisch, 2018, McHugh et al., 2021, Smith et al., 2020). The education required to become an RN in Sweden is provided through a three-year academic programme at university level. In contrast, training to become an NA is offered at upper secondary school level or through vocational education programmes. A notable difference in educational levels between RNs and NAs is reflected in their respective areas of competence. RNs receive more comprehensive training, enabling them to perform advanced assessments, analyse clinical situations, and understand complex interactions in healthcare (Svensk sjuksköterskeförening, 2024). NAs, on the other hand, undergo education focused on task-oriented knowledge aimed at providing close patient care (Socialstyrelsen, 2021).

In our study, no significant correlation was identified between the educational backgrounds of NAs, i.e. whether they had completed secondary school training or a vocational program, and outcomes. This suggests that the nature of their education does not necessarily impact their ability to perform tasks within the focus area of the study.

In Swedish healthcare there is a potential gap between the expectations of employers and stakeholders regarding the competency level of NAs and the actual skills acquired through their basic education. This indicates a need to strengthen education for NAs in specific subject areas to optimize their professional contributions and ensure high-

quality care. A government investigation in Sweden highlighted significant competency gaps among NAs, particularly in areas such as documentation, nursing and care knowledge, medical skills, diagnostic understanding, and professional conduct (SOU 2019:20). These deficiencies not only affect daily tasks but may also impact overall care quality and patient safety.

It is incumbent upon stakeholders and employers to ensure that the competencies of healthcare staff align with the tasks they are expected to perform, thereby maintaining an efficient and high-quality healthcare system. Research supports the expectation that RNs should perform advanced medical and nursing interventions, as there is insufficient evidence to show that NAs can perform these tasks with the same quality and safety as licensed healthcare professionals.

In an investigation into differences in assessments of missed nursing care, a greater proportion of RNs than NAs reported that patients had not received the care they were entitled to (Nymark et al., 2023). Multiple studies indicate that care quality risks deterioration when the number of RNs is reduced or their working hours are limited, emphasising the importance of appropriate competency levels and task distribution to maintain safe patient care (McCloskey & Diers, 2005; Carlström et al., 2020).

Managing employee learning processes

Shifting learning needs

One of the most significant challenges in managing employee learning processes is addressing the diverse learning needs within a cohort. NAs and RNs come with varying levels of experience and expertise. The results of our study indicated that some NAs felt overqualified for certain parts of the training, suggesting a mismatch between the training content and individual participants' knowledge levels. This diversity necessitates a more tailored approach to training, potentially involving pre-assessment of skills and personalised learning paths to ensure that all participants are equally challenged and engaged.

Sustaining engagement and motivation

Maintaining high levels of engagement and motivation among employees throughout the training process can be challenging. While many NAs started with a positive and optimistic attitude, their sense of being overqualified and having unmet expectations could lead to decreased motivation. To maintain their enthusiasm and commitment to learning it is crucial for management to continuously engage with employees, gather feedback, and adapt the training programmes accordingly.

Transfer of knowledge to practice

Another critical issue is the transfer of theoretical knowledge into practice. While the surveys indicated significant knowledge gains in several areas, they also indicated gaps in applying this knowledge in practice. This suggests that training programmes may need to incorporate more practical components, simulations, and real-life scenarios to help bridge the gap between theory and practice. Additionally, ongoing support and mentorship after the training can reinforce learning and ensure effective implementation in daily work.

Managing the organisation's role in the learning process

Resource allocation and support

Adequate resource allocation and managerial support are fundamental to the success of a training programme. Some participants highlighted a lack of support and insufficient content, pointing to potential issues in how the organisation prioritises and allocates resources for training. Management needs to ensure that sufficient time, financial resources, and personnel are dedicated to developing and delivering high-quality training programmes. Without this support, even the best-designed training programmes may fail to achieve their intended outcomes.

