Rapid Evidence Summary

The effectiveness of school-located nurse models

A Rapid Evidence Summary prepared by the Sax Institute for the NSW Ministry of Health. May 2021

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This report was prepared by Gabriel Moore, Anton du Toit, Susie Thompson, Jill Hutchinson, Adira Wiryoatmodjo, Prithivi Prakash Sivaprakash, Rebecca Gordon.

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The effectiveness of school-located nurse models on student health, educational and wellbeing

An Evidence Check rapid review brokered by the Sax Institute for NSW Ministry of Health, May 2021

This report was prepared by Gabriel Moore, Anton du Toit, Susie Thompson, Susan Oong, Jill Hutchinson, Adira Wiryoatmodjo, Prithivi Prakash Sivaprakash, Rebecca Gordon.

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Definitions

Nurse roles

Case management: Focuses on the support of individual at-risk students and collaborative actions to reduce barriers to their health and wellbeing and their academic success. Case management includes direct care and treatment delivery for the student, and liaison and communication with parents and other stakeholders.(1)

Care planning: The development of education and health plans for individual students based on the nurse's assessment, including planning, intervention and evaluation or, where the care plan is developed by the general practitioner (GP), liaising with the GP or general practice nurse to administer the plan to address identified goals. (2)

Service navigation: Service navigation refers to basic navigation (3), identifying a student's needs, arranging services, referring students and families to services and other resources, and following up on a student's progress.

Care navigation: is an approach to reduce inequities in access to health services at the individual student level. Care navigation aims to identify and address barriers to care, link students to health and social services and provide student centred care including proactive and ongoing follow-up.(3)

Care coordination: Facilitating communication and coordinating care across providers and sectors to address the complex health and social needs of students and families. Goes beyond individual case management to include systems-level coordination.(4) At its most comprehensive, care coordination includes mobilising change in the wider service system to achieve the best possible care for a student and family.

Information management and transfer: Gathering and storing medical information and related documentation about a student's health and health care by the school nurse, who shares the information with appropriate providers, families, or school staff.(5)

Communication: Acting as a resource or focal point for communication with families, schools and providers, ensuring that there is a consistent understanding about the students and their health and wellbeing.(2, 6)

School-based screening and prevention: a proactive approach to identifying students who may be at risk of or with academic, behavioural, emotional or health related difficulties. Early screening is considered a critical aspect in the provision of targeted prevention and early intervention services.(7)

System advocacy: Engaging with health, education and social systems at a policy level, to call for change in structures or approaches which are failing to meet the needs of schools, students and families.(3)

Health promotion and education: Health promotion and education include a curriculum to develop health skills at each school level, the provision of health services at the school, as well as, for

secondary school, activities targeting key health related behaviours such as dietary choices, physical activity, tobacco and alcohol use, sexual practices.(8)

Other definitions

Advanced nursing practice (ANP): A continuum along which nurses develop their professional knowledge, clinical reasoning and judgement, skills and behaviours to higher levels of capability (that is recognisable). Nurses practising at an advanced level incorporate professional leadership, education and research into their clinically based practice. Their practice is effective and safe. They work within a generalist or specialist context and they are responsible and accountable in managing people who have complex health care requirements.(9)

Enrolled nurse: A person who provides nursing care under the direct or indirect supervision of a RN. They have completed the prescribed education preparation and demonstrate competence to practise under the Health Practitioner Regulation National Law as an enrolled nurse in Australia. Enrolled nurses are accountable for their own practice and remain responsible to a RN for the delegated care.(10)

General Practice Nurse: Nurses working in a General (Family) Practice (also known as primary care). They may be registered nurses, enrolled nurses or nurse practitioners.(11)

Nurse Practitioner: A nurse practitioner is an advanced practice nurse endorsed by the Nursing and Midwifery Board of Australia (NMBA) to practise within their scope under the legislatively protected title 'nurse practitioner'.(9)

Person-centred practice: a collaborative and respectful partnership built on mutual trust and understanding through good communication. Each person is treated as an individual with the aim of respecting people's ownership of their health information, rights and preferences while protecting their dignity and empowering choice. Person-centred practice recognises the role of family and community with respect to cultural and religious diversity.(9)

Primary Health Care Nurse: work in primary health care settings, including community, residential aged care, schools, prisons, refugee health services, sexual health and women's health clinics, and in various non-government health services. They may be registered nurses, enrolled nurses or nurse practitioners.(12)

Registered nurse: a person who has completed the prescribed education preparation, demonstrates competence to practise and is registered under the Health Practitioner Regulation National Law as a RN in Australia. Scope of practice is that in which nurses are educated, competent to perform and permitted by law. The actual scope of practice is influenced by the context in which the nurse practises, the health needs of people, the level of competence and confidence of the nurse and the policy requirements of the service provider.(9)

Local Health Districts: State-level administrative areas each with its own governing board as part of the overall management of the public health system in NSW. Local Health Districts and Specialty Networks are established to operate public hospitals and institutions and provide health services to communities within geographical areas or a defined patient population for Specialty Networks.(13) Health services include community health, focusing on the delivery of care in the home and in other community settings such as aged care.

Acronyms

AAP	American Academy of Pediatrics
ED	Emergency Department
EN	Enrolled Nurse
GP	General practitioner
LHD	Local Health District
NAPLAN	National Assessment Program – Literacy and Numeracy
NASN	National Association of School Nurses (US)
PHC	Primary Health Care
PHP	Primary Health Provider (General Practitioner)
RCT	Randomised Controlled Trial
RN	Registered Nurse
SB-TEAM	School-Based Telemedicine Enhanced Asthma Management
SHS	South Health Services
SBHC	School-based health care
T1D	Type I Diabetes

Executive summary

Background

The context of practice for school nurses may vary significantly across jurisdictions or countries and the level of interprofessional and intersectoral engagement will be driven by factors such funding, degree of integration of the nurses within the school community, perceptions and expectations of the school nurses' roles by health professionals in primary care and other sectors and understanding of the role by students and families.

In NSW, the Wellbeing and Heath In-reach Nurse (WHIN) Coordinator Model aims to address the unmet health and social needs of school students to ensure that they are safe and can achieve to their full potential. It is anticipated that this will be achieved by:

- Giving students a sense of belonging to the school community
- Improving student wellbeing and health seeking behaviour
- Improving the emotional and physical safety of vulnerable students
- Improving health and social service pathways for young people and families.

WHIN Coordinators support the health and wellbeing needs of vulnerable school students and their families and coordinate appropriate assessments and referral to health and social services. In 2021, the program will be expanded with the creation of 100 new WHIN Coordinator positions.

In light of this expansion and the opportunity to further evolve the design of the model in the post-pilot period, the Ministry of Health commissioned a Rapid Evidence Review which aims to:

- Identify elements of school-located nurse models
- Assess what is known about their effectiveness.

Review question

This Rapid Evidence Summary addresses the following question:

What is the evidence for the effectiveness of models of school-located nurses on improved student health, educational and wellbeing outcomes?

Summary of methods

We searched PubMed, CINAHL and Google Scholar as well as jurisdictions and internal agency websites, using combinations of the following search terms: school nurse, nurse-led, school-located, partnerships and collaboration and modalities including tele-technologies. Searches were conducted in January 2021 for articles published in English in the last 5 years.

Key findings

We identified 19 peer reviewed studies which met our inclusion criteria, with the majority conducted in the US and five conducted in Australia. We also identified 10 peer reviewed commentaries and 8 grey literature reports.

Overall, the level of evidence was moderate, with the strongest evidence for school-located nurse-led models. Four models of school-located nursing were identified:

- School-located nurse-led models where the nurse is an integral part of the school team
- School-located models that are led by a nurse external to the school ('primary health care nurse')
- School-located models led by practitioners other than nurses
- School Based Health Centre models.

The most common components of school nurse roles were: communication (n=16), health promotion and education (n=13), case management (n=12), care coordination (n=11), screening and prevention (n=11), and service navigation (n=10). Other components included clinical information management and transfer (n=9), care planning (n=7), advocacy at the policy level (n=5) and care navigation (n=4).

All studies found the presence of a school nurse and school nursing interventions to be of value in the more traditional roles of health promotion, early intervention and timely care delivery for at-risk students as well as in the expanded school nursing roles featuring more intensive care coordination and navigation as well as efforts to engage families and liaise with social care providers. There was potential for nurses to take a coordination approach for the current large number of disparate wellbeing and support programs offered in schools; as qualified health professionals, nurses could ensure that students were accessing the most appropriate supports.

Together, the studies point to a degree of flexibility and responsiveness in school-located nurse models with the particular focus of a school determined in the context of the families, health system, resources, and the socio-economic landscape. Our reading of the literature suggests that where nurses are an integral part of the school team and act as the central point of communication, a more comprehensive understanding of students' needs is achieved, enabling the nurse to mobilise more targeted, appropriate and coordinated care. There may also be a shift in the school's understanding of the impact of poor health on learning and academic outcomes. As noted by Sanford et al,(3) it is the nurses' participation in schools, rather than providing services to families independently of school-based supports, that seems to enhance family engagement with both health and education systems and to achieve longer term gains.

Our reading of the literature suggests that where nurses are an integral part of the school team and act as the central point of communication, a more comprehensive understanding of students' needs is achieved, enabling the nurse to mobilise more targeted, appropriate and coordinated care. There may also be a shift in the school's understanding of the impact of poor health on learning and academic outcomes.

The importance of role delineation should be emphasised; particularly when school nursing roles have undergone significant change. Clarity about the nurses' roles seemed to contribute to their capacity to harness the right service mix, enabling smooth collaboration and referrals. In the context of change, time was needed before this clarity was achieved, with one study reporting a 12-month time-lag before the new roles were clearly understood by stakeholders.

Conclusion

This review identified four school-located models: School-located nurse-led models where the nurse is an integral part of the school team; school-located models that are led by a nurse external to the school (primary health care nurse); models led by practitioners other than nurses; and school-based health centre models where the nurse is one of the centre's health care staff. Common components across all models included: communication, health promotion and education, case management, care coordination, screening and prevention, and service navigation.

The greatest impacts were observed in access to health care, chronic disease management, care coordination and reduced absenteeism, followed by early intervention, access to social care, and reduced ED visits and hospitalisations.

A number of mechanisms to support delivery of school nurse models were identified, including role reorganisation, care coordination and navigation, technologies, referral and follow-up, and network integration. The evidence suggested that where the school nurse was central in communication, coordination and navigation, greater impacts may be observed.

Background

Introduction

The National School Nursing Standards for Practice: Registered Nurse (’National Standards’) (14) were developed and revised in consultation with school nurses and related bodies across Australia. They set out the practice standards for school nurses, noting that these will vary in application according to sector (public/private), setting (rural/regional), age (primary/secondary), individual school objectives and stakeholder expectations.

The context of practice for school nurses may vary significantly across jurisdictions or countries and the level of interprofessional and intersectoral engagement will be driven by factors such funding, degree of integration of the nurses within the school community, and perceptions and expectations of the school nurses’ roles by health professionals in primary care and other sectors and understanding of the role by students and families.

The National Standards are organised around four domains: (i) professional practice, (ii) provision of care, (iii) collaborative practice and (iv) the school environment. Domains (i) and (iii) highlight the role of school nurses in ‘coordinating, organising and providing care’ for individual students; and in being the ‘focal person (“agent”)’ of connectivity, managing communication across the school community and collaborating with external providers.

Within these broad parameters, echoed internationally (15), models of school nursing have evolved differently to maintain alignment to context. Definitions of ‘models’ for school nursing also vary; for this review we mean a set of components which together ensure that primary and secondary students’ health and wellbeing needs are identified and addressed in a holistic way, enabling them to achieve their health, social and educational goals.

In NSW, the Wellbeing and Heath In-reach Nurse (WHIN) Coordinator Model aims to address the unmet health and social needs of school students to ensure that they are safe and can achieve to their full potential. It is anticipated that this will be achieved by:

- Giving students a sense of belonging to the school community
- Improving student wellbeing and health seeking behaviour
- Improving the emotional and physical safety of vulnerable students
- Improving health and social service pathways for young people and families.

WHIN Coordinators support the health and wellbeing needs of vulnerable school students and their families and coordinate appropriate assessments and referral to health and social services. Initially piloted in 2018 in Young, Tumut and Cooma the program was expanded in 2020 to include Deniliquin, Murwillumbah and Lithgow. A formative evaluation of the three pilot sites was undertaken from July 2018 to September 2020. In 2021, it will be further expanded by the creation of 100 new WHIN Coordinator positions.

In light of this expansion and the opportunity to further evolve the design of the model in the post-pilot period, the aims of the review are to:

- Identify elements of school-located nurse models
- Assess what is known about their effectiveness.

The review question is:

What is the evidence for the effectiveness of models of school-located nurses on improved student health, educational and wellbeing outcomes?

Methods

We conducted a systematic search of the peer reviewed and grey literature from the last 5 years, in English, to inform this Rapid Evidence Summary. Rapid Evidence Summaries are conducted in a short timeframe and are limited to an analysis of up to 20 systematic reviews and up to 20 grey literature reports or peer reviewed commentaries.

Table 1 Key concepts

Concept 1: Nurse	Concept 2: Modality	Concept 3: Model	Concept 4: Impact
school nurse	face-to-face	model	effect*
school-based	tele*	partner*	evaluat*
school-located	video*	care coordination	impact
		system*	

Peer reviewed literature

We searched PubMed, CINAHL and Google Scholar using combinations of the following search terms, aligned to the key concepts in the review question as outlined in Table 1. Searches were conducted for articles published in English in the last 5 years. We included MeSH headings 'School Health Services / organization & administration' and 'School Nursing / organization & administration'.

The searches were conducted on 7 January 2021. The full list of search terms used is in Appendix A.

Grey literature

The first 10 pages of Google were searched using combinations of the following terms: 'school nurse evaluation' 'school-based nurse care coordination' 'school nurse effective*' 'public health school nurse' 'school-based nurse effectiveness'.

