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The Role of a Nurse in Early Detection of Autism in Infants During Routine Health Check-Ups

A Descriptive Literature Review

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Autism Spectrum Disorder (ASD) is a condition that increasingly becomes more commonly met and diagnosed by healthcare professionals. Early ASD diagnosis has proven to be crucial in terms of improving the outcomes for the affected children.

The nurses, involved with routine pediatric health check-ups, are bound to come across young patients affected by the condition. It is important to not underestimate the role of such a nurse in early ASD detection, as he/she might very likely have best opportunities for early ASD detection.

The purpose of this descriptive literature review was to explore the role of the nurse in early ASD detection during routine pediatric health check-ups as well as competencies and tools that a nurse could benefit from within the framework of this task. Fifteen (15) research articles, published in full text, in English language and within the time frame of the last 10 years were selected from three (3) academic online databases: CINAHL, PubMed and MedLine. The data was analyzed by applying the method of inductive content analysis.

The result of this study revealed the multitude of dimensions of the nurse's role in early autism detection during regular pediatric health check-ups. These included active communication with parent/caregivers, attending to their concerns and providing relevant education. Other aspects were found to be the skills of ASD identification, leadership/decision-making ability, nursing advocacy and nursing accessibility, promoting the receival of official ASD diagnosis and linking the patients with necessary services/treatments as well as educating co-workers and creating the network of connections between institutions.

The results of this study have also indicated the tools and competencies that a nurse can benefit from in early ASD detection during regular pediatric health check-ups. Those were found to be the aspects of knowledge and professional training, confidence and flexible approach, cultural and professional competencies as well as the quality of stress resilience, the use of multiple sources and relevant surveillance and assessment tools in ASD identification.

According to the findings of this thesis, the nurse, involved in regular pediatric health check-ups, can play a meaningful role and have the potential to make a significant contribution into the identification of ASD. The nurse can benefit from a range of tools and competencies within the framework of this task.

Key Words	nurse, infant, autism, early detection

Tekijä	Kabita Bhattarai, Chandra Kandel ja Anastasia Konovalova
Otsikko	Sairaanhoitajan rooli lasten autismin varhaisessa havaitsemisessa rutiininomaisissa terveystarkastuksissa
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Autismikirjon häiriö (Autism Spectrum Disorder; ASD) on tila, jota terveydenhuollon ammattilaiset kohtaavat ja diagnosoivat yhä useammin. Varhaisella ASD -diagnoosilla on todettu olevan ratkaiseva merkitys lasten hoitotulosten parantamisessa. Sairaanhoitajat, jotka osallistuvat rutiininomaisiin lastentarkastuksiin, kohtaavat todennäköisesti nuoria potilaita, joilla on ASD. On tärkeää olla aliarvioimatta sairaanhoitajan roolia ASD:n varhaisessa tunnistamisessa, sillä hänellä on usein parhaat mahdollisuudet havaita häiriö ajoissa.

Tämän kuvailevan kirjallisuuskatsauksen tarkoituksena oli tutkia sairaanhoitajan roolia ASD:n varhaisessa tunnistamisessa lastenneuvolakäyntien yhteydessä sekä tunnistaa ne osaamisalueet ja työkalut, joista sairaanhoitaja voi hyötyä tässä tehtävässä. Tarkasteluun valittiin viisitoista (15) kokotekstinä julkaistua tutkimusartikkelia, jotka olivat englanninkielisiä ja julkaistu viimeisen kymmenen vuoden aikana. Artikkelit haettiin kolmesta tieteellisestä tietokannasta: CINAHL, PubMed ja MedLine. Aineisto analysoitiin induktiivisen sisällönanalyysin menetelmällä.