In-house training programmes play a pivotal role in addressing the challenges faced by public healthcare systems. One significant reason is the increasing trend of nurses leaving public healthcare providers for employment with private care providers or staffing agencies. This workforce migration results in a reduced capacity to manage patients with complex healthcare needs and limits opportunities for conducting clinical research within the public sector. Further, this situation often leads to newly graduated nurses being introduced to the profession by less experienced staff. The shortage of experienced supervisors also poses challenges for healthcare organisations in accommodating and providing adequate guidance to students during their education (SoS, 2024).

Continuous improvement and adaptation

The dynamic nature of healthcare demands that training programmes are continuously reviewed and updated to reflect the latest best practices, technologies, and patient care standards. The results of our study revealing unmet expectations and areas with no significant knowledge gains suggest that the current training programmes may be lagging in certain aspects. Implementing a feedback loop whereby employee feedback is actively sought and used to improve the training content and delivery is crucial. This iterative process ensures that the training remains relevant and effective.

Balancing standardisation and customisation

Balancing the need for standardised training to ensure consistency and the need for customisation to address individual learning needs is a complex challenge. Standardised training ensures that all employees receive the same foundational knowledge and skills, which is essential for maintaining a high standard of care. However, as the results indicate, a one-size-fits-all approach can lead to feelings of being overqualified or of having unmet learning needs. Management must find a balance by providing core standardised content while allowing for customisation and flexibility to address specific areas of interest or need for different employee groups.

Study limitations

A more comprehensive dataset could have been obtained if all participants had responded to the online survey both before and after the course, particularly within the group of RNs. A contributing factor to the non-response was the Covid-19 pandemic, which affected the implementation of certain courses, and in some cases prevented them from being conducted entirely. Despite these challenges, the results obtained remain valuable for further analysis and application.

Conclusion

The study’s findings highlight the perceived effects of internal training on the self-assessed competence of registered nurses and assistant nurses, before and after completing their training. Consistent with previous research, the results confirm that learning is a complex process influenced by multiple factors. The study particularly emphasises the complexity and challenges associated with managing the learning process, whereby addressing individual learning needs, maintaining long-term engagement, and effectively transferring new knowledge into practice are key aspects. Leadership plays a crucial role in ensuring appropriate resource allocation, continuous quality improvement of training

programmes, and balancing standardisation with individual adaptation in learning. By addressing these challenges, healthcare organisations can optimise their training initiatives, which in turn may lead to increased staff competence, improved job satisfaction, and ultimately, higher-quality patient care (Fig. 2).

Clinical implications

- **Tailored training programmes**: Implement personalised learning paths and pre-training assessments to address the diverse backgrounds and experience levels of nursing staff.
- **Enhanced practical training**: Incorporate hands-on components, simulations, and real-life scenarios to bridge the gap between theoretical knowledge and practical application.
- **Continuous feedback and adaptation**: Establish robust feedback mechanisms to regularly update and improve training programmes based on participant input and evolving healthcare standards.

List of abbreviations

Registered nurses (RNs).

Nursing assistants (NAs).

Declarations

Declarations

Ethics approval and consent to participate

The study was conducted in accordance with the principles of the Helsinki Declaration (World Medical Association, 2002). All participants received written information about the study via email before the first day of the educational programmes and oral information at the start of the course. Participants were informed that participation was voluntary and that they could withdraw or refrain from participating in the study without explaining why. Furthermore, their responses would be treated confidentially, and it was not possible to trace the responses back to an individual. The study was approved by the The Swedish Ethical Review Board (2019-04-23 Dnr:2019 – 01369). The web-based survey responses are stored on a secure server (Esmaker) and are only accessible by the research leaders. The project is registered in the project database for research and development (R&D) in the Västra Götaland region with Dnr: 255041.

Consent for publication

Not applicable

Competing interests

The authors declare that they have no competing interests" in this section.

