

Educating nursing students for sustainable future rural health-care services: An umbrella review

Veronica Rusaanes^{a,*}, Hilde Eide^a, Espen Andreas Brembo^a, Lise Gladhus^a,
Birte Marten Oswald^{a,b}, Lena Günterberg Heyn^a

^a Centre for Health and Technology, Department of Nursing and Health Sciences, University of South-Eastern, Norway

^b Municipality of Midt-Telemark, Norway

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ABSTRACT

Background: Rural nursing education stands as a way to contribute to a sustainable nurse workforce in rural areas. Different approaches to organizing rural nursing education are described in the existing literature.

Objective: To explore scientific reviews about rural nursing education and synthesize current knowledge as “best practice” recommendations for rural nursing education regarding the required organization of rural nursing education programs, what **are** the competencies required to function as a nurse in rural health-care settings, and the key environmental features for learning in rural nursing education programs.

Design: An umbrella review.

Participants: Nursing students, newly graduated nurses, and clinical supervisors involved in nursing education in rural areas.

Data sources: A systematic literature search was conducted. Of the 276 review articles found, 93 were screened by title and abstract and 27 were screened in full text. The period searched was 2000–2022, and the literature search was peer-reviewed and published.

Review methods: The Joanna Briggs Institute (JBI) methodology for umbrella reviews guided the design, search, and the reporting of the findings of the included reviews. Four reviewers screened for inclusion and exclusion using Covidence in a double blinded process. The analysis was guided by the JBI guidelines for umbrella review syntheses. Two reviewers conducted the analysis.

Results: Sixteen reviews were included; eight scoping reviews, six integrative reviews, one narrative review, and one rapid review. The synthesis of current evidence provides the following “best practice” suggestions: (a) fostering context-sensitive and collaboratively designed education environments is recommended; (b) integrating curricula tailored for the nursing role and rural practice is recommended (c) establishing a supportive learning environment that encourages students’ motivation and academic success; and (d) clinical placements in locally developed learning settings address the educational needs required for practice in the rural workforce.

Conclusions: Rural nursing education needs to be properly aligned with the context and health-care development, to educate nurses who can meet the community’s needs today and in the future. A well-functioning collaboration between university faculty and local community stakeholders in a co-creation process stands out as vital to build a sustainable, flexible, rural nursing education program.

Tweetable abstract: Umbrella review: Flexible, co-created education might be “best practice” in rural undergraduate nursing programs.

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What is already known

- Rural areas frequently experience shortages of health-care professionals, including nurses.

- Nursing education in rural areas is important to ensure equal access to education and sufficient competencies in rural areas.
- There are several ways to organize nursing education in rural areas.

What this paper adds

- “Best practice” recommendations for rural nursing education advocate for a flexible organizational structure that harmonizes seamlessly with the unique demands of rural contexts.

* Corresponding author at: University of South-Eastern Norway, Grønland 58, 3045 Drammen, Norway.

E-mail address: Veronica.Rusaanes@usn.no (V. Rusaanes).

- A context-sensitive curriculum is needed to educate nurses for nursing practice in rural areas.
- Co-creation can support a context-sensitive organization of the education and supportive learning environments.

1. Background

Many countries are experiencing a shortage in the nursing workforce, particularly in rural areas (De Smedt and Mehus, 2017; Weinhold and Gurtner, 2014). Demographic changes in Norway and internationally reflect an increase in the number of older adults due to extended life expectancies, and a growing population seeking health-care services because of noncommunicable diseases (European Commission et al., 2021). This development puts pressure on health care in rural areas, as young people tend to move to urban areas to pursue education or work opportunities, limiting informal care from family (De Smedt and Mehus, 2017). Offering nursing education in rural areas may prevent people living there from moving away to study; it may also support retention and recruitment among these students into and within rural health-care services (Hyrý-Honka et al., 2016; Norbye and Skaalvik, 2013; Walker and Forbes, 2023). Furthermore, the shortage of health personnel calls for an examination of which competencies health-care professionals need in the future to meet patients' needs (Nancarrow, 2015; Sundling et al., 2022). Nursing education provided in rural areas represents a way to secure a sustainable workforce in rural health care (Abelsen et al., 2020).

1.1. Rural health care

The concept of rural health is described and defined in various ways in the literature. Population size, density, cultural barriers, and distance to a specialist or advanced referral health service, are some characteristics used to define rurality related to health-care services (De Smedt and Mehus, 2017; Versace et al., 2021). Health care in rural and remote areas is linked to regional economic and demographic factors that influence health-care planning and management. The Organization for Economic Co-operation and Development (OECD) offers a typology used to characterize rural, remote, and isolated communities (Ruiz and Dijkstra, 2010). Australia, among other countries, has developed a tailored typology to characterize its specific geographic areas and populations, called the Modified Monash Model (Versace et al., 2021). It defines medium rural towns as areas within a 10 km road distance from a town populated by 5000 to 15,000 inhabitants. Another example is Norway's "Centrality Index," which is based on the OECD principles. However, as Norway is a small country in terms of population size, only the capital (Oslo) and its surrounding municipalities have an index value of one. Municipalities are considered rural if they have an index of four to six, with the latter being the most isolated settings (Statistics Norway, 2020).

In this review, the term "rural" is used without discriminating between rural, remote, and isolated health-care settings, and "decentralized" is regarded as a synonymous concept.

1.2. Rural nursing practice and education

The characteristics of rural health care and the rural context imply that nursing practices in rural areas differ in many ways from nursing practice in urban areas. Rural nurses need a wide range of generalist as well as some context-specific competencies to handle the complexity of patients' health-care needs in their everyday work (Berry, 2018; Pavloff et al., 2022). Limited access to peers, variability in local resources, and dependence on primary health care are some characteristics of rural health practices (Berry, 2018). Other characteristics include professional isolation (MacLeod et al., 2018; Winters, 2021), limited access to support from relatives due to long distances (De Smedt and Mehus, 2017), and patients' strong motivation to be independent and remain in their home (De Smedt and Mehus, 2017; Winters, 2021).

Nursing competencies in consultation and decision-making are especially important when practicing in rural areas, due to the long distances (Hyrý-Honka et al., 2016). Additionally, the adoption of telehealth in rural areas is expected to place additional responsibilities on nurses, encompassing both patient care and the competencies required for equipment management and maintenance (Exner-Pirot, 2018, p. 209). Moreover, as a resident of the community, nurses might have a multifaceted familiarity with their patients, which can encompass both positive and negative aspects (MacLeod et al., 2018; Winters, 2021). Maintaining confidentiality and professionalism are examples of aspects that may challenge the nurse's role and demand a high degree of social accountability (De Smedt and Mehus, 2017). The rural context also requires preparedness to cope with challenging climate conditions that may delay or hinder access to or provision of health services (De Smedt and Mehus, 2017; Winters, 2021).

Rural nursing education is characterized by students living and studying at a geographical distance from (mostly) urban university campuses, organized by asynchronous independent study periods in combination with synchronous face-to-face seminars, lectures, lab work and placement periods (Butler et al., 2016; Skaalvik and Norbye, 2016; Walsh et al., 2023). The rural distribution of urban campus structures is described as organized into satellite campuses, decentralized education, distributed education, or off-campus locations (Exner-Pirot, 2018).