In addition, Australian jurisdictions were searched, as well as relevant agency websites including: NICE, NHS (UK), CDC (US), VA (US), Health Canada, Kings Fund UK, WHO, Joanna Briggs Institute, Commonwealth Fund, and Robert Johnson Wood Foundation. We also searched the National Association of School Nurses (NASN) US; School Nurses Australia; School and Public

Health Nurses Association UK (SAPHNA); Royal College of Nursing UK; Canadian Nurses Association; NZ Nurses Association; and the Australian College of Nursing.

While the aim of the Rapid Evidence Summary was to identify the strongest evidence of effectiveness of school-located nurse models (meta-analyses, systematic reviews, narrative and integrative reviews), given the limited high-quality evidence, single studies of randomised trials were included as well as promising evidence where appropriate.

We assessed the included studies against the designations of levels of evidence published by the NHMRC (June 2009). Thirteen papers met the NHMRC criteria designated in levels I – IV. We developed an additional level V: surveys, interviews, document analysis, participatory action research, case studies and pilot study evaluations.

We **included** publications evaluating school-located nurse-led models, where the nurse is integrated into the school team; models led by primary health care nurses who are external to and work in partnership with the school; those led by practitioners other than nurses; and models of school-based health services where the role of the school nurse was clearly described.

We **excluded** protocols, publications from low- and middle-income countries; school nurse models which had not been evaluated; models where the role of the school nurse was unclear; academic practice/community partnership models; studies of nurse experience in a single event; partnerships between primary care and school-based health centres where the school nurse played no role; and studies conducted in pre-school settings. We also excluded studies focusing predominantly on training and capacity building of school nurses.

The searches yielded a total of 858 publications, of which 147 were removed as duplicates. 771 titles and abstracts were screened, with 657 papers excluded. We reviewed 54 full text publications, excluding another 35 publications. Nineteen peer reviewed papers were included in the final selection.

A PRISMA flow chart of this process is located in Appendix 1. Data from these papers were extracted into tables, which are provided in Appendix 3.

Findings

We identified 19 papers which met our inclusion criteria, of which there were two systematic reviews(16, 17), three integrative reviews(2, 6, 18), a realist review(19), an RCT(20), a longitudinal case control study(21), a retrospective quasi-experimental time-series study with a survey(22), a second retrospective quasi-experimental study(23), two pre-post intervention studies(24, 25), a cross sectional study (26) , two focus group studies(3, 27), a descriptive study, with matched controls(5), mixed methods intervention study(28),a multi-method evaluation (8), and a participatory action research project.(29)

Thirteen studies were conducted in the US (2, 5, 6, 16-18, 20-25, 27), three studies were conducted in Australia (3, 8, 28), one each in Canada (29), the Netherlands (26), and the UK. (19) Five studies focused on asthma (5, 20, 21, 23, 24) and one study each focused on diabetes (27), obesity (30), complex needs (2), vision (22), suicide prevention (18), and health promotion.(8) Two studies addressed multiple health and social needs, including mental health and wellbeing, substance misuse, child protection, domestic and family violence, children in care, homelessness, youth justice, young carers, and transitions across schools. (19, 28) The remaining studies were non-specific. (3, 6, 8, 17, 25, 26, 29)

Some studies selected schools in low socio-economic or disadvantaged areas(3, 21, 22, 24, 25, 28); others had student populations which were predominantly ethnic or multiracial.(5, 20, 23) The remainder had mixed populations(2, 6, 8, 17-19, 26, 29); or did not specify the student mix.(16, 27) Six studies included social care (mentioning either social workers or social /inter-sectoral action).(3, 8, 18, 19, 28, 31)

The majority of models were led by school-located nurses(2, 5, 6, 8, 16-19, 21-23, 27, 31), with three led by primary health care nurses, working in partnership with school nurses(3, 28, 29). Two studies report on school based health centres, in which the school nurse played a part.(25, 26) Two studies used practitioners other than nurses to lead the model.(20, 24)

In four studies nurses were employed full-time(3, 22-24) and in two studies part-time(8, 28). In two studies, hours worked varied across the participating schools(21, 27), and the remaining 12 studies did not specify hours employed.

The most frequently reported outcomes were access to health services (n=7), improved disease management (n=7), better care coordination n=7) and reduced absenteeism (n=5). Reduced ED visits, reduced hospitalisations, access to social care, and satisfaction or acceptability were measured in 4 studies; prevention and early intervention and health education, and improved performance were measured in 3 studies, improved performance and greater engagement in school activities were each measured in two studies.

Overall, the level of evidence was moderate, with the strongest evidence for school-located nurse-led models.

Characteristics of school-located nurse-led models

In each school, the nurse's role is tailored to the context and needs of the school. We differentiate between models in which the nurse is predominantly based in the school and an integral part of the staff (model 1); the nurse is active in various community settings (model 2) and works in partnership with schools; models are led by a practitioner other than a nurse (model 3); and a School Based Health Centre near the school, whose clinical team includes a nurse (model 4).

1. Models led by integrated school-located nurses (n=13 studies)

The majority of the studies described school-located nurse-led models, in which the school nurse is an integral part of the school team and may be employed by the school. The models used various approaches including health promotion and health education, primary and secondary prevention, and/or direct treatment and care of individual at-risk students. Nurse-led models include a broad role requiring multifaceted levels of collaboration and communication.

School nurses must work seamlessly with students, parents, teachers, school administrators, school psychologists and counsellors) and at the community level with GPs and general practice nurses, specialists, occupational, speech, physical therapists, social workers, ophthalmologists, dentists, pharmacists, mental health providers, emergency services. They must also be able to navigate complex health and education systems as well as the wider network of community services. (32)

The strengths of Model 1, with the nurse integrated into the school team, are perceived to be that the nurse develops a deeper understanding of the student's situation within health and education and that this nexus enables a better understanding of the individual student and family and the socioeconomic environment in which they live. The model offers school nurses a greater opportunity to engage with the school about individual cases leading to targeted adjustments in the delivery of education as well as an improved person-centred approach to the provision of care.

2. Models led by Primary Health Care Nurses (external to the school) (n=2)

Two studies use primary health care nurses (RNs) in schools.(3, 29) These are nurses who are not integrated into the school team but come into schools to deliver a particular health or public health program. In Model 2 nurses are located in the community with a view to providing a whole-of-community or population level approach to students' health and wellbeing.

Primary health care nurses bring their extensive knowledge of the community context, local services and professional networks into their work within schools. They are equipped to leverage needed resources(29) and understand the ways the socioeconomic environment plays out in families and communities. Partnerships with school personnel, families, students and health professionals are central to the model.

3. Models led by practitioners other than nurses (n=3)

Three studies describe school-located models led by practitioners other than nurses. One was led by an asthma counsellor working in collaboration with school nurses, GPs, and subspecialty asthma providers and focused on asthma education and care coordination.(24) This enabled the school nurse

to liaise across schools and program teams, overseeing the implementation of several programs. The second intervention was led by a trained triage assistant,(26) whose role was to assess and prioritise students at risk to be reviewed by a school doctor or nurse. The third study used a telemedicine assistant to collect history and examination data which was stored remotely for assessment by a physician in due course.(20)

In the three studies, the practitioners worked collaboratively with school nurses, GPs and other health professionals, to promote more efficient practice, target the needs of students at higher risk, and coordinate communication and care. This enabled the school nurses to allocate their resources shift to more appropriate tasks and manage scarce resources.

The programs were conducted in the US and may not appear immediately generalisable to the Australian context. However, it may be that aspects of the roles may fall within the scope of practice for ENs in the Australian system and so bear consideration.

4. School Based Health Centres (SBHC) models (n=1)

The United States and Canada's SBHCs are partnerships created by schools and community health organizations to provide on-site health services that promote health and educational achievement for school-aged children and adolescents. SBHCs, by their location in schools, are intended to overcome health care access barriers, including transportation, lack of health care providers, lack of insurance coverage, and inconvenient appointment times because of parents working.(33) SBHCs operate in almost 2,000 schools across the United States(34) and have demonstrated an increased access to care for high-risks groups, such as those living in high-poverty communities, those with no health insurance, and ethnic minority youth.(33)

We included one study(25) which specified the role of the school nurse in facilitating interprofessional collaboration and continuity of care. The strengths of the SBHC (Model 4) are that a multidisciplinary team is co-located or is in close proximately to the school, increasing access to a mix of service providers who can address a spectrum of needs including health promotion and education, prevention and treatment and care.

The grey literature identified a related model, established to complement the SBHC. The 'School-Based Public Health Nurse Program (SB-PHN), enables school nurses to provide health care in a location that is convenient for students and their parents. (33, 35) Like SBHCs, the SB-PHN program was built on a long-standing collaboration between health and other agencies to provide health services for students and families. The nurse's role includes care coordination and interprofessional collaboration and their knowledge of individual needs can inform the design of targeted health promotion and education programs, with an emphasis on parent and family engagement.

The effectiveness of the school nurse models

1. Models led by school-located nurses (NHMRC levels I-V) (n=8)

Thirteen studies described school-located nurse-led interventions including two systematic reviews and three integrative reviews. The remaining eight studies ranged in level of evidence from I to V and included a longitudinal case control study and a retrospective time series study, followed by two level IV studies and five level V studies.

Of the level III studies, Szefler et al's **longitudinal case control** (21) determined the effect of a nurse-led school-based program to enhance asthma care on school absenteeism. 'Building Bridges for Asthma Care' program focussed on the early identification of children at risk of asthma, tailored case management and improved coordination between students, their families, health care staff and schools. The programme resulted in early identification of at-risk for asthma students and provided enhanced access to appropriate services. There was a significant decrease in school absenteeism.

Trivedi et al (23) conducted a quasi-experimental, **retrospective time series** design study of a school nurse-supervised asthma program (the Step-Up Asthma Program), delivered to 84 children in central Massachusetts with existing electronic medical records. This study used regular telephone communication between the general practice nurse and the school nurse to ensure the delivery of preventive asthma medication with school nurse supervision in an ongoing partnership between the general practice and the school. The school nurse also taught children correct inhaler and spacer technique.

Of the level IV studies, Banfield et al(8) report a **multi-method evaluation** a pilot of the School Youth Health Nurse (SYHN) Program in eight high schools in the ACT run by registered nurses (RNs) who delivered the program, with a Clinical Nurse Consultant providing clinical supervision. The health curriculum was delivered in class and in whole of school forums, with sessions tailored to local need such as smoking cessation or healthy eating. Program uptake varied between grades with most contacts with Grade 10 students and the least contacts with boys. Most students who visited the SYHN indicated a positive experience. Nurses, school staff and external stakeholders were unanimous that the program had a positive effect on student health and wellbeing. External services reported an increase in appropriate referrals but noted that limitations at the policy level on the scope of practice of the nurses, reduced the program's effectiveness. For example, some participants commented that nurses' scope of practice should extend to sexual and reproductive health.

Of the level V studies, Doi et al's mixed methods study(19) used a **realist evaluation** approach, conducted in three phases. The program enhanced opportunities for early and improved identification of health needs and used a streamlined referral of cases to school nurses, who prioritised cases and referred them to one of nine pathways of care and extended nurses' engagement with the wider service network. The program was less successful at equipping school nurses to deliver specific interventions as intended, in particular to students with more complex mental health needs.

Reeves et al(5) conducted a **pilot project** of an asthma care program for electronic communication between school nurses and GPs using electronic medical records. Participants were students who were patients of a general practice and who had a hospitalisation for asthma exacerbation. Results show that it is feasible to establish communication via electronic messaging and improve overall quality of care. There was a decline in asthma exacerbations pre- and post- program. The authors note that interoperability standards between providers and stakeholders were critical for continuity of care and to ensure a common terminology for communication.

Rodriguez et al(22) conducted a **mixed-methods, quasi experimental evaluation** of vision screening follow-up and referral methods for schools in California. Demonstration school groups were led by full-time nurses and comparison school groups had part-time nurses. This study focused on care coordination and service navigation, with school nurses working with families and students to link them

to appropriate healthcare professionals and community services. Having a full-time nurse in school led to higher rates of follow up: demonstration schools reached 96-98% while comparison schools stayed at 41-67%. Teachers in demonstration schools were satisfied with the presence of a full-time nurse in schools, while teachers of comparison schools expressed needs for more nurse time at schools.

Dennis et al(28) examined the effect of having an RN in the learning support team at a high school serving disadvantaged populations, using a mixed method study. Care coordination was facilitated by proactively communicating with parents, teachers and care providers through phone calls, letters and face to face. Up to seven health problems per student were identified ranging from vision to serious neglect. The nurses navigated complex healthcare services which disadvantaged families found difficult to access and they engaged with families more effectively than teachers on difficult and complex health issues. Teachers gained insight to the impact of health issues on educational performance. NAPLAN scores improved.

Willgerodt et al's **focus group** study(27) explored care coordination for chronic health conditions, specifically Type I Diabetes. Five critical elements of care coordination emerged: the importance of context (child's developmental level, home environment, school environment); knowledge and experience of school nurses, teachers, general practitioners, other providers and parents; access to those involved in the child's care and especially timely communication; daily communication, formal documentation, and planning; and relationships, trust, and a clear understanding of team members' roles. The study outlines elements of a possible model of care based on the experience of school nurses, parents and GPs.

2. Models led by nurses external to the school ('Primary Health Care Nurses') (adapted NHMRC level V) (n=2)

Two studies reported on the integration of primary health care nurses into school learning support teams.

Building on Dennis's work, Sanford et al(3) used focus groups to examine the role of primary health care nurses (RNs) integrated into the school team in rural NSW. The authors looked at the Broken Hill School-based primary health care service (SB-PHCS) in rural NSW. Focus groups included teachers and RNs from 6 primary and high schools. The primary health care nurses were able to address barriers to access at the student, family, school and health system levels as well as to social care services, facilitating intersectoral collaboration. In particular, it was noted that PHCNs were able to support communication between families and school and resolve issues that the school staff had not been able to address.

The authors use candidacy theory to describe how access to health care is negotiated between individuals and health services, particularly by socioeconomically disadvantaged groups. Sanford et al's study suggests that embedding primary health care nurses within learning support teams rather than providing services to families independent of school-based supports, enhances family engagement with both health and education systems and achieves longer term gains.