Author Contribution

Kjell Klint (KK) and Kerstin Ulin (KU) have contributed to all parts of the manuscript and therefore meet the BMC journals' authorship criteria. This means they have made substantial contributions to the conception and/or design of the work; the acquisition, analysis, or interpretation of data; or to drafting the manuscript or making significant revisions.KK and

KU have approved the submitted version of the manuscript—along with any substantially modified version involving their contributions—and accept personal accountability for their own work. They also commit to ensuring that any questions regarding the accuracy or integrity of any part of the work, even those in which they were not directly involved, are properly investigated, resolved, and documented.

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Data Availability

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

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Tables

Table 1. Questions about learning before and after educational programmes för Nursing Assistants

	Before and after educational programmes: Do you think you have the ability to…	To a very high degree	To quite a high degree	To quite a low degree	To a very low degree	Unable to rate
Q1	Q1 - Knowledge and understanding of person-centred care in theory and practice	☐	☐	☐	☐	☐
Q2	Q2 - Knowledge and understanding of resources, abilities, symptoms and signs?	☐	☐	☐	☐	☐
Q3	Q3 - Knowledge and understanding of oral health, fall risk, wounds and pressure ulcer	☐	☐	☐	☐	☐
Q4	Q4 - Knowledge and understanding of basic hygiene routines, blood infection and multi-resistant bacteria	☐	☐	☐	☐	☐
Q5	Q5 - Knowledge and understanding of the elderly patient	☐	☐	☐	☐	☐
Q6	Q6 - Apply and perform sampling techniques and microbiological tests	☐	☐	☐	☐	☐
Q7	Q7 - Apply and perform CIC and catheter	☐	☐	☐	☐	☐
Q8	Q8 - Apply and perform: take temperature, ECG, blood pressure, pulse, suction and oxygen, stoma, fluid lists and documentation of values taken and SBAR	a ☐	☐	☐	☐	☐
Q9	Q9 - Apply nursing measures based on the patient's ADL ability	☐	☐	☐	☐	☐
Q10	*Before educational programmes* Q10 - What are your expectations of the course?	☐	☐	☐	☐	☐
Q11	Q11 - Do you have any concerns about the course?	☐	☐	☐	☐	☐
Q12	*After educational programmes* Q12 - Were your expectations of the course met?	☐	☐	☐	☐	☐
Q13	Q13 - Did your fears show up on the course?	☐	☐	☐	☐	☐

Table 2. Questions about learning before and after educational programmes for Registered Nurses

	Before and after educational programmes: Do you think you have the ability to…	To a very high degree	To quite a high degree	To quite a low degree	To a very low degree	Unable to rate
Q1	Q1 - Knowledge and understanding of person-centred care in theory and practice	☐	☐	☐	☐	☐
Q2	Q2 - Knowledge and understanding of resources, abilities, symptoms and signs	☐	☐	☐	☐	☐
Q3	Q3 - Knowledge and understanding of documentation basics and local applications	☐	☐	☐	☐	☐
Q4	Q4 - Knowledge and understanding of patient safety and care injuries	☐	☐	☐	☐	☐
Q5	Q5 - Apply documentation in the form of a joint care plan/health plan?	☐	☐	☐	☐	☐
Q6	Q6 - Apply patient safety and prevention of care injuries according to SKL's action package. Multidrug-resistant infections. Sterile and highly clean. Practical hand hygiene?	☐	☐	☐	☐	☐
Q7	Q7 - Apply nursing measures in emergency care	☐	☐	☐	☐	☐
Q8	Q8 - Apply appropriate care plan	☐	☐	☐	☐	☐
Q9	Q9 - Explain, evaluate causes and investigate the symptoms and signs reported by the patient or as assessed by healthcare professionals?	☐	☐	☐	☐	☐
Q10	Q10 - Explain, evaluate symptoms and signs for patients in need of emergency care	☐	☐	☐	☐	☐
Q11	Q11 - Explain and evaluate the patient's need for care planning	☐	☐	☐	☐	☐
Q12	***Before educational programmes*** Q12 - What are your expectations of the course	☐	☐	☐	☐	☐
Q13	Q13 - Do you have any concerns about the course	☐	☐	☐	☐	☐
Q14	***After educational programs*** Q14 - Were your expectations of the course met	☐	☐	☐	☐	☐
Q15	Q15 - Did your fears show up on the course	☐	☐	☐	☐	☐