Tutkimuksen tuloksena paljastui, että sairaanhoitajan roolilla ASD:n varhaisessa tunnistamisessa lasten terveystarkastusten yhteydessä on monia ulottuvuuksia. Näitä olivat muun muassa aktiivinen viestintä vanhempien/huoltajien kanssa, heidän huoliensa huomioiminen ja asianmukaisen tiedon jakaminen sekä kouluttaminen. Muita keskeisiä osa-alueita olivat ASD:n tunnistustaidot, johtajuus- ja päätöksentekokyky, hoitotyön vaikuttamistyö ja saavutettavuus, ASD -diagnoosin saannin edistäminen ja hoitoon ohjaaminen, sekä työtovereiden kouluttaminen ja yhteistyöverkostojen luominen eri toimijoiden välille.

Tutkimus osoitti myös, että sairaanhoitaja voi hyödyntää useita työkaluja ja osaamisia ASD:n varhaisessa tunnistamisessa lastenneuvolakäyntien aikana. Näitä olivat muun muassa tiedot ja ammatillinen koulutus, itsevarmuus ja joustava työskentelytapa, kulttuurinen ja ammatillinen osaaminen, stressinsietokyky sekä monilähteinen tiedonhankinta ja sopivien seurantamenetelmien ja arviointityökalujen käyttö ASD:n tunnistamisessa.Tutkimuksen perusteella sairaanhoitaja, joka osallistuu säännöllisiin lasten terveystarkastuksiin, voi näytellä merkittävää roolia ASD:n tunnistamisessa ja vaikuttaa myönteisesti häiriön varhaiseen diagnosointiin. Tässä tehtävässä sairaanhoitaja voi hyötyä monipuolisista työkaluista ja osaamisalueista.

Avainsanat	Sairaanhoitaja, lapsi, autismi, varhainen havaitseminen

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1 Introduction

1.1 Autism: a brief overview

Autism can also be referred to as Autism Spectrum Disorder (ASD) due to the combination of symptoms and level of severity being unique to each affected person, resulting in wide possibility of variations. It is a neurodevelopmental disorder which starts to manifest early in life, typically before age 2. (Autism Spectrum Disorder 2024.) Autism is a complex lifelong condition that negatively impacts neurologic, biologic, adaptive, social, linguistic, and cognitive functions (Hus and Segal 2021: 3509-3529). ASD can also result in the presence of rigid or repetitive behaviours (Dunlap 2019: 496-501). The combination of symptoms and needs is individual and can change throughout the lifetime (Elder, Kreider, Brasher and Ansell 2017: 283-292). Some affected individuals are mildly impaired by their symptoms and are able to live independently, whereas others are severely disabled due to the condition and remain in need of care and support throughout the lifetime (Autism 2023).

According to the World Health Organization, it is estimated that about 1 out of 100 children worldwide has autism (Autism 2023). This is a significant rise compared to the occurrence of ASD of 1 in 2000 in the 1970s (Hus and Segal 2021: 3509-3529). It is unknown whether such a dramatic rise in autism diagnoses can be contributed to the improvement of diagnostic measures and possibilities or to the significant increase in prevalence of the condition worldwide or, possibly, combination of both (Elder at al. 2017: 283-292).

2 Background

2.1 Definition of the Term ”Nurse” in This Study

In this study the term “nurse” was used to describe all nurses who perform routine pediatric heath check-ups in different regions of the world. These are, for example: the nurse, pediatric nurse, Maternal and Child Health Nurse (MCHN), Public Health Nurse (PHN), and community nurse. Additionally, in some studies chosen for this thesis, the nurses were also referred to as primary care providers.

2.2 Challenges in Detecting ASD in Infancy

Despite the fact that autism is becoming increasingly common and known of by healthcare professionals and general public, there remain certain challenges in early ASD identification. These difficulties in autism recognition are often closely linked to each other, in many cases one leading to the other, creating tricky combinations. (Gayathri 2024.)

