Administration approaches of nursing assistants in hospitals: a scoping review

Abstract

Objectives: Administration of nursing assistants is closely associated with patient outcomes, but the current circumstances are tough and need improvement. There was limited research evaluating the intrahospital administration of nursing assistants, and there is a lack of available systematic reviews of the area. The aim of this article was to identify and synthesize the literature on intrahospital nursing assistants' administration approaches.

Design: Scoping review.

Search strategy: We searched PubMed, Embase, APA PsycInfo, Wanfang Med, SinoMed, CINAHL, Ovid Emcare, Scopus, ProQuest, CNKI, NICE, AHRQ, CADTH, JBI EBP and Cochrane DSR for English and Chinese language articles published between January 2011 and March 2022. Publications on administration approaches, models and appraisal tools of nursing assistants in hospitals, including qualitative, quantitative, mix-methods studies and evidence syntheses, were considered eligible.

Results: 36 eligible studies were included for the review with an acceptable quality. We identified one administration model, nine administration methods, fifteen educational programmes and seven appraisal tools from the included studies. The frequency effect size analysis yielded 15 topics of main focus at four levels, whilst suggesting that the previous articles were mostly (33%) focused on the competency of nursing assistants, and the lectures were the most (80%) used strategy in quality improvement projects. The evidence-based quality of the original studies was considerably low, indicating the huge gaps between the evidence-based research and the management practice.

Conclusions: A series of practical intrahospital administration approaches was revealed, and fifteen mostly focused topics were identified. We need probe more thoroughly in this area, based more on effective management theories and frameworks, and employing methods of higher quality. This scoping review will help managers find more effective methods to improve the quality of care. Researchers may focus more on evidence-based nursing skills and methods in nursing assistant administration using the 15 topics as breakthrough points.

Key words

nursing assistants; nursing administration research; organization and administration; scoping review; evidence-based nursing

Strengths and limitations:

1. First scoping review of practical administration approaches for nursing assistants in hospitals.

2. Presenting the main topics and focus of related articles.

3. Development of the nursing assistant administration was widely varied among countries.

4. Most of the included studies were of moderate-to-low methodological quality, and huge gap exists between the evidence-based research and the management practice.

BACKGROUND

Nursing assistants (NAs) are trained allied nursing personnel who provide or assist with basic care or support under the direction of onsite licenced nursing staff. In 2019, there were approximately 1.73 million NAs in America, and this number in the European Union was 4.67 million in 2018, showing that NAs have become the main force of care. As an important and indispensable part of routine nursing work, NAs have been providing more care in hospitals due to the increasing ageing population and the shortage of registered nurses (RNs) in recent years, thereby raising the cruciality of nursing assistant administration. Nursing administration is now challenged by unprofessional nursing-related occupations, diversified educational backgrounds, and the communication and connection between NAs and RNs.

Standards and regulations of NAs have been established in a number of countries. In America, an act in 1987 (OBRA) set federal requirements for the training and evaluation of NAs. In the European Union, several projects on NA education and qualification have been carried out since 2011 and as a product of the programme, the Care Certificate was published in 2013 as an education and assessment framework of health care workers in the UK. And in China, the National Health Commission emphasized the standardized regulation of NAs in 2019, providing...
instructions on NA training. Despite this, the effect and efficacy of these standards remain unclear, and evidence is scared.

The efficacy of the miscellaneous administration approaches followed by healthcare facilities was vague, leading to the grim current circumstances of NA administration. Lack of crucial competency, high turnover rate, low vocational identity, and low self-efficiency were all stumping NAs and their administrators. The faultiness of these aspects would directly affect quality of care. A higher turnover rate was associated with fewer infection events, while the retention rate was positively linked with clinical outcomes. The self-efficacy of NAs was associated with their burnout rate, which was very dangerous for care outcomes. In addition, communication among NAs, other nursing staff and administrators also needed improvement. NAs reported discontentment with administrators’ not understanding their work problems, and the performance of NAs also was influenced by relationships among NAs, RNs and other clinical staff.

Various definitions, duties and unbalanced development of NAs worldwide have created barriers to identifying applicable management strategies. In the US, NAs are called certified nursing assistants (CNAs) and unlicensed assistive personnel (UAPs), while this occupation also was named nurse/nursing aides (NAs), health care assistants (HCAs) and nursing auxiliaries in the UK. Nursing attending workers (NAW) and nursing assistants (NA) were both used in China. The communication of research from different countries is always confusing, and valid approaches and practices are needed to address the current chaos.

NAs take up a number of care duties that affect the outcomes of patients directly in hospitals. Due to the inadequacy of primary studies, it is challenging to organize systematic reviews or other evidence syntheses, hence the need and timeliness of a scoping review to identify the available evidence and assess the feasibility of undertaking evidence-based researches. In this paper, we reviewed the available administration approaches and assessment tools for NAs in inpatient care settings, introduced the current progress of this field, and presented an outlook for further researches and evidence syntheses.

Aims and research questions

This scoping review aimed to identify, describe and synthesize current knowledge and the existing literature on nursing assistants’ administration approaches and models, including education, skill training and multidimensional appraisal in hospitals. Three research questions were asked for intrahospital NA administration:

- What are the available approaches, programs or tools?
- What are the available models or frameworks?
- What are the most focused topics and most performed methods of the existing researches?

METHODS

Study Design and Protocol

The review was conducted according to the Preferred Reporting Items for Systematic reviews and Meta-analyses – Extension for Scoping Reviews (PRISMA-ScR), and Joanna Briggs Institute (JBI) guidance and methodology for scoping review were also consulted. A structured protocol was prepared a priori according to the PRISMA Protocols (PRISMA-P) 2015 statement and explanation and PRISMA-ScR.