Table 3. Response rate - Nursing Assistants

Educational programme type	Time	Number of educational programme participants	Only answers before the educational programmes	Only answers after educational programmes	Answers before and after the educational programmes
Basic n	Autumn 2019	14	2	0	9
Basic n	Autumn 2021	19	4	3	10
Basic n	Autumn 2022	7	0	0	5
Basic n	Autumn 2023	14	3	1	7
Advanced n	Spring 2022	24	5	2	15
Advanced n	Spring 2023	22	6	3	11

Table 4. Response rate – Registered Nurse

Educational programme type	Time	Number of educational programme participants	Only answers before the educational programmes	Only answers after educational programmes	Answers before and after the educational programmes
Basic n	Autumn 2021	7	1	0	1
Basic n	Autumn 2022	6	0	2	1
Basic n	Autumn 2023	5	0	0	2
Advanced n	Spring 2023	7	1	0	1

Table 5. Educational programmes for which no response has been generated – Nursing Assistants

Educational programme type	Time	Number of educational programme participants	Answer only before educational programmes	Answer only after educational programmes	Answers before and after the educational programmes
Advanced n	Spring 2020	21	14	No course	0
Advanced n	Spring 2020	1	3	No course	0

Table 6. Educational programmes for which no response has been generated – Registered Nurses

Educational programme type	Time	Number of educational programme participants	Answer only before educational programmes	Answer only after educational programmes	Answers before and after the educational programmes
Basic n	Autumn 2019	10	4	0	0
Basic n	Autumn 2020	12	9	No course	0
Advanced n	Spring 2022	6	4	1	0

Table 7. Background characteristics of participants: basic programme for Nursing Assistants

Participants	n=31
Female, n (%)	27 (87.1)
Male n (%)	4 (12.9)
Age 21–30 n (%)	9 (29)
Age 31–40 n (%)	15 (48.4)
Age 41–50 n (%)	5 (16.1)
Age 51–60 n (%)	2 (6.5)
Age 51–60 n (%)	0 (0)
Basic education n (%)	30 (96.8)
Specialist education n (%)	1 (3.2)
High school n (%)	9 (29)
Vocational education n (%)	22 (71)
Years in the profession 0–1 n (%)	6 (19.4)
Years in the profession 1–2 n (%)	2 (6.5)
Years in the profession 3–4 n (%)	13 (41.9)
Years in the profession 5–9 n (%)	4 (12.9)
Years in the profession 10–50 n (%)	6 (19.4)

Table 8. Background characteristics of participants: advanced programme for Nursing Assistants

Participants	n=26
Female, n (%)	25 (96.2)
Male n (%)	1 (3.8)
Age 21–30 n (%)	3 (11.5)
Age 31–40 n (%)	9 (34.6)
Age 41–50 n (%)	8 (30.8)
Age 51–60 n (%)	3 (11.5)
Age 51–60 n (%)	3 (11.5)
Basic education n (%)	25 (96.2)
Specialist education n (%)	1 (3.8)
High school n (%)	16 (61.5)
Vocational education n (%)	10 (38.5)
Years in the profession 0–1 n (%)	1 (3.8)
Years in the profession 1–2 n (%)	0 (0)
Years in the profession 3–4 n (%)	6 (23.1)
Years in the profession 5–9 n (%)	9 (34.6)
Years in the profession 10–50 n (%)	10 (38.5)

Table 9. Background characteristics of participants: basic programme for Registered Nurses