Educating nurses in contexts where the student population is geographically widespread means that the unity of a shared place challenges the learning environment (Koch, 2014). The use of digital technology is described as a frequently used pedagogical strategy to deliver learning content, both in decentralized education and on satellite campuses (Eriksen and Huemer, 2019; Hays et al., 2022).

Clinical placement is a fundamental learning arena in nursing education programs worldwide. Importantly, it has also the potential to contribute to local development of community health care (Nyoni et al., 2021). Experiential training as part of clinical placements in rural districts provides students with relevant rural experience (Reeve et al., 2020; Weinhold and Gurtner, 2014), as well as formative professional development and identity (Hyrý-Honka et al., 2016).

Cooperation and effective dialog between faculty and local stakeholders such as leaders, clinicians, locally situated teachers, and students are described as significant in rural education programs (Skaalvik and Nordbye, 2016; Zimmer et al., 2016). Important factors related to this aspect include building teacher and mentorship continuity (Hyrý-Honka et al., 2016), geographically distributed university lecturers, a flexible curriculum (Skaalvik and Nordbye, 2016), and creating comprehensive and relevant knowledge about nursing practice in rural municipalities (Hyrý-Honka et al., 2016; Zimmer et al., 2016).

A lack of education and training specifically addressing rural aspects in health care is among several core reasons for the shortage or maldistribution of health-care workers in rural areas (Weinhold and Gurtner, 2014). Newly graduated nurses may feel unprepared for the contextual challenges experienced in rural areas and decide to leave (Calleja et al., 2019), which has consequences for the design of rural nursing education.

An extensive body of published research exists regarding educating nurses in rural or decentralized education settings, including a substantial number of different types of reviews. However, to our knowledge, no integrated reports or systematic reviews have been published that include all aspects of current knowledge for developing nursing education in rural areas. Consequently, we conducted an umbrella review to inform the establishment or revision of nursing education in rural settings, to secure rural education that is relevant for the future.

2. Methods

2.1. Aim and research questions

To lay the foundation for developing sustainable nursing education in rural areas, taking the future challenges of delivering high quality

health care into account, this umbrella review aims to synthesize current knowledge about nursing education in rural areas. We formulated three research questions:

1. What is required in the organization of nursing education programs in rural contexts?
2. What are the competencies required for nurses practicing in rural contexts that need to be integrated into the education?
3. What are the key environmental features important for learning in rural nursing education programs in general and specifically during clinical placements?

2.2. Design

Our research questions encompass three broad areas of interest to uncover existing evidence about rural nursing education. Umbrella reviews are suitable when the objectives are broad and existing research has been synthesized in reviews (Aromataris et al., 2015). Traditionally, umbrella reviews are used to synthesize systematic reviews and meta-analyses, but the Joanna Briggs Institute (JBI) also provides a guide that includes qualitative synthesis in umbrella reviews (Aromataris et al., 2020). As qualitative reviews often have a narrow scope, an umbrella review can provide a more generalizable synthesis of evidence. We conducted an umbrella review of prior literature reviews, scoping reviews, integrative reviews, and narrative reviews. We developed a protocol (blinded for review) to guide the research process, following the items from the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) approach (Page et al., 2021). We further used the JBI Manual for Evidence Synthesis, covering recommended steps for umbrella reviews (Aromataris et al., 2020).

2.3. Search strategy

After developing the research questions, the Population, Intervention, Comparison, Outcome (PICO; Appendix 1) framework was operationalized in accordance with our study aim. A team of researchers and academic librarians developed and determined the final search strategy between April and May 2021. An updated literature search was conducted in October 2022 to enhance the timeliness of the umbrella review. The search strategy was peer reviewed using the Peer Review of Electronic Search Strategies (PRESS) 2015 Guideline Statement (McGowan et al., 2016). The literature search was performed by the librarians in Medline, Embase, CINAHL, ERIC, Web of Science, SveMed+, Libris, and SwePub. The search strategy was adapted to each database and their thesauruses. As the aim of this review was to identify and synthesize research on undergraduate nursing education in rural areas, controlled terms, synonyms, and related terms for the categories “nursing education/nursing students” and “rural areas” were mapped. In addition to nursing education, specializations in nursing and related educations within the health sciences were included in the initial searches to widely map the field but were later excluded due to the study’s aim. A filter to detect review articles was also applied. The search was set to include evidence for the period 2002 to October 2022. The year 2002 was set as a starting point due to the “Engineering Education for Sustainable Development’s Barcelona Declaration” (Barcelona Agreement on Higher Education, 2004).

The full search strategy is presented in Appendix 2 and is available at <https://doi.org/10.23642/usn.21769406.v1>. Reference lists with abstracts were screened by the researchers. The reference lists of the included articles were reviewed to identify potentially relevant articles.

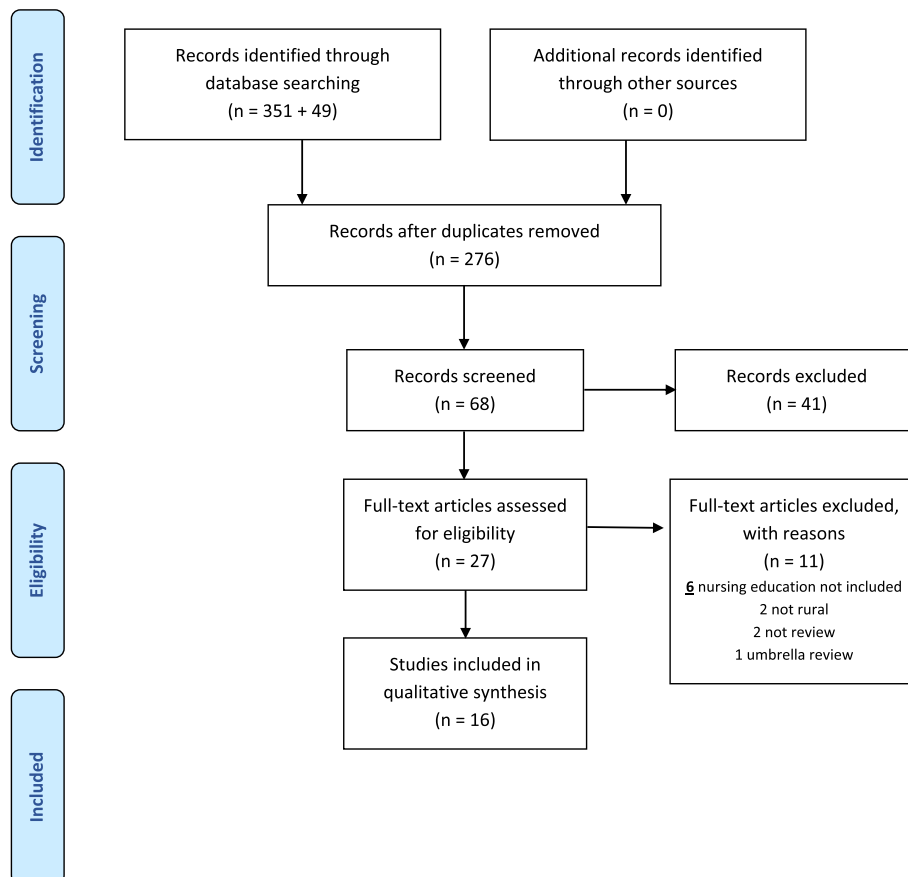


Fig. 1. PRISMA flowchart.