Sanders et al(29) explore the role of primary health care nurses (PHCs) in promoting child and youth health using partnerships between schools and local communities to advance health promotion and chronic disease prevention and to address the social determinants of health. The authors used a **participatory action research methodology** to engage participants in dialogue about challenges and opportunities for public health care nursing and point to the importance of community context on

engagement. Rural and regional areas had unique difficulties including navigating community relationships and a lack of access to internet. The nurse's role extended to include building healthy policy, strengthening partnerships and community action and enhancing the learning environment. The authors conclude that PHNs can be catalysts for engaging the voice of schools in system and are a vital link between school health programs and action at a policy level.

3. Models led by practitioners other than nurses (NHMRC level II and IV) (n=3)

In the three studies reporting interventions led by practitioners other than nurses, Halterman et al's RCT of telemedicine(20) was delivered by a clinical telemedicine assistant, providing one or more telemedicine visits and nurse-supervised school therapy. The intervention resulted in increased symptom-free days for children with asthma, reduced ED visits and hospitalisations. Liptzin's pre-post study(24) used asthma counsellors (trained lay people) to provide assessment, inter-sectoral care coordination, self-management training and staff education. The intervention led to significant improvements in asthma knowledge and inhaler techniques, with significant increases in the number of asthma action plans and medicine availability and significant reductions in asthma exacerbations.

Bezem et al's **cross-sectional study(26)** of four urban and non-urban areas in the Netherlands compared triage and task-shifting for school health services (SHS) to the usual approach. Triage involved pre-assessments by SHS assistants with follow-up assessments by a physician or nurse for children with specific needs. Results show more contact with SHS professionals when a triage and task-shifting approach was in place, and more appropriate support for children with specific needs. The model is intended to ensure that practitioners time is best used to see those with the greatest need.

4. School Based Health Care models (NHMRC level IV) (n=1)

In the one study of School Based Health Care models, Strobel et al's experimental project(25) in a school-based health centre (SHBC) involved collaboration between school nurses, who delivered a multi-strand health communication strategy, and public health professionals who oversaw the development and delivery of health promotion messages. SHBC utilisation rate increased by over 300% with students at younger levels having the highest access.

In a related service, and from the grey literature, the School-Based nurse programs(33) provides supervised care according to the care plan developed by the GP or school nurse in a location that is convenient for students and their parents. Nurses' knowledge of individual needs flows into the design of health promotion and education with an emphasis on parent and family engagement. The report highlights evidence for the effectiveness of the model for both health and educational outcomes.

Highlighting the Australian studies

Three Australian studies were identified in the peer reviewed literature search: Banfield and colleagues who focused on health promotion and education; Dennis and colleagues examined the role of primary care nurses embedded in high school learning support teams, a model that extends across NSW schools. Sanford and colleagues, building on the work of Dennis, examined the role of primary health care RNs working in a school-based Primary Health Care Service in Broken Hill. In Dennis's study the nurses are employed by the school; and in Sanford's study they are employed by the LHD. However, both roles focus on the integration of a primary health care nurse into the school team.

Dennis and Sanford were two of only six studies to include an intersectional and/or social care focus, although neither assessed families as part of the unit of care. Where Sanford reported on access to health and to social care, and on better care coordination, Dennis et al assessed additional outcomes including improved learning and performance, engagement in school activities, and early prevention and intervention.

Both Dennis and Sanford draw on candidacy theory to highlight the particular challenges faced by disadvantaged families when accessing health care. The theory describes how eligibility for health care is negotiated between individuals and health services.

Dennis's findings suggest that embedding RNs within learning support teams, rather than providing services to families independent of school based supports, enhanced family engagement with both health and education systems and increased teacher's insight about the needs of the students and the impact these needs have on learning and educational outcomes. The nurses had a pivotal role in communication about the students' needs across health, social and education settings, with improved understanding and engagement with the student on all fronts.

The nurses' role in care navigation is emphasised in both studies ie. they operationalise an approach whose focus is to reduce inequities in access to health services and social care at the individual student level. Care navigation aims to identify and address barriers to care, link students to health and social services and provide student centred care including proactive and ongoing follow-up with services. This is a 'cornerstone' of the RNs; they are a link between schools, families and the health and social care systems, promoting care integration and addressing barriers to care.

Adding a nurse to the learning support team in Dennis's study was found to be feasible and identified considerable unmet health needs that affect students' ability to learn. The families needed extensive support to access any subsequent health care they required. Sanford's study facilitated intersectoral collaboration to improve the support provided to students' health and developmental issues.

Banfield and colleagues describe the School Youth Health Nurse program, aligned with the Health Promoting Schools framework. In this program, the nurse is integrated into the school community and delivers individual and group health promotions sessions, as well as focusing on prevention and early intervention. After some initial uncertainty about the scope and nature of the role, the nurses are a respected source of health information in the schools, were consulted on curriculum development and contributed to whole-of-school health activities.

All three models were found to be feasible and acceptable the schools, students, families and to the health and social services engaged in the process of care.

Mechanisms of care coordination and delivery

Role reorganisation

In the School Health Services' (SHS) study of 600 randomly selected primary schools in the Netherlands, the mechanism for delivery of care was the use of triage and a re-organisation of the nurse's role ('task-shifting'). The triage approach involves pre-assessments by SHS assistants with follow-up assessments by a physician or nurse for children with specific needs. Only those children in need of follow-up were assessed by a doctor or nurse. (26) Primary school care coordinators and teachers reported that health care was **more appropriate** compared to usual care and that the triage mechanism made an important contribution to the **early detection** of problems in children with identified needs.

The authors note elsewhere (36) that introducing doctors' assistants to a triaging role may call for new competencies on the part of these professionals and may result in the loss of generalised knowledge and expertise on the part of doctors and nurses when they are not seeing all children. Training of professionals is thus needed to maximise their diagnostic skills.

In Scotland (19), the school nurse role was significantly re-focused to provide streamlined referrals to school nurses who prioritised and referred students to one of nine care pathways, with some existing duties assigned to other health services including immunisation and chronic care management. The role expansion includes home visits and wider family assessment.

Role reorganisation focused nurses on **more targeted interventions** for some children, and greater **engagement** with partner agencies leading to **improvements** in the health and wellbeing of children at higher risk.

A clear and agreed role

The importance of ensuring that the role of the school nurse was known and agreed by all stakeholders was highlighted in several studies. For example, Sanders et al(29) noted that the lack of clarity about the nurse's role can impede nurses' scope of work, contribute to their being under-valued and limit engagement in the school and community and Pestaner et al(18) talk about the 'obscurity' of school nurses in his study of school nurses and suicide prevention. Banfield et al(8) reported initial confusion between the roles of school counsellor and school nurses which resolved over the first 12 months of the program.

Clarity of role was frequently cited as a mechanism contributing to the effectiveness of school-located nurses. Campbell et al(31) for example describe the school nurse's role as delivering care such as chronic disease management; initiating referrals for children with social needs and addressing the social determinants of health through community, policy and political advocacy. Role delineation enables the nurse to engage colleagues, school personnel, parents, and community partners. Doi et al (19) report that role clarity adds credibility to the school nursing role, resulting in improved professional status and interagency partnerships.

Care navigation

In two studies(3, 28) the registered nurse ('primary health care nurse') was introduced into a learning support team in disadvantaged high schools. The school nurse acted as lynchpin and change agent, able to negotiate access and navigate complex healthcare services which families found otherwise

difficult to achieve. They engaged with families more effectively than teachers on difficult and complex health issues. Teachers gained insight about the impact of health issues on behavioural and educational performance. The nurses identified considerable unmet health needs and co-ordinated care by communicating with parents, teachers and providers (including schools) through phone calls, letters and face to face meetings. Critically, the role saw the nurses advocate on behalf of students and engage proactively with teachers, families, providers, including assertive and ongoing follow up as required.

Telemedicine and tele-technology

Halterman et al's RCT(20) used telemedicine and a telemedicine assistant to record clinical assessments of children at school, with the information stored remotely and accessed by a primary care clinician. The clinician would access and complete the assessment and communicate with caregivers via phone or videoconference. Preventive medication prescriptions were sent to pharmacies who delivered the medication to the school nurse for supervised administration. The trial significantly improved symptoms and reduced ED visits and hospitalisations for asthma and engendered trust between the parents and school nurse.

Reeves et al's feasibility pilot(5) used electronic communication of electronic medical records (EMRs) to link the school nurse with a GP and general practice nurse for children with asthma exacerbations; with the school nurse able to enter information into the record and access provider-made care plans. The EMR was accessible and linked family, provider, hospital and school.

Sanchez et al (17)conducted a systematic review of telehealth evaluations in 2019. Telemedicine provided an alternative care model to reduce barriers to care for children from disadvantaged backgrounds. Telehealth and telecommunication was able to deliver services in audiology, acute and chronic illness management, speech language therapy, psychiatric consultations and dental examinations. School based telehealth programs reduced student absenteeism and the costs associated with external provider visits. In addition, three of the 20 studies reported improved communication and collaboration between students, parents, health care providers and school administrators.

Strobel et al(25) used technology and social media platforms to market health promotion to a high school population. School nurses and public health professionals provide an entry point to School Based Health Centres and are a source of health education, primary health care and dental care for adolescents who would other have poor access to care. The key mechanism to increase access and use of the SBHC was health messaging developed in consultation with students, parents, staff and school faculty. Each month featured one topic delivered using four platforms during the day: a 20 s audio message delivered live with morning audio announcements and repeated in Facebook; posters; 10 minute health lessons on communicating personal needs and problem solving; and a note to parents delivered in an email.

A central communication point

Liptzin et al(24) evaluate the first two years of a school-centred, care coordination and asthma education program for elementary and middle school age children, with trained asthma counsellors (lay individuals of various cultural backgrounds with established relationships in the community) providing asthma education and care coordination. A medical advisory committee had oversight. The range of coordination activities included ensuring access to care, developing action plans, providing

medications and communicating with families and GPs and insurers. The asthma counsellor trained school nurses and ancillary staff in asthma care. While telephone, face to face communication, letters and emails are mentioned in this and several studies, the authors state that asthma counsellors provided the critical link between students, school nurse, and providers, and the staff.

In Trivedi et al(23) the school nurse was the central point of interaction with the District Head Nurse and the GP practice nurse. Communication with families was shared between the school nurse in the first instance, with follow up by the GP practice nurse as required. The authors saw the 'open line of communication' between the school nurse and the GP practice nurse as key to smooth implementation.

In Pestaner et al's study(18), the school nurse communicated with the school support staff, parents and community-based professionals including social workers, counsellors, mental health professionals and/or teachers, leading to a more holistic and multi-disciplinary understanding of student-centred care.

Referral, follow-up and standardised documentation

In Rodriguez et al's study(22) of vision screening in demonstration schools showed that school nurses provided comprehensive follow-up and care coordination with other health care and eye care providers, achieving a 96% of the target population screening rate, compared to 67% in matched controls. The article names referrals and follow-up as the mechanisms of care, but provides little other detail; nurse monitoring and tracking tools are mentioned.

Liptzin et al(24) report that the standardisation of forms enhances communication and minimises burden on school staff and facilitates effective communication.

Doi et al's(19) streamlined referral system led to better engagement with the wider service network and improved early identification of children at risk. Children were referred to the school nurse from education staff, GPs, social workers and others, with the nurses referring students to one of nine pathways. Explicit referral pathways facilitated coordinated care and access to services.

Willgerodt et al's focus group study(27) found that having complete and formalised documentation in place, such as care plans, supported care coordination. Careful systematic planning that facilitates communication was also critical, with annual planning meetings ensuring that the school, nurse, general practitioner and family had a holistic picture of the child and their treatment.

In Szefler et al(21), the school nurse managed the process of accessing documents from the other providers and families and maintaining them in a central location. Care coordination activities were tailored to the students' needs and included securing a health care provider, obtaining health insurance and monitoring both the provider's asthma plan, as well as absenteeism. The school nurse wrote to the provider three times a year using a standard template documenting progress on the agreed plan. Parents received a copy of this correspondence. Blank asthma plans were sent to families before the start of the new year, for completion with the health care provider.

Inter-sectoral collaboration

In several studies, school nurses facilitated cross-sectoral collaboration to address complex needs. Sanders et al point to the skills needed, including service navigation, organising referrals, care coordination and treatment support as well as building the relationships that will overcome barriers to

care. Primary Health Care Nurses maintain ongoing follow up with parents, providers and schools, managing documentation and enabling communication between schools and families and between schools and external providers so that the needs of all were met. The service navigation role enables families to find and access appropriate health and social care services in their community.

Structural integration

Across all studies, nurses' professional and intersectoral networks meant that family and community engagement was efficiently managed. Community nurses moving into schools brought their local community networks and needed to develop relationships with students and parents; school-located nurses needed to establish relationships key stakeholders in the community and other sectors. Communication skills and consensus building skills were helpful.

Access to the internet, policies about communication and committee memberships were important in establishing structural integration ie a coordinated network of relationships across schools, the local community and other sectors to facilitate optimal care for students.(22, 28)

Findings from the grey literature (see Appendix 3.4)

Because of the dearth of grey literature, we extended the search to cover a ten-year period. The grey literature included a research brief(37); a program evaluation(35); three position statements(38, 39); NASN 2020), a conceptual framework(40, 41), a doctoral dissertation(33), an honour research project(42) and five peer reviewed commentaries.(1, 30, 31, 43, 44)

The combined literature reported on the roles of school nurses(30, 38, 39); school nursing models (1, 31, 33, 37, 43, 44); and their effectiveness.(42) Importantly, the literature identified a new model of care linked to School-based Health Centres, called School-Based Nurse Managed Health Centres or School-Based Public Health Nurse Programs; this model has been included in the description of models on page 15.(33, 45)

The included literature addressed outcomes including improved mental health and wellbeing of students(43); increased access to services(45); reduced absenteeism(38) a better understanding in schools of the impact of health issues on learning and academic achievement, better engagement with students and families, increased access to counselling and referrals, consistent care delivery and a more comprehensive approach to care;(45) and addressing the social determinants of health.(30).