Participants	4
Female, n (%)	4 (100)
Male n (%)	0 (0)
Age 21–30 n (%)	3 (75)
Age 31–40 n (%)	1 (25)
Age 41–50 n (%)	0 (0)
Age 51–60 n (%)	0 (0)
Age 51–60 n (%)	0 (0)
Basic education n (%)	4 (100)
Specialist education n (%)	0 (0)
University of Gothenburg n (%)	2 (50)
Other university n (%)	2 (50)
Years in the profession 0–1 n (%)	0 (0)
Years in the profession 1–2 n (%)	3 (75)
Years in the profession 3–4 n (%)	1 (25)
Years in the profession 5–9 n (%)	0 (0)
Years in the profession 10–50 n (%)	0 (0)

Table 10. Background characteristics of participants: advanced programme for Registered Nurses

Participants	1
Female, n (%)	1 (100)
Man n (%)	0 (0)
Age 21–30 n (%)	1 (100)
Age 31–40 n (%)	0 (0)
Age 41–50 n (%)	0 (0)
Age 51–60 n (%)	0 (0)
Age 51–60 n (%)	0 (0)
Basic education n (%)	1 (100)
Specialist education n (%)	0 (0)
University of Gothenburg n (%)	0 (0)
Other university n (%)	1 (100)
Years in the profession 0–1 n (%)	1 (100)
Years in the profession 1–2 n (%)	0 (0)
Years in the profession 3–4 n (%)	0 (0)
Years in the profession 5–9 n (%)	0 (0)
Years in the profession 10–50 n (%)	0 (0)

Table 11. Examples of the interpretation process

Meaning Units	Condensed	Codes	Categories
To gain more knowledge about my profession	Acquire more knowledge	Learn more	Learn more – learn new
Being able enhance my skills within the profession	Strengthen my knowledge	Reinforce knowledge	Validate skills
I want to try and explore other workplaces	Test	Apply new knowledge	Practice learning

Table 12. Before: Expectations of the basic educational programmes, Nursing Assistants

Category	Subcategory	Number of participants
Learn more – learn new	Lean more	4
	Learn new	5
	Get the right knowledge	1
	Interesting	2
	High expectations	4
	Educational	1
	Good goal achievement	1
	Repetition	4
	Reinforce knowledge	2
Exchange experiences	Meet others in the professional group	1
	Exchange experiences	1
Practise learning	Apply new knowledge	2
	Develop competence	2
	Hospitalise	1

Total number ***31***

Table 13. Before: Concerns about the basic educational programmes, Nursing assistants

Category	Subcategory	Number of participants
Low confidence in own ability	Have concerns	2
	Uncertain expectations	4
No concerns	No concerns	12

Total number ***18***

Table 14. After: Expectations of the basic educational programmes, Nursing Assistants

Category	Subcategory	Number of participants
Joy of knowledge	Expectations were met	8
	Increased learning	3
	Joy of learning	3
	Expectations were met to some extent	1
Future hope	Share experiences	1
	Desire additional courses	1
	Wish to hospitalise	2
Gratitude	Grateful for the education	2
Overqualified	Incorrect level of education	1
	Educational gaps	1

Total number ***23***

Table 15. After: Concerns about the basic educational programmes, Nursing assistants

Category	Subcategory	Number of	participants
No concerns	No concerns	9	

Total number ***9***

Table 16. Before: Expectations of the advanced educational programmes, Nursing Assistants

Category	Subcategory	Number of participants
Learn new – learn more	Learn new things	8
	Learn more	8
	In-depth knowledge	6
	Develop	6
	Increased security	6
	Updated knowledge	1
	Repetition	2
Development of the professional role	Develop the professional role	2
Practise learning	Use knowledge regularly	1
	Apply the knowledge	2
	Practise the knowledge	2
Exchange experiences	Share knowledge	1
Gratitude	Gratitude	1
	Joyfully	1
Total number	***47***	

Table 17. Before: Concerns about the advanced educational programmes, Nursing Assistants

Category	Subcategory	Number of participants
No concerns	No concerns	12
Low confidence in their ability to learn	Insecure	3
	Lack of knowledge	1
Total number	***16***	