2.4. Inclusion criteria and search outcomes

Criteria for inclusion were developed by the research team as follows:

- nursing education, or competencies needed in rural nursing practice
- literature review
- rural OR remote OR decentralized education
- undergraduate nursing education
- English or Scandinavian language
- published 2002–2021, updated search 2021–2022.

We excluded studies that were not reviews, not about undergraduate nursing education, or only about postgraduate nursing education and exchange students.

The literature search led to 243 reviews being screened by title and abstract for eligibility following the removal of duplicates. After excluding papers that were not scientific literature reviews, the remaining 60 reviews underwent a double-blinded screening process using the Covidence systematic review software (Covidence.org). The screening team consisted of four researchers. Disagreements were discussed until consensus was reached on inclusion or exclusion. The most common reasons for exclusion in this stage were labeled “nursing education not included” or “not rural,” due to narrow focuses of interest (e.g., courses in different health-care specialties). We reviewed 21 reviews in full text, also double-blinded, using Covidence. The updated search found 33 recent reviews, leading to the full text screening of 8 reviews and the inclusion of 4 of these. No articles meeting the inclusion criteria were found through the hand searches. A total of 16 reviews were included (see the PRISMA flowchart in Fig. 1).

2.5. Quality appraisal

Critical assessment of each included review was conducted using the JBI Critical Appraisal Checklist for Systematic Reviews and Research Syntheses (Aromataris and Munn, 2020). Two independent researchers conducted the quality appraisal, blinded from each other. When there was a lack of consensus, a third researcher was included in the discussion and consensus was reached. The reviews were rated to have low quality if the score was 1–4, medium with a score of 5–7, and high if the score was 8–10 (Appendix 3).

2.6. Data extraction and synthesis

Data from the included reviews were first entered into an Excel spreadsheet. The item of analysis comprised the reported findings. While findings are usually presented in a results section, in some cases – such as the reviews of Green et al. (2022), Lima et al. (2019), and Trede et al. (2014), the findings were integrated as part of the discussion section. The method for analyzing and synthesizing followed the JBI framework for umbrella synthesis (Aromataris et al., 2020; Aromataris et al., 2015). One researcher created a priori codes in NVivo according to the research questions and coded the content of all the included reviews, line by line. The coded sequences were grouped, and the descriptive themes generated. The first and last authors conducted the analysis, and the results were discussed by four members of the research team, as the themes were generated and then compared to the review's aim and research question in several steps.

3. Results

The screening led to the inclusion of 16 reviews, comprising 8 scoping reviews, 6 integrative reviews, 1 rapid review, and 1 narrative review (Appendix 3). All reviews reported on aspects related to nursing education in a rural context. First, study characteristics are presented, followed by a presentation of the results, structured in alignment with the research questions.

3.1. Study characteristics

The 16 reviews included studies from all continents and 14 different countries. The total number of studies included in the reviews varied from 8 to 101 studies, as shown in Table 1. One article (Hardy and Calleja, 2019) did not report which countries were included in their review, only which continents. The critical appraisal found eight reviews of high quality, eight of moderate quality, and none of low quality (as shown in Table 1).

Five of the reviews explored the experiences of newly graduated nurses working in rural or remote areas in relation to the competencies and workplace support relevant for developing rural nursing education (Burrows et al., 2019; Fowler et al., 2018; Hardy and Calleja, 2019; Muirhead and Birks, 2019; Pavloff et al., 2017). Nancarrow (2015) conducted a rapid review of integrated models of health service delivery, relevant to the rural and remote Australian context.

Ten reviews explored the experiences of nursing students in rural education settings (Green et al., 2022; Hays et al., 2021; Killam and Carter, 2010; Leidl et al., 2020; Lima et al., 2019; Oosterbroek et al., 2017; Quilliam et al., 2021; Reeve et al., 2020; Rogers, 2021; Trede et al., 2014). (See Table 1.)

All reviews reported on different scopes of interest related to nursing education in rural settings. Three reviews exclusively included students who were already familiar with the rural context (Hays et al., 2021; Lima et al., 2019; Quilliam et al., 2021). One review focused explicitly on urban nursing students' experiences during rural placements (Killam and Carter, 2010), while others included both rural and urban students or did not differentiate between the participants' background (Green et al., 2022; Leidl et al., 2020; Oosterbroek et al., 2017; Reeve et al., 2020; Rogers, 2021). Trede et al. (2014) focused on the supervisor's experiences of supervising students in rural settings, while Leidl et al. (2020) examined the use of blended learning in nursing education, described as decentralized, out-of-urban-campus structures.

3.2. Organization of nursing education in rural areas

Several studies found that government or university strategies aimed at recruiting students who want to live and work in rural areas are effective for enhancing rural practice among newly graduated nurses (Green et al., 2022; Lima et al., 2019; Quilliam et al., 2021). Further, university and government funding of students' educational expenses was reported as important to reduce students' economic stress (Green et al., 2022; Killam and Carter, 2010; Quilliam et al., 2021).

Establishing relationships and efficient cooperation between the local stakeholders, organizations, and universities may impact students' experiences of preparation before clinical placements (Rogers, 2021) and enable effective supervision (Trede et al., 2014). Relationship building and cooperation relate to the development of information packages and the co-creation of professional development courses for supervisors with local stakeholders and curriculum development (Green et al., 2022; Trede et al., 2014). Supervisor programs should consider and address the local stakeholders' needs, such as the required time and resources, colleague support, and accessible information (Green et al., 2022; Killam and Carter, 2010; Trede et al., 2014).

Organizing faculty and teacher resources, as well as equipment and course content, to create an educational environment in the local community may bridge several of the challenges reported by students, and may encourage enrollment (Burrows et al., 2019; Killam and Carter, 2010; Oosterbroek et al., 2017; Trede et al., 2014).

3.3. Educating for competencies needed to practice in rural health-care contexts

This section first describes the role and function of nurses in rural contexts and the competencies that they are expected to have at graduation, followed by requirements for curriculum development.

Table 1
Included studies.