In terms of model components, reports or statements referred to case management or direct treatment and care (37, 45), care coordination (37); communication with stakeholders (45); access to social care.(37) Additional activities included health education for students and for staff (37), and the provision of a safe environment. Trim et al identified additional model components including school-based community development; school-wide health promotion; and advocacy at the policy level.(45)

The reports and statements addressed various health conditions including for example epilepsy, asthma, diabetes, poor oral health, and food allergies(37); mental health and wellbeing(45); obesity, insufficient sleep and asthma.(30)

Discussion and conclusion

Overall, the included models reflect a significant re-consideration of school nursing roles, with some elements of existing school nurse roles or responsibilities being moved to other professionals and, in some cases, with school nursing roles undertaking significant re-organisation. These changes were perceived as necessary in the context of rising numbers of students with health and/or social needs requiring more nursing resources. The scope of practice of school nurses facilitates a purposeful flexibility in addressing local health needs, in partnership with schools (46, 47). The need for responsiveness to local circumstances is even more apparent with the Australian experience of COVID-19; although this has impacted all Australians, it has been felt particularly by school students (48, 49), through disrupted schooling, the impacts of parental financial concerns and uncertainty about societal stability going forward. These impacts may have long term implications for students' mental and physical health.

No single model, framework or standard provided definitions for school-located nurse models that reflected all of the components of interest to the Ministry of Health. This is likely to be due to differences in country health and education systems, but also due to variation in the intended scope of the models themselves. In assessing the components of models, we drew on the US National Association of School Nurses (NASN) Framework as a starting point, as this provided the most comprehensive set of components.

Several authors acknowledge the blurring of definitions between case management, service navigation and care coordination. The NASN framework for example uses 'care coordination' as an umbrella term capturing many of the features of interest to this review; in most studies, however, the term 'care coordination' seemed to address coordination at a systems level in response to complex and specialised needs, disadvantage, models encompassing family as well as student assessment, multisectoral planning and ongoing follow-up.

All studies found the presence of a school nurse and school nursing interventions to be of value in the more traditional roles of health promotion, early intervention and timely care delivery for at-risk students as well as in the expanded school nursing roles featuring more intensive care coordination and navigation as well as efforts to engage families and liaise with social care providers. There was potential for nurses to take a coordination approach for the current large number of disparate wellbeing and support programs offered in schools; as qualified health professionals, nurses could ensure that students were accessing the most appropriate supports. Further, the elements of registered nurses roles which were successfully moved to other professionals demonstrate the potential for some roles to be undertaken in the Australian context by enrolled rather than by registered nurses. In this review these were the roles of asthma counsellor(24) and triage assistant.(26)

Our reading of the literature suggests that where nurses are an integral part of the school team and act as the central point of communication, a more comprehensive understanding of students' needs is

achieved, enabling the nurse to mobilise more targeted, appropriate and coordinated care. There may also be a shift in the school's understanding of the impact of poor health on learning and academic outcomes. As noted by Sanford et al,(3) it is the nurses' participation in schools, rather than providing services to families independently of school-based supports, that seems to enhance family engagement with both health and education systems and to achieve longer term gains. This may link to current preventive health planning that seeks to build intersectoral collaboration to enhance health across the community.

While several studies were conducted in disadvantaged populations, five studies (Dennis, Sanford, Sanders, Doi, Campbell) had explicit goals related to the social determinants of health in areas with low socioeconomic status. Dennis et al and Sanders et al found the nurse as broker in the complex health care system especially important, along with their role in facilitating intersectoral collaboration. These models were effective in identifying at risk students, improving health system navigation and achieved health and educational outcomes; however, the authors note that some aspects of the broader school nursing role were reduced or outsourced to enable nurses to target the needs of particular students or populations.

Several studies reported an increasing number of students with mental health and wellbeing issues. These were addressed at various levels in schools, with one study pointing to nurses' discomfort in addressing mental illness; another highlighting nurse and stakeholder difficulties understanding what mental health did and didn't include. A third study demonstrated positive outcomes through nurse-led suicide prevention programs. This may highlight a role for specialist mental health input and/or training to provide these specialised skills.

Most studies were focused on student activities within schools (n=12) or within health care (n=11), with about half of the studies (n=9) engaging the family and still fewer (n=6) addressing social care needs. Accordingly, the majority of interprofessional collaboration occurred within healthcare and particularly with GPs and GP practice nurses, with additional contributions from specialist physicians or nurses in specific conditions such as asthma or diabetes.

With the number of nuanced differences across school nursing models, and the constant need to be responsive to the local context, the importance of role delineation should be emphasised; even more when school nursing roles have undergone significant change. Clarity about the nurses' roles seemed to contribute to their capacity to harness the right service mix, enabling smooth collaboration and referrals. In the context of change, time was needed before this clarity was achieved, with one studying reporting a 12-month time-lag before the new roles were clearly understood by stakeholders.

Limitations

There are some limitations to be noted in the included papers. Firstly six papers were reviews, which provide limited details of the included interventions, while making an important contribution to what is known in specific aspects of school nursing. Within the time constraints for this review, we examined 13 evaluated interventions in detail. The time limitation is offset to some degree by the inclusion of the grey literature, which we have used largely to confirm and inform findings from the peer reviewed literature.

Another limitation is the predominance of US publications, as there may be questions of applicability to the Australian health and education contexts. However, a number of studies were conducted in US public rather than private schools and their findings may be generalisable to Australia.

Conclusion

This review examined the evidence for the effectiveness of a range of school-located nurse models, including those led by practitioners other than nurses. The greatest impacts were achieved in access to health care, disease management, care coordination and reduced absenteeism, followed by early intervention, access to social care, and reduced ED visits and hospitalisations.

Common components across all models included: communication, health promotion and education, case management, care coordination, screening and prevention, and service navigation.

Mechanisms to support delivery of school nurse models were identified, including role delineation, care coordination, role reorganisation and task shifting, tele-technologies, referral and follow-up, and network integration. The evidence suggested that where the school nurse was central in communication and coordination, greater impacts may be observed.

Table 1: Components of school nurse models (see definitions above, page 4)

Table 1A: Components identified in the included peer reviewed studies

First author	Country	Case / disease management	Care planning	Service navigation	Care navigation	Care coordination	Information management/ transfer	Communication	Screening / prevention	Promotion Education	Advocacy
Banfield, 2015	Australia								x	x	
Best, 2018	US	x	x	x		x	x	x		x	
Bezem, 2017	Netherlands								x		
Dennis, 2016	Australia	x	x	x	x	x		x	x		
Doi, 2018	UK	x		x		x			x		x
Halterman, 2018	US	x					x	x	x		
Liptzin, 2016	US	x		x		x		x	x	x	
McClanahan, 2015	US	x	x	x		x	x	x	x	x	x
Pestaner, 2021	US	x	x	x		x	x	x	x	x	x

First author	Country	Case / disease management	Care planning	Service navigation	Care navigation	Care coordination	Information management/ transfer	Communication	Screening / prevention	Promotion Education	Advocacy
Reeves, 2016	US					x	x	x			
Rodriguez, 2018	US	x		x	x			x	x	x	
Sanchez, 2019	US	x					x	x		x	
Sanders, 2019	Canada				x			x		x	x
Sanford, 2020	Australia	x		x	x	x		x	x	x	
Schroeder, 2016	US							x		x	
Strobel, 2020	US			x		x		x		x	
Szefler, 2018	US	x	x	x		x	x	x	x	x	
Trivedi, 2018	US	x	x				x	x		x	
Willgerodt, 2020	US		x			x	x	x			x

Note: The grey shading indicates studies that are systematic or integrative reviews

Table 1B: Components identified in one example of each model

Model Type	Case management	Care planning	Care coordination	Service navigation	Care navigation	Information transfer	Communication	Screening and preventive care	Promotion and education	System advocacy
School-located nurse-led models (Rodriguez)	x		x	x			x	x	x	
Primary care nurse-led models (Sandford)	x		x	x	x		x	x	x	
Models led by practitioners other than nurses (Szefler)	x	x	x		x	x	x	x	x	
School Based Health Centre model (Strobel)			x		x		x		x	

Table 2: Outcomes of the included studies

First author	Country	Study design	Model type*	Level**	School outcomes				System outcomes							Health outcomes	
					Reduced absenteeism	Improved performance	Greater engagement in activities	Education health prevention	Access to health services	Access to social care	Improved care planning	Better care coordination	Reduced ED visits	Reduced hospital admissions	Satisfaction / acceptability	Early intervention/ prevention	Improved disease management
Banfield, 2015	Australia	Multi-method evaluation	1	IV					x						x	x	
Best, 2018	US	Integrative Review	1	II													
Bezem, 2017	Netherlands	Cross-sectional	3	IV					x			x			x		
Dennis, 2016	Australia	Pilot study evaluation	1	V		x	x		x	x		x				x	
Doi, 2018	Australia	Realist evaluation	1	V					x	x						x	
Halterman, 2018	US	RCT	4	II	x								x	x	x		x
Liptzin, 2016	US	Pre-post intervention study	4	IV	x			x	x		x		x	x			x

First author	Country	Study design	Model type*	Level**	School outcomes				System outcomes							Health outcomes	
McClanahan, 2015	US	Integrative review	1	II													
Pestaner, 2021	US	Integrative review	1	II													
Reeves, 2016	US	Pilot study evaluation	1	V								x		x	x		x
Rodriguez, 2018	US	Mixed methods evaluation	1	V					x						x		
Sanchez, 2019	US	Systematic review	1	I													
Sanders, 2019	Canada	Participatory action research	2	V												x	x
Sanford, 2020	Australia	Focus group study	2	V					x	x		x					
Schroeder, 2016	US	Systematic review and MA	1	I													x
Strobel, 2020	US	Experimental pilot study	3	IV					x								
Szefler, 2018	US	Longitudinal case control	1	III-2	x												x

First author	Country	Study design	Model type*	Level**	School outcomes				System outcomes							Health outcomes	
Trivedi, 2018	US	Retrospective time-series	1	III-3	x								x	x			x
Willgerodt, 2020	US	Focus group study	1	V								x					

*1: School-located nurse-led models 2: Primary health care nurse-led models 3: School-based health centre models 4: Models led by practitioners other than nurses

** NHMRC levels of evidence 2009 https://www.nhmrc.gov.au/sites/default/files/images/NHMRC%20Levels%20and%20Grades%20(2009).pdf

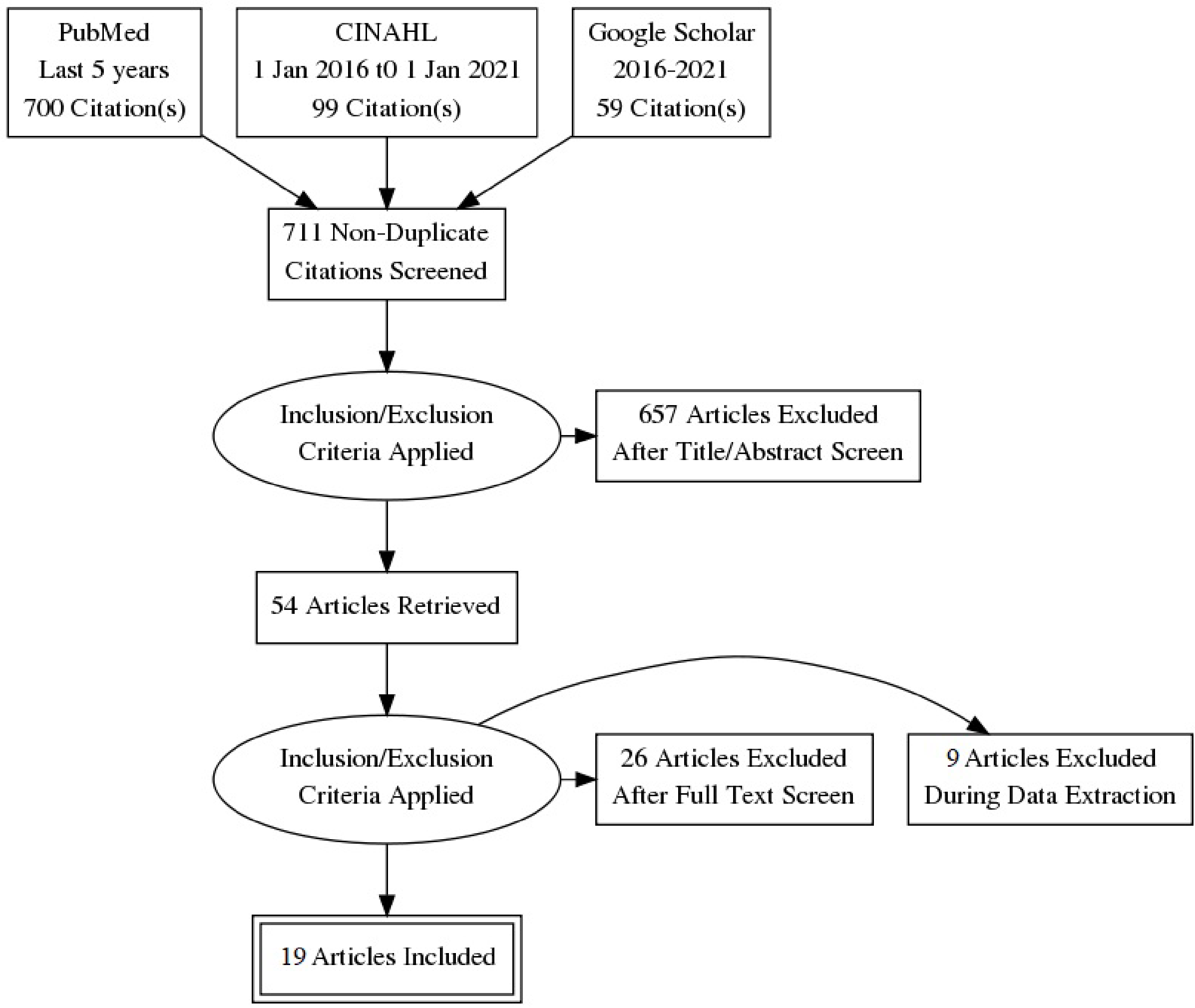
Table 2: Focus of role in school-located nurse and other models