Eligibility Criteria

This review was designed to identify studies that showed clear methods, mainly focused on NAs, and discussed at least one administration-related topic. The inclusion criteria were:

(1) Participants: nursing assistants (or certificated nursing assistants, nurse aides, etc.);
(2) Setting: hospital;
(3) Study type: Qualitative, quantitative or mixed researches, controlled trials, evidence-based reviews, guidelines, consensus, or related dissertations;
(4) Focus: specific approaches or models, or overall administration models, programs, tools or frameworks;
(5) Methodology: reporting clear intervention/exposure methods and evaluation tools;
(6) Language: English or Chinese;
(7) Peer-reviewed studies published between January 2011 and March 2022.

Studies met the criteria below were excluded: (1) Participants: other healthcare personnel, students, or orderlies; or mixed participants with different occupations, and nursing assistants were not discussed or presented separately; (2) Focus: focusing on specific areas, and the conclusions were only fit for the focused areas. (3) Setting: long-term care
facilities, nursing homes, or skilled nursing facilities; and (4) Outcome: not reporting key evaluation outcomes.

Search Strategy and Study Selection

For initial screening, we retrieved comprehensive, medical, nursing and evidence-based databases as follows: medical databases (PubMed, Embase, APA PsycInfo, Wanfang Med and SinoMed); nursing databases (CINAHL and Ovid Emcare), comprehensive databases (Scopus, ProQuest and CNKI) and evidence-based databases (NICE, AHRQ, CADTH, JBI EBP and Cochrane DSR). The initial searching completed in November 2021 and was updated in March 2022.

A prior limited search was done in PubMed to identify keywords, search fields, and related topics. We used PubMed PubReMiner to identify related keywords for search strategy establishment. Afterwards, search strategies in each database were developed, including key terms: nursing assistants, nursing aides, nursing auxiliary*, administrators*, education and training, appraisal*, organization and administration. Complete strategies are displayed in online supplemental file 1. References of all included studies were manually searched for more evidence using the key terms “assistant” and “aide”.

All publications were imported into EndNote 20.2 (build 15709) for citation management, and duplicates were removed. A brief screening checklist (online supplemental file 2) was developed for study selection to help minimize the inconsistency of the reviewers. Two reviewers screened all the studies independently according to the eligibility criteria. Any disagreements or hesitations were discussed by the reviewers together or with a third researcher until a consensus arose.

Data Charting

Article characteristics, sample size and participant demographics, focused topics, study designs and outcomes were charted from eligible studies. A structured data charting tool (online supplemental file 3) was designed by two researchers for data charting and was continuously refined. Data charting of all eligible studies was performed by two authors independently and was corroborated by a third researcher.

Quality Appraisal

The Mixed Methods Appraisal Tool (MMAT) Version 2018 was applied for qualitative, quantitative or mixed-methodological studies, and AMSTAR 2, a critical appraisal tool for systematic reviews, was used for the critical appraisal of evidence-based reviews. An overall score was carried out for each included study. For the MMAT, we calculated the percentage of items answered “Yes” in Section 2, and for AMSTAR 2, after items that were not applicable were excluded, we conducted a grade of overall confidence according to the criteria by Shea et al.

Data Synthesis

Eligible studies were divided into three fields: administration approaches, education and training, and appraisal tools. We summarized the study types, main focus and detailed intervention/exposure measures for the administration, education and training fields. For studies on practical tools, detailed tool information and psychometrics were extracted. For further interpretation, we conducted a frequency effect size analysis of the area of the main focuses and intervention strategies based on the calculating effect size method from the metasummary methodology introduced by Sandelowski et al.

RESULTS

The searching identified 1,973 related studies (1,902 initially and 71 updated), among which 538 were Chinese language studies. A total of 467 duplicates were removed, and after reviewing the title and the abstract, 138 publications remained for full-text screening, where 103 articles were excluded (see online supplemental file 4). Thirty-five studies from databases were included in the scoping review. Thirteen studies published from 2011 to 2021 were manually identified from the reference lists of the included studies, and one study was included. Ultimately, we identified 36 eligible studies for our scoping review, of which 11 were Chinese language text (figure 1).

Study Characteristics

An overview of the study characteristics and contents is displayed in table 1. Fundings and Conflicts of the studies are shown in online supplemental file 5.

The articles were mainly from the United States and China: 14 from the United States, 12 from China, four from the United Kingdom, two from Canada, one from Australia, one from Denmark, one from Sweden, and one from Brazil. 22 of 36 studies were published in the last five years (2017-2022).
Table 1 Study Characteristics