Citation details	Aim	Participant details and context	Number of databases searched	Number of studies, countries, and type of studies	Outcomes	Quality appraisal
Burrows et al., 2019 What are the support needs of nurses providing emergency care in rural settings as reported in the literature? A scoping review	To determine the support needs of nurses providing emergency care in rural setting as reported in the literature.	Nurses. Rural health-care settings	4	30 studies, Australia (n = 19), North America (n = 8), Canada (n = 3). Peer reviewed articles and some gray literature	Four broad themes: unpredictable nature of rural emergency care and the need for further education and support, extended role of the rural emergency nurse, implementation of rural nursing graduate programs, issues surrounding the recruitment and retention of rural nurses	Moderate
Fowler et al., 2018 An integrative review of rural and remote nursing graduate programs and experiences of nursing graduates	To identify the qualitative, quantitative, and mixed-method studies that explore the experiences of rural and remote new graduate registered nurses who participated in new graduate programs. To explore and synthesize the evidence relating to features of rural health student placements	Newly graduated nurses. Rural and remote context	6	8 studies, Australia and USA Peer reviewed articles, mixed/integrative, qualitative studies (n = 7), quantitative (n = 1)	Two broad themes with subthemes: 1) transition shock and 2) a sense of belonging. Transition shock thematized as overwhelmed with change, abandonment, fractured reality, a sense of belonging, social support, horizontal violence.	High
Green et al., 2022 Identifying features of quality in rural placements for health students: Scoping review	To discover how effective rural education support programs were in developing clinical decision-making skills in graduate or novice RNs for triage and 2) to determine what is known about triage education support programs for graduate or novice RNs undertaking triage in rural and remote settings	Nurse and medical students. Regional, rural, and remote contexts	7	101 studies included, Australia (n = 77) USA (n = 5), Canada (n = 17), England (n = 1), not specified (n = 1). Peer-reviewed (n = 94) gray papers, (n = 7)	Four overarching domains pertaining to features of rural health student placement quality: 1) learning and teaching in a rural context, 2) rural student placement characteristics, 3) key relationships, and 4) required infrastructure	High
Hardy and Calleja, 2019 Triage education in rural remote settings: A scoping review	To 1) discover how effective rural education support programs were in developing clinical decision-making skills in graduate or novice RNs for triage and 2) to determine what is known about triage education support programs for graduate or novice RNs undertaking triage in rural and remote settings	Newly graduated and novice nurses. Rural and remote contexts	4	14 studies, Australia (n = 3), Asia (n = 3), Africa (n = 1) and North America (n = 7) Quantitative (n = 3), qualitative (n = 6) and literature review (n = 5) papers	Three broad themes: 1) variability of triage accuracy/assessment, 2) lack of education, qualifications, and experience required, and 3) training and supervision requirement	Moderate
Hays et al., 2021 Studying nursing at Australian satellite university campuses: A review of teaching, learning and support	Investigating methods of education in addition to student experiences of teaching, learning and support at satellite campuses, with a focus on undergraduate nursing education	Nursing students enrolled at satellite campuses. Rural and remote contexts	6	12 studies, Australia (n = 12), USA (n = 2). Quantitative (n = 6) Qualitative (n = 2), discussion paper (n = 2) action research (n = 1), open-ended questionnaire evaluation paper (n = 1)	Three themes: 1) student characteristics and associated barriers and enablers to studying at a satellite campus, 2) teaching strategies and learning experiences, and 3) academic and pastoral support	Moderate

(continued on next page)

Table 1 (continued)

Citation details	Aim	Participant details and context	Number of databases searched	Number of studies, countries, and type of studies	Outcomes	Quality appraisal
Killam and Carter, 2010 Challenges to the student nurse on clinical placement in the rural setting: A review of the literature	Explore the question: "what challenges do nursing students from urban communities experience while they are on clinical placement in rural areas?"	Nursing students. Rural and remote contexts	2	13 studies, Canada, Australia. Qualitative (n = 8), quantitative (n = 2), program evaluation reports (n = 3)	Findings grouped into the categories of the Ecological Model: Wide nurse generalist knowledge, cultural and demographic knowledge. Climate challenges. Policies in rural health, and how to advocate change. Guidance in maintaining a professional role in small communities. Economic support when placements require expenses. Communication between faculty and students. Access to resources (databases, libraries). Communication with preceptors prior to placements. Faculty support to mentoring nurses.	Moderate
Leid et al., 2020 Blended learning in undergraduate nursing education—a scoping review	Examine and summarize existing literature regarding use of blended learning in undergraduate nursing education	Nursing education. De-centralized, distributed contexts	5	37 studies, Canada (n = 4), US (n = 10), UK (n = 3), Australia (n = 109), Singapore, Norway, Malaysia, Korea, Taiwan, Ireland, China, Brazil. Qualitative (n = 7), Quantitative (n = 14), mixed methods (n = 16)	Eight themes: professional nursing skills, mental health nursing, bioscience, pharmacology, specialty populations, nursing assessment, acute care nursing, the art of nursing, Blended learning aligns with terminology associated with distributed, decentralized, hybrid and flexible learning, and is rapidly becoming the new standard in nursing education.	Moderate
Lima et al., 2019 Rural nursing formation possibilities: integrative review	Understand the formation process in international rural nursing	Nursing education. Rural contexts	2	13 studies, Australia (n = 5), Canada (n = 3), USA (n = 3), Norway (n = 1), multinational (n = 1) Original studies, qualitative and quantitative	Results: Increase number of students recruited from rural areas, formation of advanced practice nurses to meet the needs of the geographic region, curricular design internships in rural healthcare units, develop continuing educations that meet the needs of rural practice	High
Muirhead and Birks, 2019 Roles of rural and remote registered nurses in Australia: An integrative review	To explore the multifaceted roles of registered nursing practice in rural and remote areas of Australia	Registered nurses. Rural and remote contexts	14	14 studies, Australia Qualitative (n = 8), practice literature (n = 6)	Four main themes: 1) roles shaped by context, 2) doctor substitute, 3) multi-skilled and advanced practice, and 4) feeling unprepared	High
Nancarrow et al., 2015 Models of care involving district hospitals: A rapid review to inform the Australian rural and remote context	To identify models of care that incorporate district hospitals and have relevance to the Australian rural and remote context	Models of care. Rural health-care organizations	11	25 studies, Australia (n = 19), Canada (n = 4), USA (n = 1), International (n = 1) Systematic review (n = 2) Descriptive review of services (n = 6), review of specific intervention (n = 10), conference paper (n = 4), PhD dissertation (n = 1), policy document (n = 1), consultant report (n = 1)	Models of care are functions integrated for service delivery, with these client focuses reported: end of life/palliative/diseases of aging, mental health, maternal/child, Aboriginal health, emergency/surgical care, cancer care, renal care, oral care. Hospitals' role in local communities by "hub and spoke" models to deliver services close to home	High
Oosterbroek et al., 2017 Rural nursing preceptorship: An integrative review	To determine the state of knowledge regarding rural nursing preceptorships	Nursing students in final practicum course. Rural context	9	19 studies, Canada Qualitative (n = 3), qualitative (n = 16)	Four main themes: 1) the nature of the rural experience, 2) interprofessional collaboration, 3) recruitment and retention of nurses, and 4) student performance evaluation and feedback	High