Autism might be hard to identify, partially due to it being a spectrum with a wide range of signs and behaviours, the combination of which is individual and might change throughout the life span of the affected person. Any single type of behaviour, as well as their various combinations, might or might not mean ASD, depending on the context. If a health care professional, attending to a child, is not a specialist or has not received a specific ASD training at least, he or she might not be able to recognize ASD due to lack of knowledge. (Miller 2024; Gayathri 2024.)

The same finding was also presented in a literature review conducted in Qatar by Bivarchi, Kehyayan and Al-Kohji (2021). The review identified several main barriers that created challenges in early diagnosis and intervention of children with ASD. One of these barriers was found to be the lack of knowledge and training among healthcare providers. Lack of knowledge and awareness about ASD, its early symptoms as well as standard ASD screening and screening tools was seen to play a major role in delaying the timely ASD assessment and diagnosis (Bivarchi et al. 2021).

The lack of ASD knowledge and awareness from the side of the parents and caregivers was found to be another significant factor, contributing to the delayed ASD evaluation and intervention (Bivarchi et al. 2021). The study has identified, that even if parents were able to describe their infant's ASD symptoms, they lacked the understanding of those to be autism related. Parents reported the lack of knowledge of early ASD symptoms, with nearly half of the parents being completely unaware what ASD was until their child was diagnosed (Bivarchi et al. 2021).

Health care professionals might not be able to pick up ASD symptoms in a quick, time restricted routine health check-up visit. According to the study of Bivarchi et al. (2021), ASD screening is generally not routinely implemented into a standard pediatric health check-up visit due to the two main reasons: lack of time and lack of trained health care professionals to perform the ASD screening. Standard ASD assessment procedure might be rather lengthy and include the use of a specific ASD evaluation tool combined with a structured interview with parents/caregivers (Miller 2024). Thereby, the idea of routine screening for ASD during well-child visits is generally not supported by healthcare providers, who feel challenged in balancing parental concerns, gathering relevant information from parents and providing recommendations regarding health guidelines within a limited time frame. Thus, the lack of time was found to be a significant barrier to implementing routine ASD screening in well-child visits. (Bivarchi et al. 2021.)

Comorbidities might also be on the way to an early ASD recognition. Other conditions resembling ASD, for example, ADHD, might challenge autism identification and initially lead to a wrong diagnosis (Miller 2024).

It also worth noticing, that normal child development allows for deviations, which might mean different rate and different way of reaching the key developmental milestones. Thus, health care professionals and parents/caregivers sometimes tend to lean towards the possibility of individual developmental features first, before exploring the chances of any other reasons for concerns, which might delay the ASD evaluation and diagnosis. (Miller 2024.) In some cases, parental concerns are dismissed by healthcare professionals, who fail to provide immediate referrals for ASD screening, resulting in a noticeable delay in ASD diagnosis (Bivarchi et al. 2021).

According to the study of Bivarchi et al. (2021), social stigma might be another barrier to the early ASD evaluation and diagnosis. Parents and caregivers are sometimes reluctant to admit and accept their child's developmental concerns or try to ignore and hide the symptoms out of fear of being rejected by the community. Developmental abnormalities might be seen as something embarrassing, leading to the parents feeling uncomfortable and unwilling to disclose and discuss their concerns with health care professionals and other community members. Additionally to that, behavioural symptoms of ASD might be mistaken by other community members for the lack of discipline and poor parenting, which might also contribute to the struggling of the family, rejection and isolation. (Bivarchi et al. 2021.)

2.3 Importance of Early Autism Diagnosis

Early diagnosis of autism allows for early receiving of necessary treatment which is widely recognized to be greatly beneficial for the children who are affected by the condition. Early accurate diagnosis is not only beneficial in the individual's childhood but will have a positive impact on their whole life, leading to increased probability of successful adaptive, personal and social growth, resulting in satisfying level of independent functioning in adulthood. (Hus and Segal 2021: 3509-3529.)