| Study | Type | Setting | Objective | Participants and Demographics | Methodologies | Sampling | Intervention/Exposure | Evaluation/Analysis | Sample Description | Limitations |
|-------|------|---------|-----------|-------------------------------|---------------|---------|---------------------|--------------------|------------------|-------------|
| Appleby (2019) the UK | mixed methods study | major hospital | Nurses' and HCA intentions to implement a "care round checklist" | A=200; nurses and HCAs; 40% HCA, approx. 110 | Theory: the Theory of Planned Behaviour; Scale Development: semi-structured qualitative interview; | 50% response rate | (1) A 60-item questionnaire to measure nurses' and HCAs' intentions was developed and consistency and reliability was satisfactory. | sample was familiar to participants, leading to probable bias |
| Campbell (2019) the US | cross-sectional quantitative study | inpatient unit | Relational quality of RN and NA, and manager's influence on the quality and patient safety | A=1152 RNs and 263 NAs; from 31 fulltime inpatient units | Database: hospital survey on patient safety culture survey results; Evaluation: LMCQ™ questionnaire to evaluate relational quality, and a four-dimension manager to influence composite measures derived from AHRQ survey composition; | | | not allowed to evaluate participants in the same unit, limited number of HCAs, lack of research on RN-NA team |
| Campbell (2020) the US | integrative review | N/A | Interventions for teamwork, delegation and communication between RNs and NAs | | Methodology: five-step integrative review by Whitmore and Knaff (2005); Searching: PRISMA; | | (1) A multikrator approach to promote teamwork, communication and delegation was essential. | |
| Dutton (2020) the US | pre- and posttest qualitative study | subacute rehabilitation unit in a hospital | The utilization, satisfaction and effect of a web-based stress management programme (BREATHE) | A=51; 31 nursing staff, of which 6 CNAs F/M 25.9; Majority age 30-49, ethnicity Black, diplom Baccalaureate | Theory: the translation Framework Knowledge to Action for developing the project; Intervention: web-based survey and 2-month web-based intervention using the programme; Evaluation: Nurse Stress Scale for measuring stress; Statistical Method: paired t-test | | (1) BREATHE programme could support nurses to manage their stress. | |
| Dykes (2011) the US | mixed methods study | acute and teaching hospital and medical center | Developing and testing the Self Efficacy for Preventing Falls – Nurse/Assistant (SEFNP/SEPA) scales | A=83 27 CNAs in Phase I and III, 269 CNAs in the survey, 83 were included in the data analysis | Theory: classical measurement theory; Scale Development: focus groups for Phase I and III, and reliability test in Phase IV; Scale scoring: six-point Likert system; Sampling: snowball; Statistical Method: independent and paired t test, and Cronbach’s for consistency reliability | | (2) Death and dying, conflict with MD, workload and uncertainty related to treatment were improved by the BREATHE programme, while other subscales showed no significant improvement. | |
| Fenet (2011) China | cross-sectional quantitative study | public hospital | Working conditions of NAs employed by hospital or company | A=538 538 NAs in 10 hospitals | Evaluations: questionnaire on demographics, vocational identity and stability, and working satisfaction; Statistical Method: chi square test | | NAs employed by hospital only had significant differences on age (younger), education background, vocational stability and identity, and working satisfaction (all better) between those employed by company. | |
| Friesen (2010) Canada | qualitative metasummary | N/A | Evidence on collaborative or interdisciplinary palliative education strategies for HCAs | 16 studies on HCAs, from the UK, the US, Canada, and Australia | Qualitative metasummary | | Six implications for implementing a collaborative palliative educational workplace: previewing teaching process with HCAs a priori; the content should be practical; all HCAs should attend; ensuring the benefits were transferrable to care settings; ensuring HCAs were able to use newly acquired skills; and choosing education strategies that HCAs favoured. | |
| Gain (2017) China | pre- and posttest quantitative study | public hospital | Effectiveness of dual management model (by hospital and company) on NAs | A=1,344 patients | Intervention: NAs from companies were dual managed by hospital (nursing department – care unit) and company; Evaluation: assessment on competency, patient satisfaction, complaints, execution of duties, and compliance with hospital regulations; Statistical Method: Cronbach’s and Spearman correlation for reliability and validity, and chi square test for results | | (1) There was a significant increase in working competency and patient satisfaction after a dual-management intervention. | |
| Geoffrion (2020) Canada | systematic review | N/A | The effectiveness of education and training methods in preventing workplace aggression | A=1,688 Nine studies with 1,688 HCWs | Cochane Handbook for Systematic Reviews of Interventions | | (2) There was no significant decrease in complaint events after the intervention. | |
| Haigh (2015) the UK | mixed methods study | teaching hospital | Impact of the Care Certificate on the HCAs | A=111 11 HCAs | Evaluation: a mixed methods 18-item questionnaire on feedback of the Care Certificate; Statistical Method: only descriptive | (1) Most participants found the Care Certificate to be of benefit, regardless of experience or education background; (2) It was uncertain if the Care Certificate made a difference to HCAs' practices | |
| Haraldsson (2021) Sweden | cross-sectional quantitative study | medical ward in middle-sized hospital | To compare a questionnaire with technical measurements (electrocardiography) on assessment of workload of CNAs | A=16, 60 CNAs, F/M 51:51 Median (min-max): weight 62 (56-92) kg, height 164 (158-181) cm, working time 475 (457-506) min, break time 66.3 (60-95) min | Evaluation: the Structured Multidisciplinary Evaluation Tool (SMET); surface electrocardiography to assess workload; Statistical Method: correlation matrix | | (1) There are significant correlations between the SMET surface electrocardiography outcomes. | |
| Kennedy (2012) the US | cross-sectional quantitative study | all health care setting | Psychometric properties of the Nursing Culture Assessment Tool | A=1,420 540 RNs, LPNs and CNAs | Statistical Method: exploratory factor analysis for validity; Exploratory factor analysis and a four-dimension manager to influence composite measures derived from AHRQ survey composition; Statistical Method: exploratory factor analysis; | | (1) Reliability and validity of all subscales and the overall tool were achieved regardless of whether nursing professionals to use it. | |
| Lee (2018) the US | mixed methods study | acute care unit | An education programme on patient handling and | A=236 224 nursing staff in pilot education, and 12 in house-wide education, 281 | Intervention: 3-phase development of the education programme: pilot, house-wide and ongoing education, Evaluation: descriptive and qualitative evaluation | A 4 to 6-hour education programme aimed at safe transfer, patient mobility and prevention of nursing staff’s injury was developed including prework, application, trainer and peer low attendance and lack of training space may affect | |
null
Study | Type | Setting | Objective | Participants and Demographics | Methodology | Theory/Frame work, Sampling, Intervention/Exposure, Evaluation, and statistical methods | Key Findings and Outcomes | Limitations
--- | --- | --- | --- | --- | --- | --- | ---
Ward® (2014) the US | pre-and posttest quantitative study | academic medical center | Development of a continuing education programme for CNAs | NA | Gansey patient satisfaction levels for patient outcome; Statistical Method: independent t test | Intervention: educational offering on the run (eDOOR) programme, using eye-catching flyers, a one-hour simulation skills lab, and a mini-interv | (1) A programme for CNA continuing education was developed, including eDOOR methods and simulation, and received positive responses from CNAs; (2) There was no significant increase in the CNA knowledge test score; (3) No randomization and control group, and various teaching styles of instructors were not mentioned.
Wilson® (2011) the US | pre-and posttest quantitative study | community hospital | Development and effectiveness of a patient handling education programme for NAs | 254 NAs; F:M approx. 10:1 age 18 to 61 | Intervention: an eight-hour education programme, including lectures and simulation taught by health care professionals and physical therapists; Evaluation: a 10-item knowledge test and a 10-item confidence and comfort level in handling patient and transfer questionnaire; Statistical Method: paired t test, Wilson rank test and Spearman correlation | (1) An education programme, including patient transfer, lifting, ambulating, and braces and protheses in the form of lecture and simulation was developed. (2) The programme can significantly improve NAs' knowledge, confidence and comfort on patient handling.
Yu® (2015) China | pre-and posttest quantitative study | public hospital | Effectiveness of hospital management and training of NAWs | 65 NAWs; F:M 62:38 | Intervention: a holistic management system including: NAW management centre, hospital regulations, continuing education, information system and software, charge scales, and humanized management; Evaluation: NAW competency test, and patient and clinical professions satisfaction; Statistical Method: paired t test and Spearman correlation | (1) Skills and knowledge of NAWs was significantly improved after intervention. (2) Satisfaction of patients and clinical professionals was improved.
Yu® (2015) China | pre-and posttest quantitative study | psychiatric hospital | Effectiveness of applying Quality Control Circle to NAW's hand hygiene administration | 9 NAWs in a psychiatric ward | Intervention: Quality Control Circle for continuing quality improvement, and Faltbene diagram for analyzing reasons; Education: facility improving, and hand hygiene compliance monitoring was used for increased compliance of hand hygiene of NAWs; Evaluation: independent observation of hand washing times, points, and methods; a hand hygiene compliance questionnaire; colony forming units at hand surface after hand washing | The Quality Control Circle method improved NAW's hand hygiene situation and compliance significantly.
Zhao® (2020) China | pre-and posttest quantitative study | public hospital | Effectiveness of a patient-oriented stratified training model for NAs | 75 NAs; F:M 51:24 (Mean±SD) Age 25±7±3.4 Working experience 2.3±1.2 yrs | Intervention: a training work group for development of training programme; Barthel Scale for four-grade stratification of patients, and a three-grade occupation certificate for NAs with different training contents and hours; Statistical Method: independent t test | (1) A stratified, patient-oriented NA management approach was identified. (2) There was significant improvement on NA competency, and patient and nursing professionals' satisfaction after the training model set on.
Zhi® (2021) China | cross-sectional quantitative study | public tertiary hospital | Patient satisfaction under different administration models of NA | 144 hospitals, 6211 patients | Evaluation: a 5-item Likert scale on satisfaction; Statistical Method: Mann-Whitney U test and Kruskal-Wallis test for demographics and satisfaction, chi-square test and binary logistic regression for different models | (1) Satisfaction for NAs under the direct hospital management model was higher than under others (commercial company, company-hospital joint, and self-employed). (2) Patients with higher family income tended to score higher. Participants' tendency to score higher. (3) Public tertiary hospital only.
Zhu D.®(2021) China | posttest quantitative study | teaching hospital | Self-protection training of NAWs during COVID-19 pandemic | 57 NAWs; F:M 35:2 (Mean±SD) Age 49±38±7.98 Working experience 3.14±2.09 yrs 89% with primary/junior school education background | Theory: Kirkpatrick Model - reaction, learning, behaviour and result (4R); Intervention: a "Dual Feedback, tertiary training and four-level evaluation" training model, including a training work group, training taught by company, nursing department and wards about protection skills and knowledge using video and lecture, and a practical exam; Evaluation: NAW satisfaction, practical exam, independent observation of self-protection behaviour, and nosocomial infection rate | (1) 100% of the NAWs were satisfied with the training programme, with a mean score of 91.6 out of 100 on the competency exams. (2) 94.5% of the NAWs followed self-protection behaviour instructions, and no infection events occurred in the three months after training. (3) Single unit, and various NAW education backgrounds.
Zhu F.® (2019) China | pre-and posttest quantitative study | rehabilitation hospital | An informed consent for patients to make NAW's care known better | 39 NAWs, 50 participants; F:M of NAW 29:10 | Intervention: an information sheet from NAWs to patients, including: what to care, what not to do, how to care, responsibilities of NAWs, and personal safety care; Evaluation: awareness rate of NAWs regarding protective behaviour, and satisfaction of patients | The information sheet can significantly improve NAW's awareness of regulation, safety and patient privacy, and patients were more satisfied with NAWs.