<p>Pavloff et al., 2017 Rural and remote continuing nursing education: An integrative literature review</p>	<p>To identify the current continuing education needs of rural and remote RNs internationally</p>	<p>Graduated nurses. Rural contexts</p>	<p>3</p> <p>8 studies, Canada (n = 2), Australis (n = 2), Sweden (n = 1), USA (n = 3), Qualitative (n = 3), quantitative (n = 3), mixed method (n = 2)</p>	<p>Moderate</p> <p>Four themes: 1) comprehensive specialized nursing practice for direct patient care, 2) unanticipated events, 3) non-direct patient care, 4) advanced specialty courses</p>
<p>Quilliam et al., 2021 Building a rural workforce through identifying supports for rural, mature-aged nursing and allied health students: A systematic scoping review</p>	<p>To scope factors influencing rural, mature-aged nursing and allied students' ability to access, participate in, and succeed in higher education</p>	<p>Nursing students, and allied health-care students. Rural contexts</p>	<p>5</p> <p>14 studies, Australia (n = 12), USA (n = 2). Quantitative research design (n = 7), qualitative designs (n = 5), mixed methods (n = 2)</p>	<p>High</p> <p>Enablers and barriers. Enablers: experiential capital feature of rural, mature-aged nursing students, internal motivation to succeed in their studies, family support. Barriers: competing responsibilities of everyday life, navigating in higher education system, lack of academic literacy, communication, and technology systems due to being distance students, financial stress.</p>
<p>Reeve et al., 2020 Health profession education in remote or geographically isolated settings: A scoping review</p>	<p>To identify undergraduate and graduate health-care professional education for remote areas, the type of educational strategies implemented, and their reported outcomes from an international perspective</p>	<p>Health profession education. Remote contexts</p>	<p>6</p> <p>40 studies, Australia (n = 32), Canada (n = 6), USA (n = 2) Appendix (2). Evaluation studies (n = 26), cohort studies (n = 7), prospective cohort studies (n = 3), quasi experimental pre post including patient outcomes (n = 2), descriptive studies (n = 2)</p>	<p>Moderate</p> <p>Six main themes: 1) cultural competency for working with Indigenous cultures in rural and remote areas, 2) instill values for social accountability, 3) rural and remote skills development for the general workforce, 4) remote specialization, 5) specialist skills required for the remote workforce, and 6) train the trainer model</p>
<p>Rogers, 2021 Supporting health students on rural placements: A scoping review</p>	<p>To review the Australian literature on initiatives used to provide support for pre-registration health students undertaking a rural placement</p>	<p>Health students. Rural clinical placement</p>	<p>5</p>	<p>High</p> <p>Two main groups of findings: 1) enablers for rural placements—accommodation and travel assistance, cultural awareness training and information about the rural context prior to placement, institutional preplacement preparation, organizational preplacement preparation and orientation through engagement with events and health professionals; and 2) barriers to undertaking a rural placement—economic burdens related to relocating, social isolation, organizational burdens related to capacity to supervisors, pre-preparation, inconsistent communication, and feedback mechanisms</p>
<p>Trede et al., 2014 Supervisors' experiences of workplace supervision of nursing and paramedic students in rural settings: A scoping review</p>	<p>To identify what is known about nursing and paramedic clinical supervisors' experiences of their supervision practices in rural settings</p>	<p>Clinical supervisors in rural nursing and paramedic education</p>	<p>8</p> <p>5 studies, Sweden, Belgium, Malaysia, Australia Original articles published in peer reviewed journals</p>	<p>High</p> <p>Organizational factors, support from colleagues, professional development. Supervisors keeping up-to-date, time to prepare for supervising. Students' learning needs vs. service needs. Foster strong relationship btw. university and organization. Support from clinical managers.</p>

3.3.1. Nurses' role and function

Five reviews (Burrows et al., 2019; Fowler et al., 2018; Hardy and Calleja, 2019; Muirhead and Birks, 2019; Pavloff et al., 2017) examined the role of registered nurses in rural health care. Moreover, Hardy and Calleja (2019) aimed at scoping knowledge on triage education programs, pointing to the unpredictability of rural emergency settings as characteristic of rural nursing practice (Hardy and Calleja, 2019). Nurses' extended role and breadth of practice in rural areas were described by several authors (Burrows et al., 2019; Fowler et al., 2018; Hardy and Calleja, 2019; Muirhead and Birks, 2019; Nancarrow et al., 2015; Pavloff et al., 2017). Nancarrow et al. (2015) found multidisciplinary health-care services aligned with community needs to be important, thus requiring access to rural-focused education for health-care professionals in, for example, palliative care and acute care in home-based services. Nurses in rural areas provide care to a diverse range of patients, encompassing laboring women, pediatric patients, individuals with neurological, respiratory, and diabetic conditions, geriatric and palliative care, psychiatric cases, trauma emergencies, and post-operative care with specialized devices. Their responsibilities extend to pharmacology, technology and leadership management, and knowledge of available health services, as well as the management of domestic violence cases, conducting medical history assessments, and performing physical examinations (Burrows et al., 2019; Killam and Carter, 2010; Lima et al., 2019; Muirhead and Birks, 2019; Oosterbroek et al., 2017; Pavloff et al., 2017; Reeve et al., 2020).

3.3.2. Experiences of newly graduated nurses

Nurse graduates are expected to practice with advanced generalist skills, leading to feelings of being abandoned and/or overwhelmed; they may thus develop a sense of transition shock, due to a lack of confidence in their competency level (Fowler et al., 2018). Furthermore, rural nurses coming from hospital settings report feeling unprepared for the nurse roles in rural settings (Muirhead and Birks, 2019).

Care models used in health-care services (e.g., team nursing), combined with a lack of appropriate educational support addressing nurses' roles and functions in teamwork processes, may make newly graduated nurses feel unprepared for undertaking leadership roles (Fowler et al., 2018).

New nurses in rural settings may encounter several challenges, such as horizontal violence from senior staff (Fowler et al., 2018) and concerns regarding the quality of care they provide (Muirhead and Birks, 2019). These issues arise when they are expected to practice without having established the necessary competencies, training, and understanding of the context and the unique needs of the community (Fowler et al., 2018; Muirhead and Birks, 2019).

Rural hospitals may not have a medical doctor on site full time. Hence, nurses are responsible for considering whether a doctor is required to attend, leading to increased pressure on nurses to make appropriate judgments and decisions independently (Burrows et al., 2019; Nancarrow et al., 2015). In community health care, nurses may be expected to substitute the general practitioners' role when the doctor is off site. Rural nurses collaborate with general practitioners, nurse practitioners, and other experts via distance communication or periodic community visits (Muirhead and Birks, 2019).

3.3.3. Curriculum aligned with the nurse role and function in rural health care

Acknowledging the multifaceted nature of the nurse competencies required for these environments has been recognized as essential when designing "fit-for-purpose" education models for rural and remote settings (Muirhead and Birks, 2019; Pavloff et al., 2017). The curriculum in rural nursing education needs to cover basic knowledge addressing the entire lifespan, as well as a wide range of nursing specialties. The included reviews describe a need for cultural competencies, such as understanding of barriers, privileges, current health trends, communication with people with different educational backgrounds (Lima et al., 2019; Reeve et al., 2020), demographics, and population characteristics (Nancarrow et al., 2015).

Short courses that provide specialist knowledge at a generalist level before and during placements, using a variety of teaching methods, are reported as useful in several studies (Burrows et al., 2019; Fowler et al., 2018; Killam and Carter, 2010; Reeve et al., 2020). Further, advanced specialty courses or continuing education programs are recommended toward enhancing patient safety and fostering a highly skilled rural nursing workforce (Burrows et al., 2019; Hardy and Calleja, 2019; Muirhead and Birks, 2019; Pavloff et al., 2017).