First author	Country	Model led by	Within the school	Inter-professional health care	Intersectoral/ social care	Family assessment
Banfield, 2015	Australia	School nurse	x			
Best, 2018	US	School nurse	x	x		
Bezem, 2017	Netherlands	Triage assistant, then doctor or nurse	x	x		
Dennis, 2016	Australia	Primary health care nurse		x	x	
Doi, 2018	Australia	School nurse	x	x	x	x
Halterman, 2018	US	Telemedicine clinician	x	x		
Liptzin, 2016	US	Asthma counsellors	x	x		
McClanahan, 2015	US	School nurse	x	x		
Pestaner, 2021	US	Integrative review	x	x	x	
Reeves, 2016	US	School nurse	x	x		
Rodriguez, 2018	US	School nurse	x	x		x
Sanchez, 2019	US	School nurse	x	x		
Sanders, 2019	Canada	Primary health care nurse	x	x	x	
Sanford, 2020	Australia	Primary health care nurse	x	x	x	
Schroeder, 2016	US	School nurse	x			
Strobel, 2020	US	School nurse+	x	x		x
Szefler, 2018	US	School nurse	x	x		

Trivedi, 2018	US	School nurse	x	x		
Willgerodt, 2020	US	School nurse	x	x	x	

Appendices

Appendix 1: PRISMA flowchart



Appendix 2: Search strategy

Table 2 Key concepts

Concept 1: Nurse	Concept 2: Modality	Concept 3: Model	Concept 4: Impact
school nurse	face-to-face	model	effect*
school-based	tele*	partner*	evaluat*
school-located	video*	care coordination	impact
		system*	

Sources

1. PubMed

   Search1 : Search: #41 AND #42 Filters: Abstract, in the last 5 years

   ("school-based"[Title/Abstract] OR "school-located"[Title/Abstract] OR "school"[Title/Abstract]) AND "nurs*"[Title/Abstract] AND ("2016/01/05 00:00":"3000/01/01 05:00"[Date - Publication] AND "hasabstract"[All Fields]) AND (("model"[Title/Abstract] OR "system"[Title/Abstract] OR "partner*"[Title/Abstract] OR "coordinat*"[Title/Abstract]) AND ("2016/01/05 00:00":"3000/01/01 05:00"[Date - Publication] AND "hasabstract"[All Fields])) AND ("2016/01/05 00:00":"3000/01/01 05:00"[Date - Publication] AND "hasabstract"[All Fields]) AND (("impact"[Title/Abstract] OR "effect*"[Title/Abstract] OR "evaluat*"[Title/Abstract]) AND ("2016/01/05 00:00":"3000/01/01 05:00"[Date - Publication] AND "hasabstract"[All Fields]))

   Limits: English, humans, Abstract, in the last 5 years

2. CINAHL

   The CINAHL search was conducted using combinations of the following terms, using 'explode' and Major Concept:

   School nurse, School Health Nursing, National Association of School Nurses; model, partnership, collaboration, care coordination; Schools, Middle; Students, high school; Inter-sectoral, interprofessional; effective

3. Google Scholar

   We searched Google Scholar using combinations of the search terms outlined in Table 2 above. Searches were conducted for publications in English issued in the last 5 years.

Appendix 3: Data extraction tables

Table 3.1 Peer reviewed literature

Author, year Country	Model name Study design n=	Population	Led by	Model components (state whether interprofessional or intersectoral or mixed; or within school only) Add as above	Mechanisms of coordination or practice	What was measured	With what outcomes	Comments
Banfield et al 2015 Queensland, Australia	School Youth Health Nurse (SYHN) Program. Retrospective evaluation using RE-AIM framework. Students n=4100 Interviews completed with: Students n=290; RNs n=4; School staff n=17.	8 government high schools (years 7-10)	Registered Nurses (RNs), with experience in youth health, who deliver the Program within schools, a Clinical Nurse Consultant who provides procedural and clinical supervision, and a Program Manager within the health department.	Within school.	The program team works with school principals, student welfare team members and senior members of the education department to tailor the Program according to school needs. The nurses work with teachers to assist in the delivery of the health curriculum in class and whole of school forums. The nurses also co-ordinate smaller sessions tailored to student population needs e.g. smoking	Impact on students Impact on external services (i.e. appropriate referrals to the services) Was the program adopted? Was it implemented as planned? Factors affecting long-term maintenance of the program	Majority of students positive. Approximately half said their health had improved; the other half reported no change. Nurses, school staff and external stakeholders were unanimous the program had a positive effect. The evaluation provides: “good evidence that the pilot Program is reaching the majority of students in need, is reported as having positive effects on student health and wellbeing, has been	Some nurses, school staff and external stakeholders suggested there was decreased truancy and improved educational outcomes due to the program

	8 stakeholders from 7 external services. Gov't employees n=9 (from health, education and comm. Services)				cessation, healthy eating		adopted successfully in schools and by other youth services, is being implemented as intended, and could be maintained with sustained resourcing."	
Best et al2018 US	Integrative literature review to explore empirical research findings for links between school nurse interventions and activities and student health and education outcomes Interventions were categorized according to National Association of School	65 studies Public, private and charter schools in the US. Student age from pre-K to Year 12. Students ranged from n=28 to n=4437 School nurses ranged from n=6 to n=2049 Parents n-64 to n=72 One study included 11	School nurse	In school Care coordination (55% of studies) • Chronic disease mgmt. (n=11) • Collab. Communication with parents, school staff, healthcare providers, students (n=10) • Motivational interviewing/counselling (n=7) • Direct care (n=5) • Case mgmt. (n=5) Student care plans (n=2)		35 studies included outcome measures Health outcomes (28 studies) Education outcomes (2 studies) Both (5 studies)	School nurse interventions in 17/65 studies were linked to positive changes in student health outcomes Motivational interviewing/counselling (n=5) Case mgmt. (n=4) Chronic disease (n=1) Collab. Communication (n=1)	

	Nurses' Framework for 21st Century School Nursing Practice	parent/child dyads						
Bezem et al, 2017 Netherlands	Triage and task-shifting approach for SHS Cross sectional study N = 600 schools	Four distinct urban and non-urban areas in the Netherlands. One urban and non-urban area for each group Triage approach group = 300 schools + 1249 professionals Usual approach group = 300 schools + 729 professionals	School health services (SHS) assistant for the pre-assessment procedures SHS nurses and doctors to follow up children with specific needs	Interprofessional collaboration between SHS assistant, school professionals and SHS professionals. School health professionals include primary school teachers and care coordinators	Not stated?	School professionals' perceptions of access to SHS: - SHS approachability for contact and feedback - SHS approachability for support for health issues - Appropriateness of provided SHS support of children with specific needs	School professionals have more contact with SHS professionals when a triage approach is in place - Groups with triage approach received more appropriate support from SHS for children with specific needs - No impact on perceived approachability	There is a possibility for children who are missed in assessments by assistants in the triage approach

Dennis et al, 2016 South Western Sydney Australia	Healthy Learner Model Mixed Method Pilot Study n = 29 (quantitative) n= 9 (qualitative)	1 high school South Western Sydney, Quantitative = students with NAPLAN scores in the school's lowest quintile Qualitative = 4 parents, 5 school staff (nurse, 2 teachers, counsellor, senior executive	Primary health care nurse as part of learning support team	Initial health assessment, communication with parents, students, school staff and health care providers, Information transfer to health care provider, service navigation	Telephone, letters, and direct contact.	Number and type of health issues, health services provided, change in NAPLAN scores from class 7 to class 9 Candidacy theory and five dimensions of access frameworks adequacy	Up to 7 health issues were identified per student. Vision problems (13), dental neglect (11) and mental health issues) (10) were the most common. NAPLAN scores for reading and numeracy improved by at least 1 band in 83% and 85% of sample. A nurse as part of the learning support team seems to adequately fit into the candidacy and access frameworks to warrant a multi-site randomised control trial	Only descriptive data provided. Nurse as broker to health care system especially important considering low health literacy (students, families) and complex health system. Access provision to and service navigation of complex health system. Transfer of information to physician to prevent/clarify misunderstanding due to low health literacy. Providing a

								bridge of communication between teachers and parents in complex/sensitive issues.
Doi et al, 2018 Scotland UK	“Getting It Right for Every Child” (GIRFEC), a new / refocused programme for school nursing Mixed methods study: Phase 1: interviews and focus groups (*n* = 6 participants) Phase 2: qualitative data from 27 school nurses and quantitative data from first 6	School nurses and school nurse managers (Two study sites)	Not stated as such, but school nurse managers mentioned as study participants.	Standardised referral pathway: from teacher via pupil support teacher to school nurse. Standardised data collection. Nurses’ roles focused and clarified. Nurse training and revised role focused on nine priority areas (or “pathways”): 1. mental health and well-being 2. substance abuse 3. child protection 4. domestic abuse 5. homelessness 6. “looked after children” (i.e. where the State has parental responsibility)	A case record form was used to collected standardised data. Standardised referral forms were used for teachers to refer students to school nurses.	Four programme theories (similar to hypotheses) were investigated. These were organised in a Context – Mechanism – Outcome (CMO) framework: 1. The nine priority areas (C) would streamline referrals (M), improving children’s outcomes (O). 2. Standardisation of service and role clarity (C) adds credibility to school nurses’ role (M), enhancing	The refocused programme appeared to help with early identification of risks and needed interventions. However, it was not as successful in equipping school nurses to deliver interventions themselves, especially in mental health and well-being. The programme theories mentioned under ‘What was measured’ were largely confirmed in second phase data collection: 1. The standardised referral system was broadly seen to work well, though some changes were requested.	The study was focused on how desired programme outcomes were enabled and constrained by the contexts, the mechanisms of change and their interactions (or facilitators and barriers). It was not focused on measuring outcomes (though these were discussed in the second phase qualitative research).

	months of programme Phase 3: Analysis and interpretation			7. youth justice (children involved in the justice system) 8. young carers 9. transitions (children moving from one school to another)		professional status and interagency cooperation (O). 3. Due to changes in role (C), accessibility and visibility of school nurses overall decreases (M), but engagement with agencies and high risk children increases, helping to build trusting relationships (O). 4. Training and support (C) facilitate programme adoption and provide opportunity for role development (M), empowering nurses to deliver, identify and provide appropriate support within	Nurses generally did not feel able to deal with less severe mental health issues, however, and these comprised a large part of their referral load. 2. The standardised referral system also clarified the role of the school nurses to other agencies and made the nurses more aware of agencies with which they had not previously engaged. 3. Nurses felt they had more opportunity to build trust with families accessing the programme. However, the presence of a pupil support teacher in the referral pathway (i.e., between the referring teacher and the school nurse) was felt to form a barrier to service access for some children. 4. Nurses received training in all 9 priority areas, but	

						the priority areas (O).	some felt it was insufficiently practical in terms of delivering interventions, especially in mental health.	
Halterman et al, 2018 New York, US	RCT N=400 School-Based Telemedicine Enhanced Asthma Management (SB-TEAM) program on asthma morbidity among urban children with persistent asthma	3- to 10-year-old children with persistent asthma from 49 schools in Rochester City School District, New York	a clinical telemedicine assistant who already worked in the school district	196 (98.0%) had 1 or more telemedicine visits, and 165 (82.5%) received supervised therapy through school	Telemedicine	Mean number of symptom free days per 2 weeks	SB-Team group had more symptom-free days per 2 weeks post intervention and were less likely to have an ED visit or hospitalization for asthma	
Liptzin et al, 2016 Denver Colorado US	Step up Asthma Program Pre and Post	elementary and middle school students	Asthma counsellors (trained lay persons with strong local community	Case identification, risk assessment, care co-ordination (intersectoral), self-management skills training, student education, staff	Letters to care providers, face to face and letter communication with parents and children	Asthma knowledge, asthma control and exacerbations	Significant improvement in asthma knowledge scores (p<.001) and inhaler use techniques (p<.0001)	While components are described actual care co-ordination activities are not described

	n = 252 students, 3 asthma counsellors		knowledge and network)	education, within school provision of asthma safety net			Significant increase in school asthma action plans, controller medication availability and prescription. Significant reduction in asthma exacerbations (oral steroid use, emergency care visits and school absence) (p<.05)	except for components involving parents. Focus seems to be on the self-management and education components. Actual post-intervention data is not provided for one outcome (control), similarly for asthma exacerbations a figure is provided with geometric mean and confidence intervals but not the actual change.
McClanahan et al, 2015 US	Care co-ordination (also called	Children with chronic illness and	School nurses (*k* = 9); other (*k* = 16)	Care co-ordination: “nurse-guided activities to implement a care plan to benefit the	See: What was Measured / Outcomes column	“Core concepts associated with the role of school nurses in providing care coordination”		This study’s guiding question was to identify “the core concepts

	case management) Integrative lit. review *k* = 25: 15 descriptive studies, 9 expert opinion papers, 1 RCT	complex needs. Settings: school (*k* = 9); other (*k* = 16)		patient through integration of services with the patient, family, health care providers, and other significant personnel .. participating in the patient's care."		Six core concepts were identified. Aspects of these are highlighted below: (a) collaboration: "developing relationships and partnerships for a common goal" (b) communication: "providing a single point of contact to ensure effective transfer of information" (c) care planning and nursing process: "care planning, assessment, planning, intervention, and evaluation" (d) continuous coordination: "monitoring for gaps and duplication of care and providing everyday logistics" (e) clinical expertise: "including disease management and application of standards-based care" (f) complementary components: "Community-based actions, family and youth-centred care, providing advocacy, and a focus on prevention are key aspects" Care coordination was seen as able to make patient care more efficient and "minimise gaps and redundancies" in care.	associated with the role of school nurses in providing care coordination". It aimed to clarify the role of the SN in care coordination and provide evidence-based recommendations for policy and practice. However, the authors pointed to a lack of intervention studies and outcome evaluations, noting: "major concepts [of] care co-ordination and school nurses were described rather than specific interventions tied to outcomes." As such, this

								study is largely descriptive rather than evaluative.
Pestaner et al, 2021 US	Integrative literature review *k* = 6: 4 quantitative studies and 2 quality improvemen t projects	Various: School nurses, teams, and students	Various	The interventions and outcomes were classified under the five NASN Framework Principles: 1. Community/public health 2. Care coordination 3. Quality improvement 4. Leadership 5. Standards of practice They were also classified under the components of each Principle.	Various	- Screenings conducted by SNs resulted in early identification of at-risk students, referrals to services and use of other resources - Outreach by SNs resulted in parents and students using school and community resources Collaborative communication by SNs resulted in better awareness of students with mental health treatment or psychosocial needs.	- In one project, a SN advocated for a gatekeeper suicide prevention training programme, became a trainer and trained nonmedical school personnel, which led to increased knowledge of suicide and use of a gatekeeper protocol at 3 month follow-up	Most of the outcomes were attributed to teams which included a SN, but only those outcomes attributed only to SNs are included here.
Reeves et al, 2017	Pilot asthma care program for	Students who were patients at	School nurses	Interprofessional collaboration between school	Electronic messaging using	Process: completed message	Feasible to establish communication and	Crucial to establish interoperabilit