HCA, health care assistant; approx., approximately; PBC, perceived behavioural control; RN, registered nurse; NA, nursing assistants (or nursing aides); NAW, nursing attending worker; N/A, not applicable; LPN, licensed practical nurse; CNA, certified nursing assistant; F:M, female to male ratio; HCW, healthcare workers; AIN, assistant in nursing; UAP, unlicensed assistive personnel; yrs, years
Two theses, three evidence syntheses and 31 original research papers were included. For study types, 25 articles presented quantitative designs (17 interventional and eight descriptive), one was qualitative, and seven studies employed mixed methods. Most studies (19 of 24) with interventions applied a quasi-experimental, controlled study before and after test (CBA) design, while one study\textsuperscript{57} presented a post-then-pretest design.\textsuperscript{74} Focus group interviews were the most employed method in qualitative and mixed methods studies. The three evidence syntheses were of different types: one integrated review,\textsuperscript{40} one qualitative metasummary,\textsuperscript{44} and one systematic review.\textsuperscript{46}

All 33 original studies were conducted in hospitals due to our inclusion criteria, and the sample size ranged from six to 700 NAs. Three studies\textsuperscript{45 64 71} were focused on patients’ attitudes, and did not report the demographics of NAs. Only one study\textsuperscript{44} reported a higher than 60% response rate, while others ranged from 10% to 40%.