3.4. Key elements for successful rural education programs

This section first describes the environmental features of learning in rural nursing education programs in general followed by clinical placements.

3.4.1. Studying in rural learning environments

Rural students' motivation and academic achievements are strongly associated with their perceived access to support and resources (Hays et al., 2021). A blended learning design proved useful for teaching almost all theoretical competencies (Leidl et al., 2020). The use of digital resources in teaching theoretical courses in rural nursing education is described in several of the included articles; these include video-recorded or videoconference lectures, tutorials, podcasts, and skills training apps (Hays et al., 2021; Leidl et al., 2020; Quilliam et al., 2021). To succeed in providing the students with an effective learning experience, the teachers' competence in designing digital learning environments, using technology, adapting curriculum, and managing multiple roles is important (Hays et al., 2021).

Some students hesitate to ask questions during videoconference lectures (Hays et al., 2021). One way to enhance communication and engagement and reduce depersonalization in virtual classrooms is to provide students with an on-site supervisor, a local or online teacher, or a support person who can assist with active learning and provide guidance on practical matters (Hays et al., 2021; Leidl et al., 2020).

Reported barriers include lack of support from university administration, negative perception of educational methods (such as videoconferences), and lack of access to library services (Hays et al., 2021).

Socioeconomic status, level of information literacy, and preparedness for higher education are other factors that must be considered when planning nursing education in rural environments. In addition, satellite campus students are often older and need to balance the demands of study and clinical placements with work and family commitments. Educational methods that support students' own network may help facilitate time to study, emotional support, and the balancing of family obligations (Hays et al., 2021; Quilliam et al., 2021).

Moreover, face-to-face teaching enhanced their experience of a positive relationship and familiarity with the teacher, with a positive impact on their learning experience (Hays et al., 2021). Opportunities to build relationships and network between students were also found to be highly valued (Hays et al., 2021).

3.4.2. Learning in rural clinical practice placements

Clinical practice rotations in rural contexts address the unique educational needs of health-care students in developing the necessary skills to practice in the general workforce (Reeve et al., 2020). Clinical rotations including placement sites such as local hospitals and primary health-care settings in the community are relevant for learning the extent of competencies and skills needed (Hardy and Calleja, 2019; Reeve et al., 2020).

Nursing students in clinical placements in rural settings experience a learning environment with limited technology, a sense of professional isolation, and a complex and unpredictable patient census; these challenges can positively and negatively affect learning outcomes (Oosterbroek et al., 2017). Recognizing students' needs and giving them the opportunity to choose their placement periods have been found to be quality characteristics (Hays et al., 2021; Rogers, 2021). Limited resources and being isolated from other professionals to learn from and be supervised by

may require students to be self-structured and independent in their learning (Killam and Carter, 2010). Furthermore, a lack of peer support may be a characteristic of rural clinical placements (Rogers, 2021). Students' experiences of feeling welcomed and safe were found to be important to their learning process and the development of their confidence and professional identity (Green et al., 2022).

Students typically encounter a wide range of patients with diverse, unpredictable, complex care needs during clinical placements. Findings regarding students' experiences indicate that these learning environments may be challenging but may also offer valuable opportunities to enhance students' learning outcomes (Killam and Carter, 2010; Oosterbroek et al., 2017). Professionalism and boundary issues add to the complexity when students encounter patients in public places, such as grocery stores and bars (Killam and Carter, 2010; Oosterbroek et al., 2017). The students' values, social accountability, and personality as expressed through their knowledge and relational competencies may affect their ability to interact professionally with patients as care givers, influencing their learning possibilities during clinical practice (Killam and Carter, 2010; Reeve et al., 2020).

The duration of clinical placement is associated with both favorable and unfavorable aspects that influence the quality in terms of learning outcomes (Green et al., 2022). Longer clinical placement periods provide students with the opportunity to reside and work in rural or remote communities, enabling them to acquire a comprehensive skill set and competencies in these settings, embracing a generalist approach (Reeve et al., 2020). Short placements may introduce variation in clinical experience, but also inhibit socialization and the inclusion of students in social events, resulting in a diminished sense of belonging (Fowler et al., 2018). A sense of belonging was found to be important for students' intention to seek employment in that area (Oosterbroek et al., 2017).

3.4.3. Student supervision during clinical placements

Student supervision and preceptorship relate to teaching and learning processes during rural placement (Killam and Carter, 2010; Oosterbroek et al., 2017; Trede et al., 2014). Lack of staff represents a

barrier to effective supervision, leading to conflicting perceptions of the learning environment, where the students' learning needs are compromised by nurse preceptors who must prioritize other tasks (Killam and Carter, 2010; Trede et al., 2014). Acknowledgement from supervisors' colleagues and leaders and an understanding of preceptorship as a team effort may ease time constraints and create a joint preparedness to meet students' learning needs (Killam and Carter, 2010; Oosterbroek et al., 2017; Trede et al., 2014).

The evaluation of students' performance and overall learning progress is described as a joint responsibility between the student, supervisor, and faculty teacher, but the faculty teacher is usually the one responsible for the final assessment of the student (Killam and Carter, 2010; Oosterbroek et al., 2017). Faculty teachers' unfamiliarity with rural contexts may lead to a mismatch between students' actual performance and teachers' final assessment (Killam and Carter, 2010).

Rural supervisors may have less access to collegial support than urban supervisors, leading to a lack of preparation and unfamiliarity with the feedback tools used in student evaluation. Regular contact with faculty teachers may therefore support their confidence and preparation (Oosterbroek et al., 2017). The supervisor role may become more attractive if supervisors are provided with sufficient time, beneficial conditions, and recognition of their role, as well as close cooperation with university teachers (Burrows et al., 2019; Fowler et al., 2018; Killam and Carter, 2010; Trede et al., 2014).

4. Discussion

This study synthesized existing knowledge about rural nursing education. The major findings across many of the included articles convey the need to develop context-sensitive education and aligning students' competencies with the needs of the community and rural context. Our findings yield valuable insights and "best practice" recommendations for rural nursing education. Table 2 gives an overview of the key synthesized findings and details of the findings described in the Results section. These will be discussed below.

Table 2
Presentation of qualitative findings.