North Carolina US	electronic communication Pilot project N = 33 students	primary care practice, had parental permission and a hospitalisation for asthma exacerbation		nurse and medical provider, information exchange across community care team using electronic medical record	electronic health record system	between school nurse and primary provider Outcome: asthma exacerbation	improved overall quality of care: All 33 students had a nurse sent a message during the study Decline in number of in-patient admissions from 60.6% in the 12 months prior to messaging to 21.2% in the 12 months post messaging (p<0.001) Decline in mean number of in-patient admissions from 0.70 to 0.21	y standards between providers and stakeholders for continuity Use of common language terminology for interprofessional collaboration is crucial
Rodriguez et al, 2018 California US	Vision screening follow-up and referral Mixed-method, quasi experimental evaluation N = 2785 demonstration group, 3445 comparison group for	San Jose Unified School District, California Intervention: 4 demonstration schools, 2800 children, full-time nurses, low-income and minority Comparison: 5 schools, 3445	School nurses – full time in demonstration schools	Care coordination – school nurse coordinate care and work with families and students to connect them to appropriate healthcare professionals and community services	Nurse monitoring and tracking tools. Nurses sent referral letter to parents and contacted by phone.	Follow up rates: number of students screened for vision, referred for professional examination and evaluated by a vision specialist Teacher's perceptions about work being done by school nurses and perceived impact of	Having full-time nurse in school provide higher rates of follow up. After full implementation of project, follow up rates for demonstration schools reached 96-98% while comparison schools stayed at 41-67% Teachers in demonstration schools are satisfied with the presence of full-time	

	descriptive screening follow up data 129 teachers for qualitative analysis	children, part-time nurses				having a full-time nurse at their school	nurse in schools while teachers of comparison schools expressed needs for more nurse time at schools.	
Sanchez et al 2019 US	Systematic review of school-based telehealth interventions	20 studies Children in school, centre based early childhood education and secondary education. In the studies reporting on outcomes n=2028 students + 84287 child-months of billing claims-based observations pre- and post-intervention			School-based telehealth	Health status improvement reported in 6 studies. Health care utilization reported in 6 studies. Communication between students, parents, providers and school administration examined in 3 studies.	Health outcomes: Improvements seen in asthma, diabetes and speech/language disorders. Healthcare utilisation: some improvements were seen Communication: Positive outcomes and potential improvements outcomes were found in some studies	

Sanders et al 2019 British Columbia Canada	Paper explored the role of public health nurses (PHNs) in comprehensive school health (CSH) Using a participatory action research methodology	Two schools, one urban, one rural				(i) What is the process of engagement of PHNs in a part- nership model with schools, other public health professionals, and the community? (ii) How can CSH practice be supported in school communities? (iii) Can the school health assessment tool serve as an effective point of engagement in a partnership model and capacity building for CSH and healthy schools initiatives?	Three themes emerged: facilitators of PHN engagement, barriers to PHN engagement, and the influence of context on engagement. Findings indicate that the PHN role in CSH must be developed and supported so that PHNs remain a vital link between school health communities, programs, and policies in the promotion of health.	

Sanford et al 2020 Broken Hill Australia	Focus groups. Model: School based primary health care service (SB-PHCS) A model which integrates public health care (RNs) into the school team	Teachers from 6 Primary and high school in rural NSW (Broken Hill) included in the analysis. 5 RNs		Care coordination, communication, service navigation, referral, follow-up care	Facilitating referral to services. Support to teachers in addressing barriers to care for students (a health person having more credibility with families). Providing a link between health, education and families.	The role of the RN in the SB-PHCS	Study findings suggest that the school-based RN role promotes care integration and addresses barriers to PHC for students and families at three levels: individual or family, school and health systems. - RNs used 'care navigation' to reduce barriers to care by addressing healthcare candidacy with students and families. - RNs linked schools, families and health and social care services, and facilitated intersectoral collaboration to improve support for supports with health and	

							developmental issues	
Schroeder et al, 2016 US	School nurses in reducing childhood obesity SR and MA 11 studies (7 quasi-experimental and 4 RCTs) 8 studies included in meta analysis	N/A	School nurses	Care coordination – school obesity prevention program that involves school nurses	Communication mechanisms	Efficacy of school-based obesity	School based interventions that involve nurses lead to small but significant decreases in BMI, BMIz and BMI percentile. May require more intensive intervention than can be provided in school settings. School based interventions may be better suited for obesity prevention	Barriers: confidence level of school nurses, poor parental support
Strobel et al, 2020 US	School based health centres (SHBC) Experimental study – pilot project N = 140 (female = 87, male = 53)	Adolescents (year 9 to year 12 students) in a high school in Minneapolis	SHBC (public health professionals) and school nurse	Interprofessional collaboration, information transfer (PHP acts as systems-level expertise as an addition to SHBC program)	School nurses act as school professionals whose expertise is to manage and care for all students, SBHC and PHP provides additional support for continuity of care and assists students	Health access outcomes – student's motivation for seeking healthcare in a new SBHC	SBHC utilisation rate increased by over 300% - females used the clinic two-thirds more than male, younger level students access the clinic more than senior-level students	This component is a multilevel component that includes the creation and delivery of health education messages by PHP

Szefler, 2018 Denver Colorado US	Building Bridges for Asthma Care Longitudinal Case Control (Primary Outcome) Pre and Post (Secondary Outcomes n=463	28 elementary schools in Denver and Hartford – Children aged 5-14 years Equal numbers in intervention and control groups (individual matching)	School Nurse	Education (students and parents); care coordination and information transfer (parents, health care professionals)	Face to face sessions, letters to parents and health care professionals, forms for parents and students	School absenteeism (primary), Secondary - clinical asthma scores and usage of anti-asthmatic medication	22% reduction in school absenteeism among programme participants Bronchodilator usage > 2 times a week reduced by 12.9% 37.4% of participants showed improvements in clinical asthma test scores	
Trivedi et al, 2018 US	School nurse-supervised asthma program Quasi-experimental, time-series retrospective design study N = 84 children	84 children in central Massachusetts , identified by the physician with persistent asthma and poor medication adherence (from 44 schools) Mean age: 10.5 years	School nurse – mostly working full time	Interprofessional collaboration between medical provider nurse, school nurse, medical providers and families. Care coordination; information transfer from medical provider nurse to school nurse	Telephone between medical office and school nurse;	Healthcare utilisation: Change in the number of emergency department visits in the year before and after the enrolment. Hospital admissions School absences Rescue medication use	Reduced asthma-related ED visits (from 0.8 visits to 0.3 visits, $p < 0.001$) and asthma-related hospital admission (from 0.3 admissions per week or month or to 0 admissions from the pre to post-intervention period, $p < 0.001$) Reduced number of asthma rescue medication by 46.3% from the pre to post-intervention period ($p =< 0.001$) Reduced number of ED visits by 53.3% over a 1 year period ($p = 0,001$) and total	Schools were not recruited separately, school nurses were invited to participate in the program if a children from that school was identified for the study. Enablers: real-world application of paediatric asthma program that relies on established infrastructure of school nurses, providers and families

							hospital admissions (from 0.4 admissions to 0 admissions from the pre to post-intervention period, p =< 0.001) Non significant declines in school absences and oral steroid use for children	
Willgerodt, 2020 Washington State US	Care co-ordination for chronic health conditions, specifically T1D Qualitative study; *k* = 20 focus groups	96 participants: 50 school nurses, 38 parents, 8 clinicians Context was children with Type 1 diabetes	School nurses (SNs)	Care co-ordination: "[a] coordinated state-wide approach [with] technical and clinical assistance, professional development, and oversight [for SNs]"	NA, as this was an exploratory study	Focus group questions addressed: Facilitators Barriers Solutions Preventive measures For "making things go smoothly" and "challenges" for the children	Five critical elements of care coordination for children with T1D in schools emerged: 1. context: child's developmental level, home environment, school environment 2. knowledge/ experience: re: T1D and the roles played in the child's care, for 4 groups: SNs, teachers, providers, parents 3. access/ availability: to/of other people involved in the child's care, esp. timely and responsive communication 4. communication: daily communication, formal documentation, and planning	This study aimed to understand how care coordination for T1D operated and how it might be facilitated and supported. It does not describe a formal model of care but rather provides input which might be used to create an effective model. The study does not address the RQ directly but rather outlines elements of a possible model of care based on the experience

							5. relationships: trust, understanding team members' roles	of SNs, parents and clinicians.

Appendix 3.2: Summaries of included peer reviewed studies

Banfield et al 2015

This paper evaluated a pilot of the School Youth Health Nurse (SYHN) Program in eight high schools in the ACT. The program evaluation was guided by the RE-AIM framework. The program was run by Registered Nurses (RNs) who delivered the program in schools, a Clinical Nurse Consultant who provided procedural and clinical supervision and a Program Manager within the Health Department. The health curriculum was delivered in class and whole of school forums; nurses also coordinated smaller sessions tailored to local need e.g. smoking cessation or healthy eating.

Program uptake varied between year and grades with most contacts with Grade 10 students and the least contact with boys. Various factors affected contact e.g. location of the nurses' office, confidentiality, nurse is non-judgemental. Most students who visited the SYHN indicated a positive experience with about half saying their health had improved. Nurses, school staff and external stakeholders were unanimous that the program had a positive effect on student health and wellbeing. External services reported an increase in appropriate referrals but noted barriers due to the nurses' scope of practice being limited despite them being trained health professionals e.g. they could offer some sexual health services. The paper also discusses factors affecting implementation and long-term maintenance of the program.

Best et al 2018

This integrative literature review looked at how school nurse interventions were linked to student health and education outcomes. Interventions were categorized according to the National Association of School Nurses' Framework for 21st Century School Nursing Practice. Most interventions were categorized under care coordination (most commonly motivational interviewing). 17 of the 65 included studies found a link between school nurse interventions and improved student health outcomes. Few studies measured education outcomes.

Bezem et al 2017

This was a cross-sectional study on four urban and non-urban areas in the Netherlands comparing school professionals' perception of a triage and task-shifting approach for school health services (SHS) to the usual approach. The triage approach involves pre-assessments by SHS assistants with follow-up assessments by a physician or nurse for children with specific needs. This study focuses on interprofessional collaboration between SHS assistant, school professionals and SHS professionals.

Results show that school professionals have more contact with SHS professionals when a triage and task-shifting approach is in place. Groups with triage approach received more appropriate support from SHS for children with specific needs. However, there are no impact on perceived approachability between the two groups.

Campbell et al 2020

This case study paper presents a case study on asthma and air quality issues, comparing individual approaches to population-level approaches. It is the first of a set of three focusing on the National Association of School Nurses' Framework for 21st Century School Nursing Practice. Upstream approaches align with the framework's recommendations.

It concludes that by collaborating with key community stakeholders school nurses can successfully implement policies and programs to address social determinants of health and in turn improve the health of the entire community.

Dennis et al 2016

Dennis et al examined the effect of having a primary health care nurse in the learning support team at a high school serving disadvantaged populations, using a mixed method study. 'Healthy Learners' was a pilot project in 1 high school in Sydney, Australia. The school had students from families with lowest Socioeconomic Status and low health and education literacy. Children in the years 7-9 were referred by Student Support Services to be part of the program. Student's health was assessed by the nurse in the presence of their parents/guardians. Based on the assessment personal health plans were prepared and appropriate referrals made. The nurse co-ordinated care by communicating with parents, teachers and care providers through phone calls, letters and face to face. Educational support was also provided when required. The quantitative component consisted of measuring the number and type of health issues identified and health services required as well as assessing educational outcomes through National Assessment Program, Literacy and Numeracy (NAPLAN) scores. The qualitative component consisted of in-depth interviews with five school staff (nurse, 2 teachers, counsellor, senior executive) and 4 parents.

The nurse helped identify up to seven health problems per student ranging from issues in vision and hearing to serious neglect. Dental, mental health and vision issues were the most common. Identification and addressing these issues resulted in improvement in NAPLAN scores. The nurses were able to broker access, navigation and utilization of complex healthcare services which disadvantaged families found difficult otherwise. They were also able to engage with families more effectively than teachers on difficult and complex health issues. Teachers also gained insight to health barriers to a student's educational performance through the nurse.

Doi et al 2018

This was a mixed methods evaluation study of a new school nursing programme, GIRFEC ("Getting It Right for Every Child"). This programme involved training for school nurses in nine priority areas, improved routine data collection, and a formalised referral pathway from teachers to school nurses via a pupil support teacher. Programme theories were developed in the first phase, combining the designed programme logic and qualitative data from school nurse managers. The qualitative data focused on how the programme was expected to work, and why. After 6 months' operation the nursing and support staff at the two test sites provided qualitative data (27 of 33 staff participated) which was combined with routinely collected quantitative data. The qualitative data collection focused on how programme mechanisms interacted with contexts to produce outcomes.