It is considered that the earliest age when it is possible to make autism diagnosis is 18 to 24 months. At that age characteristic symptoms of ASD can be identified as differences to typical development as well as not being indications of any other developmental delay. (Zeidan, Fombonne, Scorah, Alaa, Durkin, Saxena, Yusuf, Shih and Elsabbagh 2022: 778-790.) However, most children affected by the condition receive the official diagnosis after age 3 (When do children usually show symptoms of autism? 2017).

Significance of early autism diagnosis is reflected in the recommendation of American Association of Pediatrics to have “all children be screened for ASD at ages 18 and 24 months, along with regular developmental surveillance. Toddlers and children should be referred for diagnostic evaluation when increased risk for developmental disorders (including ASD) is identified through screening and/or surveillance”. (Autism Spectrum Disorder 2023.)

Importance of early autism diagnosis was also assessed in a study conducted in National Autism Research Center of Israel between 2017 and 2019 by Nitzan Gabbay-Dizdar and colleagues. In the study, researchers have measured changes in core ASD symptoms over a 1–2-year period in 131 children diagnosed with the condition. The results have disclosed that children who were diagnosed before the age of 2.5 years were three times more likely to demonstrate significant improvements in social ASD symptoms in comparison to children diagnosed at later ages. These results confirm the importance of early autism diagnosis and treatment. Additionally, these results encourage screening for ASD before the age of 2.5 years to become universally adopted. (Gabbay-Dizdar, Ilan, Meiri, Faroy, Michaelovski, Flusser, Menashe, Koller, Zachor and Dinstein 2022: 1353-1363.)

2.4 Role of a Nurse in the Early Autism Diagnosis

Due to being primary health care providers, nurses, involved in routine pediatric health check-ups, are in a unique position of being in close contact with infants and young children as well as their care givers. Nurses will see the young child around 10 times in their first 2 years of life for routine pediatric health check-ups alone. (Reece, Johnson, Dunlap and Honargoher 2024: 104896.) That provides nurses with more opportunities to assess young children for the risk of ASD than any other professional (Dunlap 2019: 496-501).

Additionally, nurses have a regular opportunity to discuss health related aspects of an infant with their caregiver(s) (Dunlap 2019: 496-501). Caregivers are a significant source of information as they spend the most amount of time with the infant and are able to provide valuable perspective on the state of health of their child and raise concerns regarding their development (Snijder, Langerak, Kaijadoe, Buruma, Verschuur, Dietz, Buitelaar and Oosterling 2022: 3473-3485).

The fact that routine pediatric health check-ups happen on a consistent and repetitive, regular basis enables nurses to evaluate the dynamics of the development and health condition of the infant during a period of time to confirm or allay concerns regarding any abnormalities (Turner 2018: 347-353).

Thus, the role of a nurse in early detection of autism in infants during routine pediatric health check-ups is of a paramount importance, potentially making it possible to base concerns on the observations and information obtained by the nurse and proceed with further testing and diagnostic evaluation, ultimately possibly leading to the early autism diagnosis (Dunlap 2019: 496-501).

2.5 Significance of Studying of the Role of the Nurse in the Early Detection of ASD

Nurses, who are involved in routine pediatric health check-ups, have a potential to minimize the barriers of the early ASD diagnosis (Kerub et al. 2021: 1394, 1396). The role of the nurse in this situation is more multifaceted than it can first seem, having a possibility to positively impact not only the affected family (Weill et al. 2018: 24), but a community and society as a whole (Bivarchi et al. 2021).

Professional ASD related trainings, ideally received by all nurses, involved in routine pediatric health check-ups, can enhance their ASD knowledge and increase the capability of early ASD recognition, also in the presence of comorbidities. This will happen not only on individual level, but also on a team level, as the number of health care professionals, who have the necessary knowledge and skills, will be increased. (Kerub et al. 2021; Gilbert et al. 2023; Kilicaslan et al. 2024.)