Table 18. After: Expectations of the advanced educational programmes, Nursing Assistants

Category	Subcategory	Number of participants
Joy of knowledge	Expectations were met	10
	Good education	11
Disillusioned: expectations not met	More practical education	1
	Too basic	2
	Missing some subjects	1
Growing learning	Increased knowledge	4
	Developing	3
	Educational	5
	New ideas	1
	Practical application	1

Total number ***39***

Table 19. After: Concerns about the advanced educational programmes, Nursing Assistants

Category	Subcategory	Number of participants
No concerns	No concerns	8

Total number ***8***

Table 20. Before: Expectations of the basic educational programmes, Registered Nurses

Category	Subcategory	Number of participants
Deeper understanding	Increased knowledge	2
	Develop	1
Validate knowledge	Repetition	1

Total number ***4***

Table 21. After: Expectations of the basic educational programme, Registered Nurses

Category	Subcategory	Number of participants
Fulfilled expectations	Good course	2
	Good information	2
Updated knowledge	Repetition	1
Prioritise professional discussion	Relevant discussions	1

Total number ***6***

Table 22. Before: Concerns about the basic educational programmes, Registered Nurses

Category	Subcategory	Number of participants
No concerns	No concerns	3

Total number ***3***

Table 23. After: Concerns about the basic educational programmes, Registered Nurses

Category	Subcategory	Number of participants
No concerns	No concerns	3

Total number ***3***

Table 24. Before: Expectations of the advanced educational programmes, Registered Nurses

Category	Subcategory	Number of participants
Learn more	In-depth knowledge	1

Total number ***1***

Table 25. After: Expectations of the advanced educational programmes, Registered Nurses

Category	Subcategory	Number of participants
Fulfilled expectations	Expectations were met	1

Total number ***1***

Table 26. Summary of questionnaire responses at the beginning and end of the educational programmes – NAs basic

	Very high degree		Rather high degree		Rather low degree		Very low degree		Cannot take a stand		p-value
	Course start	Course end	Course start	Course end	Course start	Course end	Course start	Course end	Course start	Course end	
Q1, n (%)	10 (32.3)	14 (45.2)	21 (67.7)	15 (48.4)	0 (0.0)	2 (6.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	< .001
Q2, n (%)	8 (25.8)	13 (41.9)	16 (51.6)	13 (41.9)	7 (22.6)	2 (6.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	.256
Q3, n (%)	13 (41.9)	14 (45.2)	16 (51.6)	15 (48.4)	2 (6.5)	2 (6.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	.063
Q4, n (%)	17 (54.8)	20 (64.5)	14 (45.2)	9 (29.0)	0 (0.0)	2 (6.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	.044
Q5, n (%)	19 (61.3)	19 (61.3)	12 (38.7)	10 (32.3)	0 (0.0)	2 (6.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	.001
Q6, n (%)	7 (22.6)	18 (58.1)	18 (58.1)	9 (29.0)	4 (12.9)	3 (9.7)	2 (6.5)	1 (3.2)	0 (0.0)	0 (0.0)	.006
Q7, n (%)	9 (29.0)	16 (51.6)	15 (48.4)	14 (45.2)	6 (19.4)	1 (3.2)	1 (3.2)	0 (0.0)	0 (0.0)	0 (0.0)	.581
Q8, n (%)	14 (45.2)	17 (54.8)	14 (45.2)	12 (38.7)	3 (9.7)	1 (3.2)	0 (0.0)	1 (3,2)	0 (0.0)	0 (0.0)	.223
Q9, n (%)	19 (61.3)	21 (67.7)	11 (35.5)	9 (29.0)	1 (3.2)	1 (3.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	< .001

Table 27. Summary of questionnaire responses at the beginning and end of the educational programmes – NAs advanced