The methodological quality appraisal results of the studies are listed in online supplemental file 6. The mean score of all 33 original studies assessed by the MMAT reached a level of 65%, and for evidence-based reviews, two of the studies\textsuperscript{40 44} received a “very low” rating, while the other one\textsuperscript{46} got a “high”. Overall, the methodological quality of the included studies was considered acceptable.

**Administration Approaches**

Fourteen studies addressed various administration approaches and focuses, as listed in table 2. The development of NA administration in China was still preliminary, and articles by Chinese researchers were more fixated on employment models. Five studies\textsuperscript{43 45 51 68 71} were aimed at the change of management and employment from company-led to hospital-led, or double-track, with consistent positive results on satisfaction and NA/NAW working competency after intervention. Other original studies identified four practical tools or methods, i.e., the Failure Mode and Effects Analysis (FMEA),\textsuperscript{52} the Activities of Daily Living (ADL) scale,\textsuperscript{59} the Quality Control Circle,\textsuperscript{69} and an information sheet to patients,\textsuperscript{73} as well as two valuable programmes on stress and CNA-patient relationships.\textsuperscript{41 58}

Negative outcomes were found on turnover rates after a CNA orientation coach\textsuperscript{62} and on adverse events with the addition of AINs to acute wards.\textsuperscript{64} Meanwhile, several approaches, including crew resource management, the TeamSTEPPS programme,\textsuperscript{75} and the SBART shift model, were summarized by an integrated review from Campbell et al.\textsuperscript{40}

**Education and Training**

Each of the 13 research papers developed an education programme with different topics, while two evidence reviews\textsuperscript{44 48} discussed educational strategies on palliative care and workplace aggression with wide availability (table 2). NA knowledge and skills were most emphasized. Six studies highlighted five aspects of NA competency: patient handling,\textsuperscript{50} dementia,\textsuperscript{57} restorative care\textsuperscript{60} and routine work capacity.\textsuperscript{55} Of other studies, two\textsuperscript{53 63} improved patient safety, two\textsuperscript{56 65} were on communication, two\textsuperscript{61 66} pointed at continuing education and the other two\textsuperscript{46 72} focused on self-protection. The strategies taken ranged from classical lectures to web-based learning, simulation and practical training. The mixed outcome of education on workplace aggression was reviewed by Geoffrion et al.,\textsuperscript{46} addressing the needs of further study in this area.

**Appraisal Tools**

We found seven valid appraisal tools on NA administration with stable psychometrics from the included studies (table 2):

1. HCA & RNs’ intention questionnaire;\textsuperscript{38}
2. LMX-7 relational quality questionnaire from Campbell et al.\textsuperscript{39} and developed by Graen et al.;\textsuperscript{76}
3. NA working questionnaire\textsuperscript{47}, first built by Parahoo;\textsuperscript{77}
4. The Nursing Culture Assessment Tool (NCAT);\textsuperscript{49}
5. The Structured Multidisciplinary Evaluation Tool (SMET) from Haraldsson et al.\textsuperscript{48} and developed by the author in 2016;\textsuperscript{78}
6. Self-Efficacy for Preventing Falls – Assistants (SEPFA);\textsuperscript{42}
7. The Work Ability Index from Monteiro et al.\textsuperscript{34} and produced by Ilmarinen.\textsuperscript{79}

Three of seven papers developed original scales and tested reliability and validity. Four studies examined the psychometrics of existing questionnaires or applied questionnaires to NA administration and reported eligible outcomes. The main focuses were diverse, from working capacity and workload to relationships, intentions and nursing culture.
### Table 2  Administration approaches, training & education programs, appraisal tools and main focuses (n = 36)

| Study | Main focus | Program/Model | Contents |
|-------|------------|---------------|----------|
| Campbell &amp; Nørgaard (2020) | teamwork communication | Crew Resource management; TeamSTEPPS; SBART for shift; ANA principles | not applicable. (This integrated review reported five programs and virtual simulation scenarios from the previous studies.) |
| Dutton (2020) | stress | BREATHE stress management program | six modules including introduction of stress, assessing stress, identifying stressors, managing stress, avoiding negative coping, and mental health. |
| Feng &amp; Nørgaard (2012) | vocational identity patient satisfaction competency | hospital-only employment model dual employment mode by hospital and company | NAWs were only employed by hospitals and were managed by the nursing department. |
| Gao (2017) | patient satisfaction | Care partner program | a shared mental model education was conducted, including seven aspects on expectations, discussion of current care, teaching of relationships building, discussion on patient experiences, education on the HCAHPS and caring skill stations. |
| Liu &amp; Nørgaard (2017) | patient satisfaction | three-level comprehensive management model | a three-level nursing department – head nurse – bed nurse management modal, including regulation and responsibilities, NAW prework training, performance incentive mechanism and care quality control standards. |
| Ma (2019) | job responsibility care quality control | FMEA model | a FMEA group including head nurses and hospital managers scored the severity, detection and occurrence, and then found approaches to solve the problem. |
| Prestin &amp; Nørgaard (2012) | relationships of CNAs and patients | Care partner program | a shared mental model education was conducted, including seven aspects on expectations, discussion of current care, teaching of relationships building, discussion on patient experiences, education on the HCAHPS and caring skill stations. |
| Qiu (2020) | patient satisfaction | Activities of Daily Living (ADL) Scale stratified and management model | ADL was used to stratify patients and NAW care contents into four levels so as to make care and charge standards. |
| Swann (2018) | turnover/retention | CNA orientation coaches | a two-hour program on clinical and emergency skills |
| Twiggs (2016) | adverse patient outcome | adding AINs to acute wards | not applicable |
| Wu (2015) | competency | a holistic NAW-center management model | NAWs received unified management from NAW center. Regulations, working formulations, continuing education, care quality control by 360-degree evaluation, application of information system and humanized management were used. |
| Yu (2015) | hand hygiene | Quality Control Circle (QCC) | a QCC group for observing and analyzing NAW’s hand hygiene. Fish bone diagram for analyzing factors of low compliance, and brainstorm for intervention methods. Education, facilities adding, and everyday detection was used for improving. |
| Zhi (2021) | patient satisfaction | direct hospital management model | NAWs were only employed by hospitals and were managed by the nursing department or NAW center. |
| Zhu (2019) | awareness of work contents patient satisfaction | inform sheet | the inform sheet contained care requirements and personalized requirements, signed by both NAWs and patients and leaving to patients. |