Adequate ASD education, provided by the nurse to all families with young children, will not only lead to the parents/caregivers being able to pick up possible ASD sings early (Kerub et al. 2021), but also to the increased level of ASD awareness and understanding in the community. This might result in the decrease of social stigma, rejection and isolation of the affected families as well as stimulate those families to be more open about their concerns and seek medical help sooner, potentially resulting in earlier ASD diagnosis. (Bivarchi et al. 2021.)

An ASD aware and educated nurse, performing routine pediatric health check-ups, will ensure that any possible ASD signs in an infant will not be ignored by their pediatrician and necessary referrals for specific tests and check-ups will be received in a timely manner. This will minimize the chance of ignorance of parental concerns as well as procedural delays, leading to earlier ASD diagnosis. (Gilbert et al. 2023; Gore et al. 2024.)

In the opinion of the authors of this thesis, the role of the nurse in early detection of autism during routine pediatric health check-ups is currently not paid enough attention and there is likely a need for more research to cover the existing gaps in exploring the versatile and profound dimensions of this multi-level role.

3 Purpose, Aim and Research Questions

3.1 Purpose

With the above being said, the purpose of this study is to describe the role of a nurse in the early detection of autism in infants during routine health check-ups.

Another purpose set for this study is to describe the nursing tools and competencies that can positively affect the capability and sufficiency of a nurse in the early detection of autism in infants during regular health check-ups.

3.2 Aim

This thesis aims to expand the knowledge regarding the role and the capabilities of a nurse in the early detection of autism in infants during routine health check-ups, exploring the relevant tools and nursing competencies that could prove to be beneficial in the frame of the early ASD detection during routine pediatric health check-ups.

3.3 Research Questions

The two research questions that have been set up for this study are as follows:

1. What is the role of a nurse in early detection of autism in infants during routine health check-ups?

2. What are the competencies and tools that a nurse can benefit from in early detection of autism in infants during routine health check-ups?

4 Who Could Benefit from the Results of the Study

In the understanding of the authors of this thesis, the outcomes of the study would be beneficial for medical institutions that specialize in pediatric care in general and provide pediatric routine health check-ups in particular. The results of the study would make it possible to understand the importance of the role of a nurse in detection of early ASD symptoms. The outcomes of the study could also lead to putting more attention into evaluating the availability, quality and effectiveness of autism risk assessment performed by the nurses employed in these institutions and possibly lead to making necessary changes and/or taking additional actions (such as, for example, developing or adjusting the protocols for regular pediatric health check-ups and/or providing relevant education for the employed nurses).

In the opinion of the authors of this thesis, the results of the study could also be beneficial for the educational institutions having a nursing degree. The outcomes of the study would highlight the importance of relevant and sufficient nursing education related to ASD awareness and competence as well as make it possible for these educational institutions to evaluate the availability, quality and amount of the offered studies related to ASD and make necessary changes or adjustments.

5 Methodology and Methods

The authors of this thesis have conducted a descriptive literature review in order to gather information relevant to the two research questions aimed to be studied. According to Lau and Kuziemsky (2017), a descriptive literature review provides an extensive summary of existing research on a specific topic, presenting an overall perspective of the current extent of knowledge in the field by synthesizing a large range of research. This type of review produces structured overview without performing critical analysis or evaluation. Descriptive literature reviews aim to identify trends, pattern and gaps within the existing literature, that can form base for further research. (Lau and Kuziemsky 2017.) Three different electronic research databases were used to search and select the research studies on the topics of the role of the nurse in the early ASD detection during regular pediatric health check-ups as well as the competencies and the tools that a nurse can benefit from in the task of the early ASD detection during regular pediatric health check-ups.

5.1 Data Collection Method

A table of PICo (Table 1) was created by the authors of this thesis to help form the general direction of the search strategy in the database search process. The primary research studies that were aimed to be found, were expected to be focused on the nurses, involved in the early identification of ASD within the frame of routine pediatric health check-ups.