Phenomenon of interest	Synthesized findings	Details of findings	Sources
1. What are required in organization of rural nursing education programs offered in rural contexts?	Fostering a context-sensitive and collaboratively designed education environments is recommended	<ul style="list-style-type: none"> - Recruitment of students who wants to live in the rural district - Economic funding of students' educational expenses, such as traveling expenses, lack of access to university library services - Clinical placements in student local community or nearby, reduce traveling - Professional development – designed for rural teacher recourses and clinical supervisors 	Burrows et al., 2019; Green et al., 2022; Killam and Carter, 2010; Lima et al., 2019; Oosterbroek et al., 2017; Quilliam et al., 2021; Rogers, 2021; Trede et al., 2014
2. What are the competencies required for nurses practicing in rural contexts that needs to be integrated in curricula?	Integrating curricula tailored for the nursing role and rural practice is recommended	<ul style="list-style-type: none"> - Nurses' extended role and breadth of practice require competencies within a wide range of specialties at a generalist level - Rural health care may be organized specially to meet community needs, this influencing nurse roles and functions - Rural nursing is different from urban nursing context and requires a specially developed curriculum that covers basic knowledge addressing the whole lifespan, as well as a wide range of nursing specialties. 	Burrows et al., 2019; Fowler et al., 2018; Hardy and Calleja, 2019; Killam and Carter, 2010; Muirhead and Birks, 2019; Nancarrow et al., 2015 Oosterbroek et al., 2017; Pavloff et al., 2017; Reeve et al., 2020
3.1 What are the key environmental features important for learning in rural nursing education in general?	Establishing a supportive learning environment that encourages students' motivation and academic success	<ul style="list-style-type: none"> - Relationships among students and with teachers are important to enable students' motivation and academic success - Digital approaches to learning activities might lead to depersonalization of communication and engagement in learning activities - Studying at university level may be challenging for rural students, due to limited access to recourses and students have many competing obligations. 	Hays et al., 2021; Leidl et al., 2020; Quilliam et al., 2021;
3.2 What are the key environmental features important for learning in rural nursing education programs specifically during clinical placements?	Clinical placements in locally developed learning sites address the educational needs required for practice in the rural workforce.	<ul style="list-style-type: none"> - Unpredictable days during clinical placements, practicing along a wide scope of specialties of care offer valuable opportunities to enhance learning outcomes. - the rural learning context require students to become self-structured, independent, responsible, and skilled. - Students sense of belonging is important for students' later intention to seek employment in the area - Student supervision require support locally and close cooperation with university faculty 	Burrows et al., 2019; Fowler et al., 2018; Green et al., 2022; Hardy and Calleja, 2019; Killam and Carter, 2010; Lima et al., 2019; Oosterbroek et al., 2017; Reeve et al., 2020; Rogers, 2021; Trede et al., 2014

4.1. Organization of rural nursing education programs

A context-sensitive and co-designed education environment is recommended. The organization of nursing education in rural districts is affected by geographical distance to the university, making close relationships and collaboration essential for a sustainable organization.

Collaboration between local authorities and universities in recruiting students who are already familiar with the rural areas may strengthen the effect of education on the rural workforce. Weighting geographic affiliation in the application process (Quilliam et al., 2021), providing financial support for study expenses (Green et al., 2022) and part-time employment during studies (Wise et al., 2022), and guaranteeing employment after graduation (Winters, 2021, p. 303) are suggested ways to attract potential students from the local community. Additionally, the training of health-care workers in rural clinical settings necessitates an infrastructure that can be costly and time-consuming before any achieved competencies are documented. To mitigate this, local health-care services can include student competencies in their services, and students can work there part-time while pursuing their studies (Nancarrow, 2015). Establishing close relationships between the university and local stakeholders can facilitate the development of procedures for documenting stepwise achievements. To further ease economic burdens for students, financial support during their studies might strengthen recruitment to the communities, preventing new graduates from pursuing more economically lucrative opportunities (Frenk et al., 2010).

The relationship between the university and local stakeholders affects students' experience of quality and continuity during clinical placements (Trede et al., 2014). The clinical supervisor role is an important part of clinical placements and acknowledging their need for support and training at a system level requires collaboration between the university and the health-care organization (Pedregosa et al., 2020). Building academic–practice partnerships can bring together educational and clinical resources to create sustainable learning environments, in which students and nurse mentors alike experience growth and competency development. Combined positions for clinical personnel, where the employment is shared between the university and the health-care institution, might be one way to strengthen this relationship (Mathisen et al., 2022; Pedregosa et al., 2020) and secure sustainable development by empowering local stakeholders in a co-creation partnership (Ansell et al., 2022). Individuals in combined positions can serve as education facilitators in both theoretical courses and clinical settings, supporting the local learning environment. Moreover, developing and adapting the curriculum to the rural nursing context might also be supported by collaboration partnerships. Health-care settings in rural areas have more flexible structures and approaches to care than urban care settings (Lima et al., 2019; Nancarrow et al., 2015), thus a context-sensitive organization of education and learning environments is needed. Additionally, the co-creation of models for education may lead to developing learning environments which have the potential to contribute to the delivery of health services.

4.2. Competencies to be integrated in rural nursing curricula

The findings suggest that curricula should be specifically designed for the nurse role and practice in rural contexts, to educate nursing students to be “fit for practice” with the necessary competencies.

While patients used to go to hospitals for advanced care and treatment, the trend is now for them to receive such services in the comfort of their own homes, supported by telemedicine where possible (Jin et al., 2020). This shift is particularly evident in rural communities, where the limited proximity and accessibility to specialized consultations place increased responsibility on nurses with regard to judgment and decision-making. The broader generalist competencies identified in the included reviews (Fowler et al., 2018; Muirhead and Birks, 2019), along with the competencies needed to function as a nurse in

rural communities, might require curriculum developers to align these to a set of 21st century competencies and skills (Chu et al., 2022).

As remote technological solutions for health services continue to advance, the skills and competencies of nurses in rural areas are evolving. Limited access to resources in rural and remote areas, such as technicians, may place nurses at the forefront of this process. Nursing education should equip students to function in a flexible nursing role, make complex assessments based on patients' preferences and ethical and social implications, and take a leadership role in designing and adopting technologies to the rural contexts. This will ensure that nurses are at the forefront of utilizing technology while prioritizing patient needs and values (Chu et al., 2022). These competencies might facilitate the resilience and flexibility needed to be a nurse in a rural context. Based on the findings and current health trends, a curriculum aimed at developing social accountability (Killam and Carter, 2010; Reeve et al., 2020), a broad scope of generalist advanced skills, and 21st century competencies might be a relevant recommendation.

4.3. Locally based academic and clinical learning environments

The synthesized findings underscore the need to cultivate a conducive learning environment that fosters students' motivation and enhances their prospects for academic success. Typically, programs rely on digital solutions; however, caution should be exercised here, as students' perceived support from faculty may be compromised due to frequent reliance on online lectures, the depersonalization inherent in digital classrooms, and the absence of meaningful physical, face-to-face interactions with their teachers. The reviews report challenges that students face when studying at a distance, as in the case of rural learning environments (Fowler et al., 2018; Quilliam et al., 2021). Students' self-esteem concerning their proficiency in academic work might be influenced. Tailoring education programs to meet students' needs for flexibility, support, and positive relationships with teachers and other students requires an understanding of the student's rural context and the digital classroom environment (Quilliam et al., 2021). Flexibility may entail enabling students to progress at their preferred pace and allowing them to select from various course components or program modules, diverse learning modalities, and the option to engage in individual or collaborative work (Casey and Wilson, 2005).