### Theme 2: Education and training (n = 15)

| Study | Main focus | Educational strategy |
|-------|------------|----------------------|
| Friesen (2019) | palliative care | collaborative or interdisciplinary palliative education strategies from 16 studies, methods including lectures, case studies, practical training, learning groups, role play, discussions, slide presentations, web-based learning, workshops, and feedback discussions. |
| Geoffrion (2020) | workplace aggression | education interventions from nine studies, methods including online learning, group discussions, lectures, videos, simulation, and role play. |
| Lee &amp; McKenzie (2018) | patient handling and mobility | the Crisis Avoidance and Resource Management using scenarios, taught by senior nurses. |
| Nie (2017) | knowledge and skills patient, clinical professionals and NA satisfaction | a group collaborative training, including lectures, practical training, simulation, and group role-play. |
| Nørgaard (2012) | communication | a three-day training program using role play, lectures, discussions, and communication practice, with a six months interval between the first two days and the last day. |
| Pfeifer (2018) | dementia | a one-hour dementia education program using lectures, videos, and scenarios. |
Ritchie\textsuperscript{48} (2017) restorative care a didactic day and a three-to-four-hour practice session, using lectures and practical training, taught by a physical therapist.

Small\textsuperscript{64} (2012) continuing education a continuing and normalized education program based on teaching plans from RNs at shifts, using lectures, demonstration and return demonstration.

Tom\textsuperscript{34} (2016) patient safety a two-day patient safety aide training program by the Veteran Affair Department, with lectures and a competency test.

Wagner\textsuperscript{65} (2018) delegation and communication a half-hour learning program with lectures and video, taught by the practitioner investigator.

Ward\textsuperscript{66} (2014) continuing education the eDOOR (educational offering on the run) program, with flyers, simulation, and mini-in-service study.

Wilson\textsuperscript{47} (2011) patient handling and mobility an eight-hour education program (two four-hour parts) with lectures, demonstration, discussion and simulations.

Zhao\textsuperscript{70} (2020) knowledge and skills patient and nursing staff's satisfaction an ADL-stratified, patient-oriented training model, with a 40-hour training for all levels of NAWs and a 32-to-48-hour stratified training for different levels, using lectures and practical training.

Zhu\textsuperscript{72} (2021) self-protection a tertiary training model by companies, nursing department and wards using lectures, practical training, competency test and continuing improving.

| Theme 3: Appraisal tools \((n = 7)\) | Study | Main focus | Tools | Contents | Reliability and Validity |
|---|---|---|---|---|---|
| Appleby\textsuperscript{38} (2019) | intention to following a checklist | a 66-item intention questionnaire | five demographic items, seven on clinical context, seven on habit, 17 on attitude, 15 on subjective norm and 15 on perceived behavior control. | Overall Cronbach's \(\alpha\) 0.83 for HCAs; 24.2% of HCA's intentions were explained |
| Campbell\textsuperscript{39} (2021) | relational quality between RN and NA, and patient safety | a seven-item leader-member exchange (LMX-7) questionnaire by Graen and Uhl-Bien\textsuperscript{76} | seven items on leader satisfaction, understanding, recognition, problem solving, "bail you out" for employees, and confidence and relationships of leader. | Overall Cronbach's \(\alpha\) 0.89 for NAs. |
| Dykes\textsuperscript{42} (2011) | preventing falls | an eight-item Self-Efficacy for Preventing Falls– Assistant (SEFFA) scales | eight items on confidence, communication, understanding of the environment and team working for preventing falls | Overall Cronbach's \(\alpha\) 0.69 – 0.74; item total correlation 0.3 – 0.7. |
| Haigh\textsuperscript{47} (2019) | feedback of the Care Certificate | an 18-item questionnaire by Parahoo\textsuperscript{77} | eighteen items on confidence, knowledge and skills, and attitudes. | not specified |
| Haraldsson\textsuperscript{48} (2021) | workload | the Structured Multi-disciplinary Evaluation Tool (SMET) | 22 items on movement, position, pace, eyesight, sitting, noise, space, lighting of workplace, and working condition, attitude, and satisfaction, | validity test: P-values of correlation between SMET subgroup scores and surface electromyography measure outcome were ranged from 0.001 to 0.05, indicating the effectiveness. |
| Kennerly\textsuperscript{49} (2012) | nursing culture | the Nursing Culture Assessment Tool (NCAT) | 19 items and six subscales on expectations, behaviors, teamwork, communication, satisfaction and commitment | Overall Cronbach's \(\alpha\) 0.92, and subscales ranged from 0.60 – 0.93 validity test: subscale correlations 0.27 – 0.74, comparative fit index 0.94. |
| Monteiro\textsuperscript{54} (2011) | working capacity | the Work Ability Index | seven items on current work ability, diseases, and work impairment | not specified |

† This article is an evidence synthesis.