	Very high degree		Rather high degree		Rather low degree		Very low degree		Cannot take a stand		p-value
	Course start	Course end	Course start	Course end	Course start	Course end	Course start	Course end	Course start	Course end	
Q1, n (%)	9 (34.6)	11 (42.3)	17 (65.4)	15 (57.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	.419
Q2, n (%)	6 (23.1)	11 (42.3)	15 (57.7)	13 (50.0)	5 (19.2)	2 (7.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	.008
Q3, n (%)	10 (38.5)	16 (61.5)	16 (61.5)	10 (38.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	.037
Q4, n (%)	12(46.2)	16 (61.5)	14 (53.8)	10 (38.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	.248
Q5, n (%)	13 (50.0)	17 (65.4)	13 (50.0)	9 (34.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1.000
Q6, n (%)	12 (46.2)	16 (61.5)	11 (42.3)	9 (34.6)	3 (11.5)	1 (3.8)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	.003
Q7, n (%)	15 (57.7)	18 (69.2)	11 (42.3)	8 (30.8)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	.038
Q8, n (%)	14 (53.8)	19 (73.1)	11 (42.3)	7 (26.9)	1 (3.8)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	.749
Q9, n (%)	16 (61.5)	20 (76.9)	9 (34.6)	6 (23.1)	1 (3.8)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	.182

Table 28. Summary of questionnaire responses at the beginning and end of the educational programmes – RNs basic

	Very high degree		Rather high degree		Rather low degree		Very low degree		Cannot take a stand		p-value
	Course start	Course end	Course start	Course end	Course start	Course end	Course start	Course end	Course start	Course end	
Q1, n (%)	1 (25.0)	2 (50.0)	3 (75,0)	2 (50,0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1.000
Q2, n (%)	2 (50.0)	2 (50,0)	2 (50.0)	2 (50.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	.333
Q3, n (%)	1 (25.0)	3 (75.0)	2 (50.0)	1 (25.0)	1 (25.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	.500
Q4, n (%)	1 (25.0)	3 (75.0)	3 (75.0)	1 (25.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1.000
Q5, n (%)	1 (25.0)	2 (50.0)	3 (75.0)	2 (50.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1.000
Q6, n (%)	2 (50.0)	4 (100.0)	2 (50.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	_
Q7, n (%)	0 (0.0)	2 (50.0)	3 (75.0)	2 (50.0)	1 (25.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1.000
Q8, n (%)	0 (0.0)	3 (75.0)	4 (100.0)	1 (25.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	_
Q9, n (%)	1 (25.0)	2 (50.0)	2 (50.0)	2 (50.0)	1 (25.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	.333
Q10, n (%)	0 (0.0)	3 (75.0)	3 (75.0)	1 (25.0)	1 (25.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1.000
Q11, n (%)	1 (25.0)	3 (75.0)	3 (75.0)	1 (25.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1.000

Table 29. Summary of questionnaire responses at the beginning and end of the educational programmes – RNs advanced

	Very high degree		Rather high degree		Rather low degree		Very low degree		Cannot take a stand		p-value
	Course start	Course end	Course start	Course end	Course start	Course end	Course start	Course end	Course start	Course end	
Q1, n (%)	0 (0.0)	0 (0.0)	1 (100.0)	1 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	_
Q2, n (%)	0 (0.0)	0 (0.0)	1 (100.0)	1 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	_
Q3, n (%)	0 (0.0)	0 (0.0)	1 (100.0)	1 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	_
Q4, n (%)	0 (0.0)	0 (0.0)	1 (100.0)	1 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	_
Q5, n (%)	0 (0.0)	0 (0.0)	1 (100.0)	1 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	_
Q6, n (%)	1 (100.0)	1 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	_
Q7, n (%)	0 (0.0)	0 (0.0)	1 (100.0)	1 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	_
Q8, n (%)	0 (0.0)	1 (100.0)	1 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	_
Q9, n (%)	0 (0.0)	0 (0.0)	1 (100.0)	1 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	_
Q10, n (%)	0 (0.0)	0 (0.0)	1 (100.0)	1 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	_
Q11, n (%)	0 (0.0)	1 (100.0)	1 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	_