While more focused on facilitators and barriers than outcome measurement per se, the study found positive changes due to the programme. It helped with early identification of risks and early intervention; helped school nurses to build relationships with families of children in their care; improved engagement of school nurses with other agencies; and provided training that was mostly felt to be useful. Some aspects of the programme might be reviewed, e.g. additional training in delivering interventions for less-severe mental health issues, revised categories for the nine priority areas, and the presence of the pupil support teacher in the referral pathway.

Gray et al 2020

This paper focused on case management and is the second of a set of three focusing on the National Association of School Nurses' Framework for 21st Century School Nursing Practice. The paper describes Washington's School Nurse Case Management Program (SNCM). Washington's SNCM Program trains school nurses in, and provides case management for high-risk students (disengaged, at or below grade level, absent due to health, or with health conditions most likely to cause morbidity and mortality).

Halterman et al 2018

This RCT of the School-based Telemedicine Enhanced Asthma Management (SB-TEAM) found the intervention (SB-Team) significantly improved symptoms and reduced health care utilization among urban children with persistent asthma.

The trial included 400 children from 49 schools in Rochester City, New York. Supervised administration of preventive asthma medication at school as well as 3 school-based telemedicine visits to ensure appropriate assessment, preventive medication prescription, and follow-up care were provided. The school site component of the telemedicine visit was completed by telemedicine assistants, who obtained history and examination data.

Liptzin et al 2016

The authors evaluated the effects of a school-based program 'Step-Up Asthma Program' on asthma morbidity. The program covered 252 elementary and middle-school students in the Denver Public Schools system, US. A pre- and post-intervention model was used. Central to the program were asthma counsellors, community leaders familiar with local language, culture and socioeconomic issues. 3 counsellors were involved. Major program components were case identification, risk and control assessment, care-coordination, asthma education for students and school health staff and improving self-management skills. A medical advisory board supported the counsellors. Care coordination involved students, parents, school health staff and physicians. Both education and care co-ordination were repeated, assessed and course-corrected periodically (every 3 months). Gaps in care (lack of provider, health coverage) were identified and addressed. School health staff were encouraged to attend asthma education events and school asthma action plans were developed.

There was significant improvement in asthma knowledge and self-management skills as well as reduction in asthma exacerbations such as school absence, use of oral steroids and urgent care visits. Further, school health staff education on asthma improved and schools became more asthma friendly while care coordination by counsellors led to a unified approach to asthma management. This resulted in sustained reduction in asthma morbidity. The lack of control group is the main limitation of the study.

McClanahan 2015

This was an integrative literature review seeking to was to identify and clarify "the core concepts associated with the role of school nurses in providing care coordination" for children with chronic illness and complex needs. The papers were from the US context only. There was a lack of intervention studies and outcome evaluations, with only one RCT among 25 papers reviewed; the rest were descriptive studies (k = 15) and expert opinion papers (k = 9).

Six core concepts were identified: collaboration, communication, care planning and the nursing process, continuous coordination, clinical expertise, and complementary components. Communication and collaboration were seen to be essential to effective care coordination. Care coordination was seen as able to make patient care more efficient and “minimise gaps and redundancies”. The authors called for the establishment and use of effectiveness measures which take medical, educational and system outcomes into account, and for these to be used in outcome research.

Pestaner et al 2021

This integrative literature review examined school nurses' role in suicide prevention. It assessed results from 6 studies, though two of these were quality improvement studies. Interventions were categorised within the NASN Framework and then within the components in each category.

While many of the results related to team-based programmes in which the contribution of the school nurse was not separable from that of other team members, there were still some results attributable to school nurses alone. The outcomes related mainly to awareness, identification of at-risk students, referrals, and increased use of already-available resources to help students.

Reeves et al 2017

Reeves et al conducted a pilot project of an asthma care program for electronic communication between school nurses and medical providers using electronic medical record. This study was done on students who were patients at a primary care practice and had a hospitalisation for asthma exacerbation. This study’s model component is interprofessional collaboration and information exchange across community care team using electronic health record system.

Results show that it is feasible to establish communication via electronic messaging and improve overall quality of care. There is a decline asthma exacerbation, measured by the number of in-patient admissions prior to and post program. However, it is crucial to establish interoperability standards between providers and stakeholders for continuity and ensure that there is a use of common language terminology for communication.

Rodriguez et al 2018

This paper was a mixed-methods, quasi experimental evaluation to evaluate vision screening follow-up and referral methods for schools in California. Demonstration school groups were led by full-time nurses and comparison school groups had part-time nurses. This study focuses on care coordination – school nurses coordinate care and work with families and student to connect students to appropriate healthcare professionals and community services using referral letter and telephone calls to parents.

Outcome measured was follow up rates using a descriptive study and teacher’s perception about having a full-time nurse using a qualitative approach. Having full-time nurse in school provide higher rates of follow up. After full implementation of project, follow up rates for demonstration schools reached 96-98% while comparison schools stayed at 41-67%. Teachers in demonstration schools are satisfied with the presence of full-time nurse in schools while teachers of comparison schools expressed needs for more nurse time at schools.

Sanchez et al 2019

This systematic review of school telehealth evaluations assessed finding from 20 studies. The sample population included children in school, centre-based childcare and secondary school. Outcome measures included health status improvement, health-care utilization and communication and collaboration.

Students receiving telehealth experienced improvements in health outcomes for asthma, diabetes and speech and language disorders. Some studies showed reduced health care utilization. Other measures of student health or academic progress were not measured in the included studies.

Sanders et al 2019

This paper explored the role of public health nurses (PHNs) in engaging school communities in promoting child and youth health within intersectoral and interdisciplinary comprehensive school health (CSH) models in Canada. CSH models use partnerships between schools and communities to advance health promotion and chronic disease prevention with school populations. The research was guided by the following questions: (1) What is the process of engagement of PHNs in a partnership model with schools, other public health professionals, and the community? (2) How can CSH practice be supported in school communities? (3) Can the school health assessment tool serve as an effective point of engagement in a partnership model and capacity building for CSH and healthy schools initiatives?

Using a participatory action research methodology, the authors identified three themes: facilitators of public health nursing engagement, barriers to public health nursing engagement, and the influences of community context on engagement. The authors conclude that PHN engagement in schools is a part of the PHN role and that PHNs can be catalysts for engaging the voice of schools in CSH and are a vital link between school health programs and policies that facilitate best practices.

Sanford et al 2020

Using focus group data this study examined the role registered nurses embedded in the school team. The authors looked at the Broken Hill School based primary health care service (SB-PHCS) in rural NSW. Focus groups included teachers and RNs from 6 primary and high schools. The data collected in the groups demonstrated that RNs working within the school team can address barriers to accessing care at the individual/family, school and health system level. RNs were described as ‘care navigators’ and the ‘link’ between health, education and families. They also linked social care services and facilitated intersectoral collaboration. In particular, it was noted that RNs were able to support communication between families and school and that in some cases they were able to address issues with families that the school had not been able to address.

Schroeder et al 2016

This systematic review and meta-analysis examined the effectiveness of a school-based obesity intervention involving nurses. The authors included 11 studies for systematic review – 7 were quasi-experimental studies and 4 were RCTs; 8 studies were included in the meta-analysis. This study focuses on care coordination.

Results show that school-based interventions that involve nurses lead to small but significant decreases in BMI, BMIz, and BMI percentile and that changing weight may require more intensive intervention than can be provided solely in a school setting. Furthermore, cultural factors could contribute to intervention's success, and addressing obesity requires a multifaceted societal change. School based interventions may be better suited for obesity prevention and school nurses can play a key role in implementing sustainable effective school-based obesity interventions. Barriers to implementation identified are time, nurses' interest and confidence, and availability of school nurses.

Strobel et al (2020)

This was an experimental pilot project in a school-based health center (SHBC) in a high school in Minneapolis to study health access outcomes by measuring the utilisation of SBHC by 9th to 12th grade students. The intervention involves school nurses, who act as school professionals whose expertise is to manage and care for all students, supported by public health professionals for additional support and continuity of care and assistance. Public health professionals were responsible for the creation and delivery of health promotion messages. This study focuses on interprofessional collaboration and information transfer.

SHBC utilisation rate increased by over 300% - females used the clinic two thirds more than males and students at younger levels accessed the clinic more than senior level students. The project demonstrated the potential of an education effort by creating and implementing an effective program to improve healthcare access and to normalise health promotion to an overlooked population.

Szefler et al 2019

This study determined the effect of a school-based programme to enhance asthma care on school absenteeism. 'Building Bridges for Asthma Care' focussed on early identification of children at-risk of asthma, tailored case management and improved co-ordination between student, their families, health staff and schools. The study population was 463 students aged between 5-14 years across one school each in Denver and Connecticut (U.S.A). Programme effect was compared to an equal number of non-participant matched students in these schools. Programme utilized existing school health setup (full time SN in Connecticut, part-time SN with health assistant/trained unlicensed helpers in Denver). Voluntarily enrolled students meeting set criteria were interviewed initially. Based on those interviews tailored educational and care co-ordination components were provided. Educational component included an initial part with periodic reinforcement and involved parents as well. Co-ordination component included ensuring health care services were in place, closing gaps in service delivery and follow-up, and periodic assessment. SNs were supported to co-ordinate with both health care staff and parents.

The primary outcome was school absenteeism among the programme participants. Secondary outcome was more than twice weekly usage of short acting Beta agonists (SABA) and Childhood Asthma Control Test (CACT)/Asthma Control Test (ACT) scores. The programme resulted in early identification of at-risk for asthma students and provided enhanced access to appropriate services while reducing potential barriers to access, utilization, and asthma management. There was a significant decrease in school absenteeism, SABA usage more than twice a week as well in ACT/CACT scores. Limitations included possible selection bias leading to effect over-estimation, lack of data on clinical issues and non-participant population, and non-inclusion of external factors (psychosocial and familial).

Trivedi et al (2018)

This study reports on a quasi-experimental, retrospective time series design study of a school nurse-supervised asthma program (the Step-Up Asthma Program), delivered to 84 children in central Massachusetts with existing electronic medical records. Physicians identified children with persistent asthma and poor medication adherence from 44 schools. The intervention is led by the school nurses, with ongoing communication between physician's office and school nurse through the school year. This study's model component is interprofessional collaboration, focusing on information transfer from medical provider nurse to school nurse. This study used regular telephone communication between medical provider and school to ensure the delivery of preventive asthma medication with school nurse supervision, taught children correct inhaler and spacer technique and ongoing partnership between school and medical provider.

Outcome measures include healthcare utilisation and school performance, with a significant reduction in asthma-related ED visits and hospital admissions; reductions in asthma rescue medication refills; declines in school absences; and decreased oral steroid use for children enrolled in this program. Enablers of this study is that it uses real-world application of paediatric asthma program that relies on established infrastructures (medical providers, school nurses and families).

Willgerodt et al 2020

This exploratory focus group study (k = 20) aimed to understand care co-ordination for children with Type 1 Diabetes (T1D), its facilitators and barriers, and the critical components of quality care for children with T1D in schools. The study was done in the US (in Washington State); parent, school nurses, and other healthcare providers were included.

Five critical components of care coordination for this population were found: context, knowledge and experience, access and availability, communication, and relationships; these findings were in line with other findings in the literature. Facilitators and barriers were considered in terms of actionable strategies, working in the context of limited resources and less-than-ideal systems, and the perspectives and experiences of different people involved in the child's care. The study's implications were considered to generalise beyond care for children with T1D, to care for children with other chronic conditions.

Appendix 3.3 Peer reviewed commentary summaries

Baker et al 2017

This commentary describes care coordination, a key component of school-located nurse models highlighted in the 2016 National Association of School Nurses framework for school nurse practice. Care coordination moves beyond basic case management to a systems-level approach for delivery of school health services. The framework broadly applies the term care coordination to include direct care and communication across systems. Effective care coordination requires that the school nurses not only know the principles of traditional case management but also understand complex systems that drive effective care coordination. The outcome of a system-level approach is enhanced access to services in an integrated health care delivery system that includes the school nurse as an integral member of the school's health care team. This article presents a comprehensive, system-level model of care coordination for school nurse leadership and practice.

Guzys et al 2013

This paper explored self-perceived factors that influence quality of secondary school nursing practice in Australia. A purposive sample of 9 secondary school nurses representing 4 of the 8 Department of Health Services regions of Victoria, Australia was used. In this interpretive descriptive, qualitative study, nurses participated in in-depth semi-structured interviews and data obtained was analysed using a thematic network approach. A global theme of sustaining quality practice was identified. This was composed of six organizing themes namely ‘respecting our work’, ‘one size does not fit all’, ‘more than ticking boxes’, ‘having the right tool for the job’, ‘with or without the safety net’, and ‘coaching from the side-lines’.

Results revealed good quality secondary school nurse practice required a positive and flexible environment. The role required a wide knowledge base (adolescent, mental, sexual health, family planning etc) which, in Australia, closely resembled the role of adolescent nurse practitioners. A shared understanding, among all stakeholders, of the purpose, principles, role definition and obligation of nurses, leading to improved interprofessional collaboration and role clarity was another important factor. Critical companionship (facilitated critical reflections on practice) by a technically competent person, ideally, not part of organizational management and regular knowledge sharing with other school nurses were essential as well. The main limitation of the study was a small and narrow sample, and inherent limitations of qualitative study design and in-depth interview techniques.

Kubik et al 2018

This paper describes development of a randomized trial “Students Nurses and Parents Seeking Healthy Options Together (SNAPSHOT)”. SNAPSHOT is an elementary school-based, school nurse-led, healthy weight management program to reduce excess weight gain among 8 -12-year-old children. The trial, with 132 child/parent dyads, uses home visits by school nurse, a “Kid group” (14 x 90min sessions), parent group (5 x 90min sessions), newsletter program (monthly mailings with healthy lifestyle info for the family). Outcome measures include child and parent anthropometry, child dietary intake, child physical activity, child Health-related Quality of Life, and psychosocial factors.