**Frequency Effect Size Analysis**

We derived frequency effect size analysis on the included studies’ main focuses and strategies (table 3 and online supplemental file 7). Fifteen main focuses were identified at four levels. The most reported focuses were competency at the NA level (frequency effect size 33%), communication and clinical staff satisfaction (both 14%) at the clinical personnel level, and patient satisfaction (25%) at the patient level. Both topics at the fourth facility management level (retention and care quality control) were at a 6% level of effect size.

Twenty studies contained the theme for education and training strategies. Face-to-face lectures were still the most employed method (80%), followed by simulation and role play and practical training (both 30%). We also noted that flyers with various knowledge and skills for CNA continuing education were designed by Ward et al.,\textsuperscript{66} which was a unique and effective method not adopted by other studies. Since the significant heterogeneity existed, we failed to
distinguish themes and codes in studies on NA administration methods, thus simply summarising their objectives. Approximately 62% of the studies evaluated tools for administration, and the other five papers were on hospital management models (38%).

| Topics | Studies | Frequency effect size |
|--------|---------|-----------------------|
| Main focus ($n = 36$) | | |
| Level 1: NA competency (skills and knowledge) | 44, 45, 47, 50, 52, 54, 55, 57, 60, 67, 68, 70 | 33% |
| self-efficacy, job-related identity and responsibility | 43, 49, 52, 73 | 14% |
| satisfaction | 43, 49, 52, 55, 59 | 14% |
| continuing education | 61, 66, 68 | 8% |
| self-protection | 46, 72 | 6% |
| workload and stress | 41, 48 | 6% |
| intention | 38 | 3% |
| Level 2: clinical personnel communication and teamwork | 40, 47, 49, 56 | 14% |
| clinical/nursing staff satisfaction | 51, 55, 59, 68, 70 | 14% |
| relationship | 39 | 3% |
| Level 3: patient satisfaction | 45, 51, 55, 58, 59, 68, 70, 71, 73 | 25% |
| patient safety | 42, 45, 53, 63, 64 | 11% |
| relationships | 58 | 3% |
| Level 4: facility management retention/turnover | 59, 62 | 6% |
| care quality control | 52, 69 | 6% |
| Intervention method Education & training ($n = 20$) | | |
| lecture | 50-52, 55, 56-58, 60, 61, 63, 65, 67-70, 72 | 80% |
| simulation/role play | 50, 55, 58, 66-68 | 30% |
| practical training | 52, 55, 56, 68, 70, 72 | 30% |
| exam | 62, 63, 66, 69, 72 | 25% |
| discussion | 50, 56, 58, 67 | 20% |
| video | 50, 57, 65, 68 | 20% |
| demonstration | 61, 67-69 | 20% |
| web-based training | 41, 50 | 10% |
| group study | 50, 55 | 10% |
| scenario | 53, 57 | 10% |
| flyer | 66 | 5% |

**DISCUSSION**

In this review, we outlined existing administration tools, management models, education programs and scales for appraisal from previous studies. The included studies implied the need to develop more studies on tools, theories and educational strategies for NA administration in hospitals with better evidence quality. Gaps in NA administration development and current circumstances between developed and developing areas were noted and needed improvement.

**Exploring Newer Topics and Strategies**

Twenty-three focuses were initially found by the frequency effect analysis, while they were combined to form 15 topics. NA knowledge and skills were most widely considered, with a trend of being more specified for contents of competency improving. The Care Certificate Program identified basic competencies for carers, which have been applied to certificate training. Most of the studies conducted an on-the-job training mode, thus the necessity of exploring advanced competency to avoid repeats. Focuses that contributed smaller effect sizes may denote the possible directions of future studies. NA intentions, relationships of NA-other nursing staff and NA-patients, workload, stress and retention in hospitals needed deeper investigation. Existing studies revealed that all of the factors above influence the quality of care at the RN or nursing home level, while evidence of influence and improvement methods of NAs in hospitals is limited.

Eleven groups of educational strategies were applied to 20 included studies. 90% of the studies employed at least two groups of strategies, with an average of 2.60, and more multiple education methods may result in more positive outcomes. A simulation was highlighted because it has proven effective in nursing education, and a debrief simulation method also was recommended. Web-based training has become a modern trend, especially during the COVID-19 pandemic. However, it is worth noting that the evidence on the effectiveness of e-learning in nursing education is limited.
education is still mixed\textsuperscript{89 90}. Nevertheless, the effectiveness of these methods applied to NAs needs further exploration due to the educational background gaps between NAs, RNs and nursing students. Moreover, half of the articles used interactive methods, e.g., simulation, discussion and group study, and more interactive methods have been gradually used and evaluated in NA education and training in recent years. We suggest that theories should be identified and applied to each programme, with only one-third of the included studies developing programmes based on a specified theory or conceptual framework.

**Lack of Evaluation on Models**

We found one main administration model from Chinese studies, and nine methods or theories were discovered. In China, NAWs were employed by companies, hospitals, or were self-employed\textsuperscript{91 92}, where the company employment model took the majority\textsuperscript{93}. Based on agreements between hospitals and service companies, the selection and training of NAWs were conducted by directors and executives of companies, leading to uncontrolled quality of care and muddled management\textsuperscript{94}. Hence, the hospital management model was proposed for improvement and proved effective in the included studies. The studies showed a three-level model where NAWs were managed by (1) nurse departments or NAW centres, (2) head nurses and (3) ward nurses together. The review revealed significant heterogeneity, inadequate quality of evidence and unrepresentative samples of related studies of this area. Further analysis of the hospital management model and the effectiveness of other mature models in Chinese hospitals is considered to be the next evaluation step.

The FMEA model, ADL scale and Quality Control Circle have rarely been evaluated in intrahospital NA management. The FMEA model has already been employed in hospital administration for long\textsuperscript{95 96} and has received pretty good results, but the efficacy of the FMEA model on NAs is little known. The ADL scale was first developed by Katz\textsuperscript{97} and is one of the most widely used tools for assessing patient functions. Different ADL scores and levels represented different statuses and care needs of patients to guide managers to a more cost-effective and patient-oriented model of NA allocation. The Quality Control Circle was first developed in Japan in the 1950s\textsuperscript{98} and was widely applied to company management. Limited studies have evaluated quality circles in hospital management with mixed outcomes\textsuperscript{99}. The efficacy of this method after the addition of NAs to health care facilities needs more exploration.