The pedagogical literature recommends utilizing knowledge about students' learning needs, abilities, interests, and learning styles as a foundation to enhance engagement, proficiency, and transformative learning in digital classrooms, given their frequent use (Damsgaard, 2019; Slavich and Zimbardo, 2012). In this review, we discovered notable distinctions between students in rural nursing programs and their urban counterparts. Rural students typically exhibit characteristics that set them apart, such as higher proportions of mature learners who may encounter challenges related to academic literacy, digital tool accessibility, and navigating the university system (Quilliam et al., 2021). Other sources report that one in five nurses earned an academic degree before their nursing degree (Winters, 2013) which adds to the complexity involved in designing a learning environment. We suggest that evaluating students' academic literacy, motivation, and study situations may aid in the design of a learning environment which facilitates students to effectively manage their study time and family obligations. Flexible delivery of diverse learning materials such as readings, podcasts, and videos among which students can choose might be one way to facilitate motivation and academic feasibility, regardless of students' academic literacy.

Several of the included reviews suggest solutions to enhance student support and active learning through dedicated teacher functions (Hays et al., 2021; Leidl et al., 2020). In the rural context, where faculty availability may be limited, one solution is to involve the creation of combined positions specifically focused on fostering local relationships and supporting a learning environment (Mathisen et al., 2022). Additionally, a study during the COVID-19 pandemic on the use of small-

group, virtual patient simulations found a significant positive effect on students' individual learning process in digital classrooms (Mestre et al., 2022). Organizing educational support according to students' resources may require robust yet flexible scaffolding that aligns with the curriculum, to facilitate students' transformation into competencies relevant for their future work (Slavich and Zimbardo, 2012).

4.3.1. Learning environments in rural clinical placements

Clinical placements in locally developed learning environments offer students opportunities to develop competencies for the rural nursing role.

To prepare students to effectively navigate learning situations in rural health-care settings, where resources and health professionals to learn from may be limited, they must develop proficient learning skills and be autonomous and self-directed in their learning process. A model for clinical practice that promotes peer learning might enhance the learning environment via peer support (Williamson et al., 2020). Moreover, to facilitate a safe, flexible, clinical learning environment, mapping students' previous experience (Hyry-Honka et al., 2016) and exploring their prior knowledge (Nyoni et al., 2021) may be recommended before placement. A sense of belonging and being integrated in the team is also important, to facilitate learning outcomes in demanding environments (Fowler et al., 2018; Nyoni et al., 2021; Oosterbroek et al., 2017): Acknowledging students' learning prerequisites may contribute positively to integration in that team, as might tailoring educational support to students' needs.

Given the diversity in geographic and demographic factors, the organization of health-care services in rural community and district hospitals may exhibit distinctive approaches not commonly observed in urban settings. For example, district hospitals and satellite services may be organized in so-called "hub and spoke" models, where specialized services represent the "hub" in a network of community services (the "spokes") (Nancarrow et al., 2015). Consequently, the education of the future nursing workforce in rural areas must incorporate a comprehensive array of specialties, facilitating the transformation of students' knowledge into generalist competencies tailored to the specific needs of local services (Fowler et al., 2018; Oosterbroek et al., 2017). Hence, nursing students should possess a foundation of advanced generalist skills, with their education complemented by brief specialist courses focusing on specific tasks. A context-sensitive collaboration involving faculty, students, and local communities in customizing syllabi and curricula for rural or remote nursing may provide a viable solution.

Clinical placements in rural health services serve as vital learning opportunities for nursing students, enabling them to translate classroom knowledge into practical competencies through firsthand experiences in authentic clinical settings (Nyoni et al., 2021). However, the use of a workplace environment in education is not without limitations. The process of allocating mentoring resources and building positive attitudes toward taking on students influences students' learning outcome (Nyoni et al., 2021; Oosterbroek et al., 2017). Hence, developing close and supportive relationships between faculty and supervisors is valuable in creating positive experiences among supervisors (Oosterbroek et al., 2017; Trede et al., 2014). It is of particular importance that clinical placement models be carefully co-designed with the local institutions and management staff. Ongoing tasks for the managers in educational planning involve the support of preceptor roles, the cultivation of relationships between local stakeholders and faculty, and the identification of pertinent learning facilities (Nyoni et al., 2021; Oosterbroek et al., 2017; Trede et al., 2014).

4.4. Limitations

The findings encompass facets related to the research questions and consequently offer insights into what could be considered "best practice" in the context of rural nursing education. It is important to note, however, that the nature of an umbrella review imposes limitations.

As only existing reviews are included, valuable insights concerning "best practice" in rural nursing education from studies not yet incorporated into reviews may remain unreported. Furthermore, certain potentially intriguing aspects, such as lessons gleaned from the COVID-19 pandemic, are absent in this review. This is attributed to the timeframe under consideration and the absence of comprehensive literature reviews on these specific topics. Moreover, most of the studies were from Australia, Canada, and the United States. Limiting the reviewed studies to those published in English might have resulted in other relevant studies being overlooked. Ultimately the quality of this synthesis is dependent on the conduct and reporting of the included reviews. This might lead to inherent bias, consequently affecting the reliability of the findings in this review.

Despite these limitations, eight of the included reviews were evaluated to be of high quality. A competent group of researchers evaluated the findings in several steps. The initial analyses were performed by two of the researchers, discussed in several steps and thoroughly evaluated by the entire research team. In this umbrella review, findings relevant to our research questions are reported based on relevance, regardless of the quality of the appraisal score. However, no reviews of low quality were included, enhancing the trustworthiness of the results. In the discussion, however, the included reviews with a quality score of "high" were weighted more heavily with regard to informing our "best practice" suggestions.

As a main result was the importance of context sensitivity, the recommendations from this review cannot automatically be generalized to all the different contexts of rural nursing education. However, the review's findings can be used in establishing new or revising existing rural nursing curricula, critically evaluating the relevance of the findings for the specific context.

The findings indicate that further research is needed to provide more detailed and updated information on how to establish and maintain a context-sensitive collaboration with local stakeholders, in order to develop a co-created nursing education program. Further research is also needed regarding what competencies are needed to function as a nurse in rural contexts, as advanced care and treatment are increasingly provided in patients' homes.

5. Conclusions

To view students and their rural context at the center of education in contrast to seeing them as remote requires a flexible, student-centered approach. A "best practice" for organizing rural nursing education is to utilize co-creation to create context-sensitive education, learning environments, and study content.

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CRediT authorship contribution statement

Veronica Rusaanes: Writing – review & editing, Writing – original draft, Validation, Supervision, Software, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Hilde Eide:** Writing – review & editing, Supervision, Methodology, Investigation, Data curation, Conceptualization. **Espen Andreas Brembo:** Writing – review & editing, Writing – original draft, Supervision, Software, Investigation. **Lise Gladhus:** Methodology, Funding acquisition, Data curation, Conceptualization. **Birte Marten Oswald:** Methodology, Investigation. **Lena Günterberg Heyn:** Writing – review

& editing, Writing – original draft, Supervision, Methodology, Formal analysis, Conceptualization, Data Curation.

Data availability

All analyzed data in this study are from published papers that are openly available (see Table 1 for included studies). The protocol is available in <https://doi.org/10.23642/usn.21769406.v1>. Sandsleth, Marit Gjone; Myrvold, Jana (2023). Search strategies for the umbrella review article "Best practice for organizing nursing education in rural areas". University of South-Eastern Norway. Dataset. <https://doi.org/10.23642/usn.21769406.v1>.

Declaration of Competing Interest

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