Pianalto and Wall, 2016

This honours research project from the US is an integrative literature review that seeks to answer the question: How does implementation of school-based nursing affect health-related outcomes in children within and outside the school environment? Twenty research articles published within the past nine years were selected, along with descriptive approaches including surveys, journals, and interviews with the school nurse. Limitations to the articles include small sample sizes, narrow populations, single database extraction (CINAHL), and not specifying the level of expertise of the school nurse.

The review examined interventions performed by nurses for obesity prevention, diabetes management, asthma control and behavioural emergencies such as abuse and depression. Some chronic illnesses and situations were more heavily focused than others. The authors support the provision of school-based nursing for its related positive outcomes for children in school and provide recommendations for future studies to examine whether levels of education and licensure of the school nurse affect health outcomes.

Reaume-Zimmer et al 2019

This descriptive paper describes how mental health services for youth living in Chatham-Kent, a semi-urban and rural region of Canada, are being transformed by a new health delivery structure. The service operates through the framework of the ACCESS Open Minds project, a pan-Canadian initiative with the aim of transforming and evaluating the way mental health services are delivered to youth aged 11-25 from 14 diverse communities. The project aim was to bring together existing youth resources to ensure that youth in need are connected to the appropriate providers. The main way the project achieved its goal was the creation of a new permanent physical space in a central location within the community. The open-plan space facilitated a coordinated approach between partnering organisations, which each had a booth set up in the building.

No mention is made specifically of school nurses, although mention of a Mental Health and Addictions Nurse working in the school sector is. The role of the Mental Health and Addictions Nurse along with the Youth Diversion Officer among others, come under the banner of 'Working with Local Champions', one of six key elements crucial to the service transformation. The other elements are coordination and partnership between youth services; establishing a youth-friendly space in a central part of the community; training of clinicians; engaging youth and family; and engaging community through awareness and educational events. The success of the youth-friendly space has resulted in a similar model being set up in a neighbouring community.

Schroeder et al 2018

Schroeder explains the significant impact that social determinants of health have on school-age children and why school nurses are well suited to address them using qualitative evidence. The article provides concrete guidance for understanding, identifying, and addressing SDOH in school nursing practice by using three common childhood health problems – obesity, insufficient sleep and asthma – as case studies. The paper asserts that as school nurses are easily accessible to children who may have barriers accessing traditional healthcare and often understand families' SDOH-related barriers because they have a long-term relationship with children and families, they can play a key role in addressing the SDOHs that may be impacting a child's wellbeing.

Five broad recommendations are given to help nurses recognise and provide the appropriate care to students facing SDOH barriers, namely: provide care in a culturally competent manner; upstream approaches and policy change; consider literacy levels and English language proficiency; connect to resources; and consider access to Economic resources. It concludes that with a greater focus on SDOH, nurses can serve as leaders in promoting health and addressing health disparities with the goal of improving the health of all children.

Simons 2014.

This doctoral dissertation is a descriptive study designed to specifically guide the development of a school-based nurse managed health centre for a public school district in the US state of Michigan. It outlines different models of nurse health centres and their specific uses, including school-based health centres. Simons cites SBHCs as operating in almost 2000 schools across the US. The centres have demonstrated an increase in access to care for high-risks groups, such as those living in high-poverty communities, those with no health insurance and ethnic minority youth. Simons produces recommendations for a business plan for the development of SBHCs.

Williams and Dickinson, 2016

Williams and Dickinson explore the history and development of school-based health services internationally and provide an insight into the current provision of primary school-based health services in New Zealand. This discussion paper argues for more research into the feasibility, provision, and effectiveness of the country's school-based health service, including development of a collaborative framework for health service delivery into primary schools, one where the needs of all stakeholders are considered. The authors report that in New Zealand there is no significant inter-service collaboration between health and education resulting in the delivery of fragmented and underdeveloped health services.

They look at the role of schools in providing not only a location to deliver health services to children but also the opportunity to reach entire families and communities. The authors point to a paucity of available literature despite the widespread use of school-based health services over many decades.

Appendix 3.4 Grey literature summaries

The Centers for Disease Control and Prevention (CDC), 2017

This research brief summarises current scientific knowledge from a systematic literature review on the relationship between the role of school health services in the US and the health and academic outcomes of students with chronic health conditions. It also reflects position statements for and guidelines from national organisations with expertise in school health.

The brief outlines six strategies for school-based management of chronic health conditions in students with the aim of strengthening a good working partnership between students, school nurses, clinicians, and school staff to help reduce absenteeism and improve academic achievement. The strategies are namely: 'Plan and develop a coordinated system to meet students' needs', 'Provide school-based health services and care coordination', 'Provide specific and age-appropriate education to students and their families', 'Provide professional development opportunities for school staff', 'Provide appropriate counselling and social services for affected students' and 'Provide a safe physical environment'. Examples of students' chronic health conditions include seizure disorders/epilepsy, asthma, diabetes, poor oral health, and food allergies.

Trim, K. 2011

This evaluation report evaluates the success of a program providing School-Based Public Health Nurses (SBPHN) in Perth County, Ontario, Canada. The goal of the evaluation was to demonstrate the impact the individual healthcare services component of the program was having on student health and educational outcomes and to identify any needed improvements to the program. The strength of this program evaluation is that two methodologies were employed to gauge opinions: focus group method and user surveys. Results revealed the program provided students, parents, and school staff with high-quality services in their daily school environment which students may not otherwise have had access to.

The four different user groups involved in the program were: school staff, nurses, parents, and students. Findings were robust and valid in representing the impact, successes, and areas of improvement for the SBPHN program. The evaluation also included a literature review of 20 articles. Results indicated there is a strong need for the provision of a school-based public health nurse service.

Royal College of Nursing, 2018

This policy and position statement by the Royal College of Nursing (UK) is a call to action to Government to address a significant decline in the number of school nurses and reductions in the health visiting workforce. It includes three focused recommendations addressing funding, availability of data, and specialist training. The stance of the RCN is that a child's health has a significant impact on their wellbeing, educational attainment and economic prosperity throughout their adult life. This stance drives the RCN's appeal to the Government to value the role of health visitors and school nurses, and ensure their service is properly resourced.

This short paper summarises the roles of health visitors and school nurses – defining a school nurse as "[someone who] delivers both universal and targeted services and work across education and health, providing a link between school, home and the community." It references research evidence that highlight the economic value of investing in early years intervention and evidence that school nursing services improve the long-term condition management of pupils, resulting in significantly fewer missed school days. It lists disinvestment in health services for children and young people, and fragmentation in service provision as key contributors to the declining service levels.

National Association of School Nurses [NASN], 2016

This visual, conceptual Framework by the National Association of School Nurses explains the key principles of school nursing with a focus on current evidence-based school nursing practice. It updates (and replaces) articles in the July 2015 NASN related to the Framework.

The resource highlights '21st century care coordination' (or case management), a term that includes collaborative communication and care across systems. The five components of the Framework's Principles are: Standards of Practice, Care Coordination, Leadership, Quality improvement, and Community/Public Health. Each of these principles is further defined by practice components.

American Academy of Pediatrics, 2016

This policy statement describes the crucial aspects of the school nurses' role, its relationship to pediatric practice and recommendations to facilitate productive working relationships between the two. It updates (and replaces) an earlier AAP position statement. Crucially, the AAP determines that the previous school nurse to student ratio (1:750) is no longer adequate to determine nurse workload.

The paper offers four recommendations for pediatricians to employ to improve working relationships with school nurses.

Less et al, 2020

This 2020 position statement by the National Association of School Nurses (US) outlines the role, background and rationale of school nurses. It defines the function of the school nurse as a "pivotal role that bridges healthcare and education through provision of care coordination, advocacy for quality student-centred care, and collaboration to design systems that allow individuals and communities to develop their full potential".

It states that school nurses, as part of a team of specialist personnel, play a significant role in student success as student health is linked to academic achievement related to grades, test scores, school attendance and student behaviour. It cites the American Academy of Pediatrics (2016)

recommendation that all schools have a minimum of one registered professional school nurse to provide health services.

Appendix 4: Summary of barriers and facilitators

Because Umh et al 2020 reviewed perceived barriers and facilitators associated with school nurse models, we have summarised these in Box 1 below (see Uhm et al 2020 Figure 2). We have added a list of references describing barriers and facilitators.

Box 1: Perceived barriers and facilitators to school nursing models

Intrapersonal level
• Knowledge • Confidence and self-efficacy • Career experience • Leadership abilities

Interpersonal level
• Collaboration and communication among stakeholders • Parental support and engagement • Team-based approach • Stakeholders meeting

Institutional level
• Resources: staffing, training, supplies, time, funding, and educational resources for students • Practical guidelines: best practices and role boundaries • Administrative support • Case management

Community and public policy level
• Equity in school health care • Law, regulation, and action plan • Data system for sharing health information

Other pertinent reverences include:

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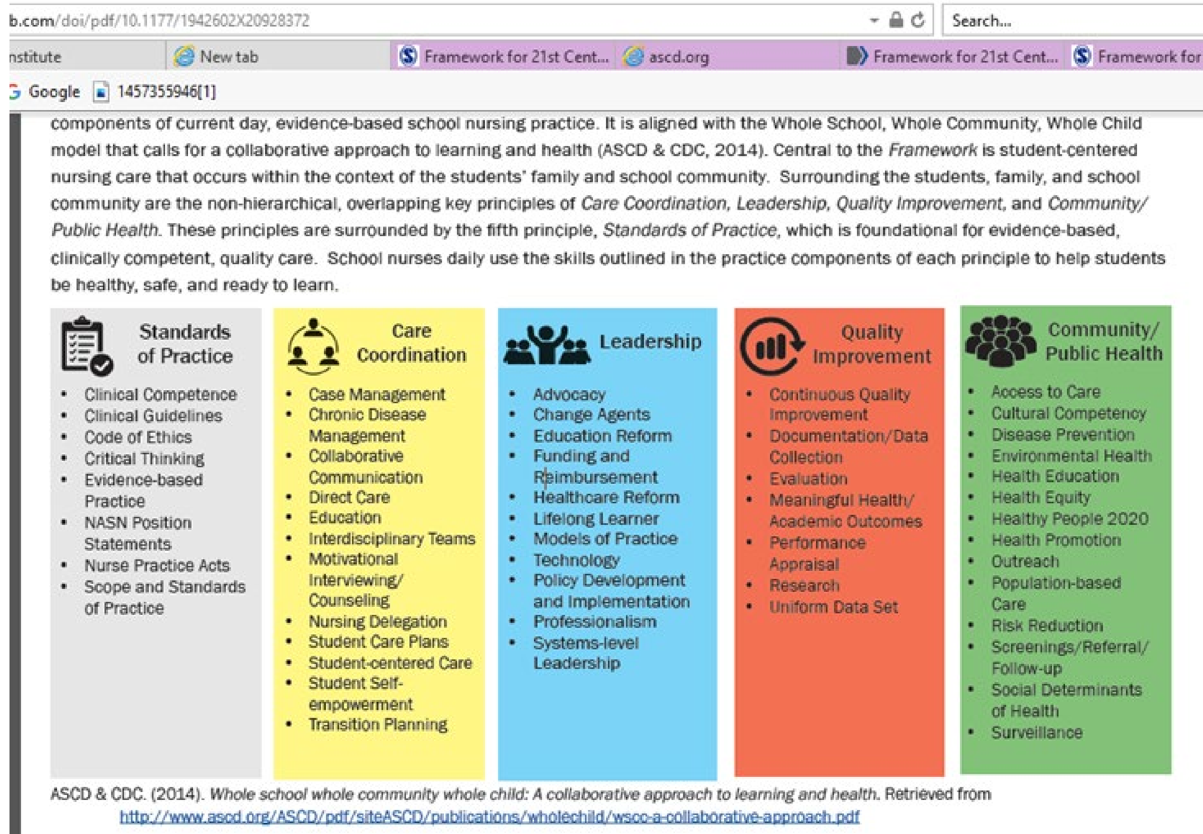
Appendix 5: The NASN Framework



components of current day, evidence-based school nursing practice. It is aligned with the Whole School, Whole Community, Whole Child model that calls for a collaborative approach to learning and health (ASCD & CDC, 2014). Central to the *Framework* is student-centered nursing care that occurs within the context of the students' family and school community. Surrounding the students, family, and school community are the non-hierarchical, overlapping key principles of *Care Coordination, Leadership, Quality Improvement*, and *Community/ Public Health*. These principles are surrounded by the fifth principle, *Standards of Practice*, which is foundational for evidence-based, clinically competent, quality care. School nurses daily use the skills outlined in the practice components of each principle to help students be healthy, safe, and ready to learn.

Standards of Practice

- Clinical Competence
- Clinical Guidelines
- Code of Ethics
- Critical Thinking
- Evidence-based Practice
- NASN Position Statements
- Nurse Practice Acts
- Scope and Standards of Practice

Care Coordination

- Case Management
- Chronic Disease Management
- Collaborative Communication
- Direct Care
- Education
- Interdisciplinary Teams
- Motivational Interviewing/ Counseling
- Nursing Delegation
- Student Care Plans
- Student-centered Care
- Student Self-empowerment
- Transition Planning

Leadership

- Advocacy
- Change Agents
- Education Reform
- Funding and Reimbursement
- Healthcare Reform
- Lifelong Learner
- Models of Practice
- Technology
- Policy Development and Implementation
- Professionalism
- Systems-level Leadership

Quality Improvement

- Continuous Quality Improvement
- Documentation/Data Collection
- Evaluation
- Meaningful Health/ Academic Outcomes
- Performance Appraisal
- Research
- Uniform Data Set

Community/ Public Health

- Access to Care
- Cultural Competency
- Disease Prevention
- Environmental Health
- Health Education
- Health Equity
- Healthy People 2020
- Health Promotion
- Outreach
- Population-based Care
- Risk Reduction
- Screenings/Referral/ Follow-up
- Social Determinants of Health
- Surveillance

ASCD & CDC. (2014). *Whole school whole community whole child: A collaborative approach to learning and health.* Retrieved from http://www.ascd.org/ASCD/pdf/siteASCD/publications/wholechild/wscc-a-collaborative-approach.pdf

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