Figures

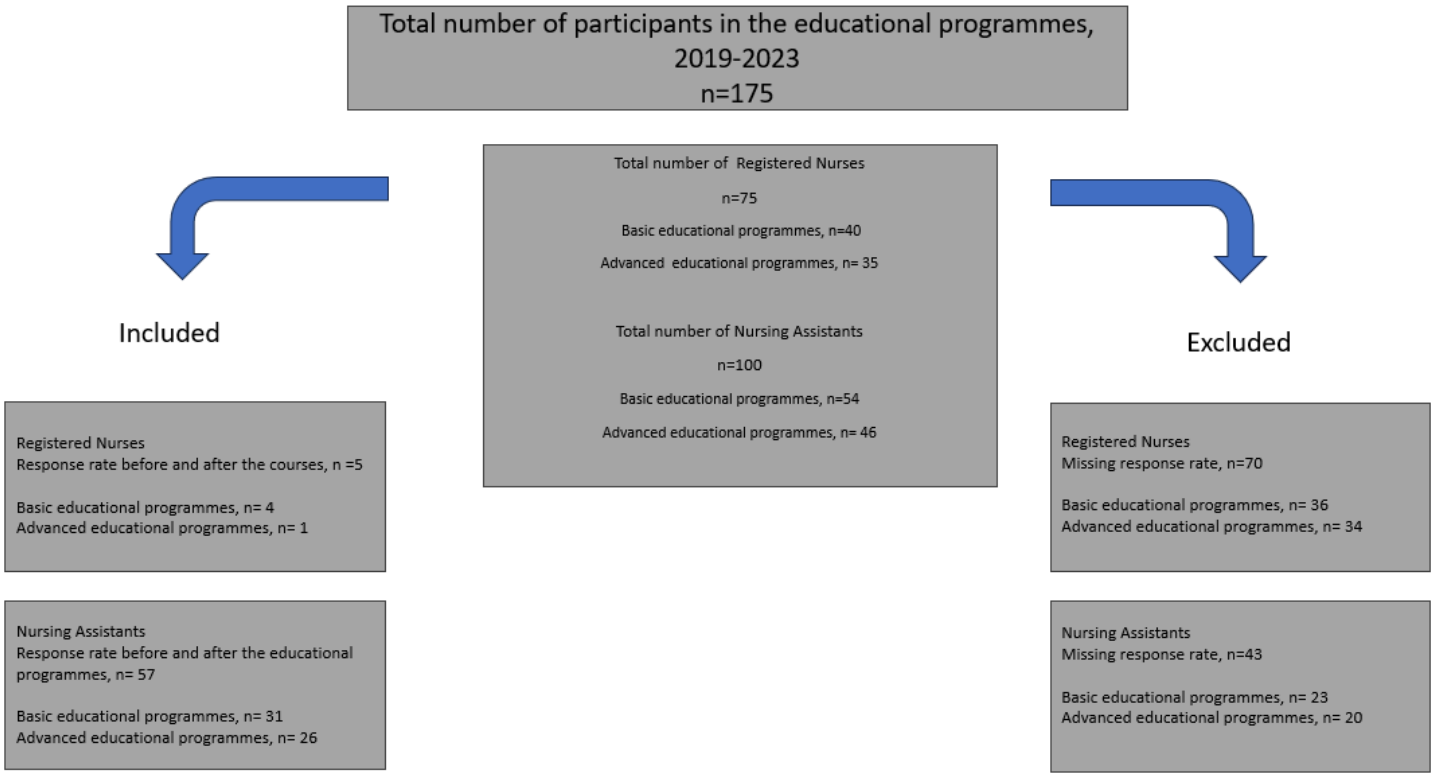


Figure 1

Flowchart of included and excluded participants



Figure 2

Figure 2

The Learning Process: Individual, Competence, and Organization