Other original papers\textsuperscript{41 58} developed or evaluated programmes to improve administration, i.e., the BREATHE programme and the Care Partner Programs. Despite the pretty outcomes, the small sample size placed barriers to the widespread application of their designs. Additional studies on approaches to widen the applicability and design of more diverse programmes are crucial.

**Negative Outcomes**

Three studies\textsuperscript{46 62 64} reported notable negative or mixed outcomes. The systematic review from Geoffrion\textsuperscript{46} et al. supposed that both patients and healthcare workers may not benefit from educational programmes on workplace aggression for clinical staff, revealing that other approaches or the education for patients may be conducted for the improvement of NA safety. Swann\textsuperscript{62} evaluated the influence of the CNA orientation coaches on the retention rate and derived a negative result, while Twigg\textsuperscript{64} placed an analysis of adding AINs to acute care wards with unexpected outcomes on failure to rescue, urinary tract infection, and falls. The sample of the latter two articles was still limited, with the potential risk of inadequate study designs (observational study to evaluate the interventions), so researchers may conduct more studies on their topics in spite of the discouraged results.

**Low Evidence-Based Quality**

We appraised the quality of evidence of the included studies based on the five-level evidence system from the Oxford Centre for Evidence-based Medicine\textsuperscript{100}. As a result, all included original studies were at level III and level IV (for questions on common-Q1, prognosis-Q3, treatment benefits-Q4, and worthwhile-Q7), which indicated a low to moderate quality of evidence. Due to the lack of high-quality evidence, we hoped that more randomized controlled trials would be presented to help improve the evidence-based practice of NA administration, despite existing ethical and methodological issues. In addition, few studies reported their designs and outcomes in extenso, where the participant demographics, sampling, detailed and full outcomes, and the assessment of potential bias (for quantitative study) were the most obscure areas. We suggest that reporting guidelines, e.g., SQUIRE 2.0\textsuperscript{101}, should be followed when reporting research outcomes to improve the methodological quality and availability of the studies.

**Gaps**

Several gaps were concluded for the NA administration area: (1) NA definitions, regulations and circumstances varied widely among countries, especially between high-income and those with moderate to low incomes, which created barriers to global evidence and practical experience shared processes; (2) The limited sample sizes and nonrandomized study designs of the included studies may decrease the reliability of outcomes; (3) The low quality of existing evidence may not support the evidence-based syntheses and practice for care quality improvement, and (4) Theories and conceptual frameworks were often neglected in the study designs.
**Limitations**

The diversified intervention methods of the included studies led to significant heterogeneity so barriers existed for further analysis and synthesis. We included only Chinese and English articles, while studies published in other languages were excluded, thus leading to a potential risk of bias. Furthermore, more studies may not be included for analysis in other social sciences databases, as NA administration is a broad, multidisciplinary and interdisciplinary topic. We also noted that three included evidence-based reviews addressed 32 original studies, where 13 studies were published between 2011 and 2021 but were not included in our scoping review, implying a potential risk of incomprehensiveness of our work.

**CONCLUSION**

This scoping review demonstrated the practical administration approaches and focus from previous studies for hospital nursing assistants. The review found a total of nine administration methods, one administration model, 15 education and training programmes, and seven appraisal tools. With the frequency effect size analysis, 15 groups of main focus and 11 educational strategies used for improving administration were outlined. The insight from our review will add knowledge to effective NA administration for hospital managers and head nurses and help to improve the quality of care with increasing evidence.

Barriers remain between the intrahospital NA administration area and evidence-based nursing research and practice. The endeavour to apply evidence-based methods to administration will be arduous but will contribute greatly to improved outcomes.

We expect that the administration approaches concluded by our study will help leaders interpret more about effective management to improve quality of care and benefit all clinical staff and patients. The difference between hospitals and long-term care settings should be recognized, and more studies for NAs in hospitals are expected. Researchers should draw more attention to evidence-based methods in the administration area, resulting in continuing improvement, global sharing and system establishment of intrahospital nursing assistants' administration.

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**Figure Legend**

Figure 1  PRISMA Flow diagram for study selection
Identification of studies via databases

- Records identified from:
  Databases (n = 1,973)
  Chinese language (n = 538)
  Source: Ovid (342), PubMed (406), CINAHL (224), Scopus (177), ProQuest (156), CNKI (118), WanFang (257), SinoMed (163), NICE (127), CADTH (0), AHRQ (3)

- Records removed before screening:
  Duplicate records removed (n = 467)
  Automatically moved by title words (n = 14)

- Records screened for title (n = 1,492)
- Records excluded (n = 1080)

- Records screened for abstract (n = 400)
- 12 records had no abstract
- Records excluded (n = 274)

- Records assessed for eligibility (n = 138)
- Records excluded: (n = 103)
  setting (n = 15)
  specific area / main focus (n = 13)
  participant (n = 24)
  methodology (n = 26)
  outcome (n = 5)
  not a research paper or evidence synthesis (n = 10)
  conference abstract (n = 2)
  full text not found (n = 7)
  publication year (n = 1)

- Studies included in review (n = 36)

Identification of studies via other methods

- Records identified from:
  Citation searching (n = 13)

- Records sought for retrieval (n = 13)
- Records excluded: (n = 9)
  setting (n = 3)
  main focus (n = 2)
  methodology (n = 1)
  no outcome (n = 1)
  not a research paper (n = 2)

- Records not retrieved: (n = 3)
  having been included (n = 1)
  having been excluded (n = 2)