Table 1: PICo

P (Population)	Nurses
I (Interest)	Early Identification of Autism in Infants
Co (Context)	Routine Pediatric Health Check-Ups

5.2 Data Search and Selection

5.2.1 Inclusion and Exclusion Criteria

Certain inclusion and exclusion criteria, presented in Table 2, were incorporated in the study search in order to meet the necessary search criteria.

Table 2: Inclusion and Exclusion Criteria

Inclusion	Exclusion	Rationale
English Language	Other Languages	English Language Used by Researchers
Years 2014 - 2024	Before 2014	Finding Latest Information

Primary Studies	Reviews and other non-primary studies	Focus on Writing Descriptive Literature Review based on Information from Reliable Sources
Articles Related to Infants Aged 0-3	Articles Related to Children older than 3 years	Focus on the Early ASD Detection in the Age Gap 0 – 3 years
Qualitative Studies	Quantitative Studies	Methodology Difference
Articles Related to Routine Health Check-Ups	Articles Related to Other Settings	Focus on the frame of routine pediatric health check-up
Articles Within the Scope of Nursing	Articles Related to Other Medical Professions	Focus on the role of the nurse and nursing competencies/tools

5.2.2 Database Search

Three reliable research databases were utilized in the study search: CINAHL, PUBMED and MEDLINE. A university informatician was consulted at the beginning stage of the database search process to assist in the forming of the correct and relevant search sentences. A search record table (Table 3) was created by the authors of the thesis in order to keep record of every search conducted. The search record table was filled by entering the information regarding the database, the date, the limiters and the search sentence(s) used as well as the number of hits and selected studies.

Table 3: Database Search Record Table

DATABASE AND DATE	SEARCH TERMS	LIMITERS	NUMBER OF HITS	SELECTED BASED ON TITLE	SELECTED BASED ON ABSTRACT	SELECTED BASED ON WHOLE TEXT
CINAHL						
20.09.2024	nurs* AND early AND autism	2014-2024	76	18	9	5
23.09.2024	nurse AND “early detection” AND autism	2014-2024	8	4	2	
23.09.2024	well-child AND autism	2014-2024	51	10	7	1
29.09.2024	"Pediatric nursing" AND autism AND "early signs"	2014-2024	2	2	1	
29.09.2024	(Maternal and Child Health Nurs*” OR MCHN OR ped* nurs*) AND Autism	2014-2024	49	13	5	3
PUBMED						
20.09.2024	nurs* AND early AND autism	2014-2024	262	5	3	3
22.09.2024	tools AND autism		83	11	5	

	AND infants	2024-2024				
23.09.2024	nurs* AND early AND autism		268	27	6	
		2014-2024				
23.09.2024	nurse AND early AND autism		66	14	10	
23.09.2024	well-child AND autism	2014-2024	82	16	10	
		2014-2024				
MEDLINE						
21.09.2024	nurs* AND early AND autism	2014-2024	258	30	14	
21.09.2024	nurse AND “early detection” AND autism	2014-2024	27	4	2	
27.09.2024	nurse AND early AND autism		71	69	10	1
		2014-2024				
23.09.2024	well-child AND autism		77	20		
		2014-2024				
16.09.2024			135	21	12	1

27.09.2023	nurse AND autism AND diagnos* nurs* AND screen AND autism	2014-2024	31	4	3	1
29.09.2024	(“Maternal and Child Health Nurs*” OR MCHN OR “ped* nurs*”) AND Autism	2014-2024 2014-2024	130	8	4	1

5.2.3 Prisma Flow Chart

A graphical overview in the form of Prisma Flow Chart (Figure 1) was created by the authors of this thesis to reflect the four stages of the process of selection of the research studies. The number and origine of the initially selected studies (total number of 1374) as well as the number of the excluded studies together with the brief rationale for the exclusion at each phase were also indicated in the Prisma Flow Chart.

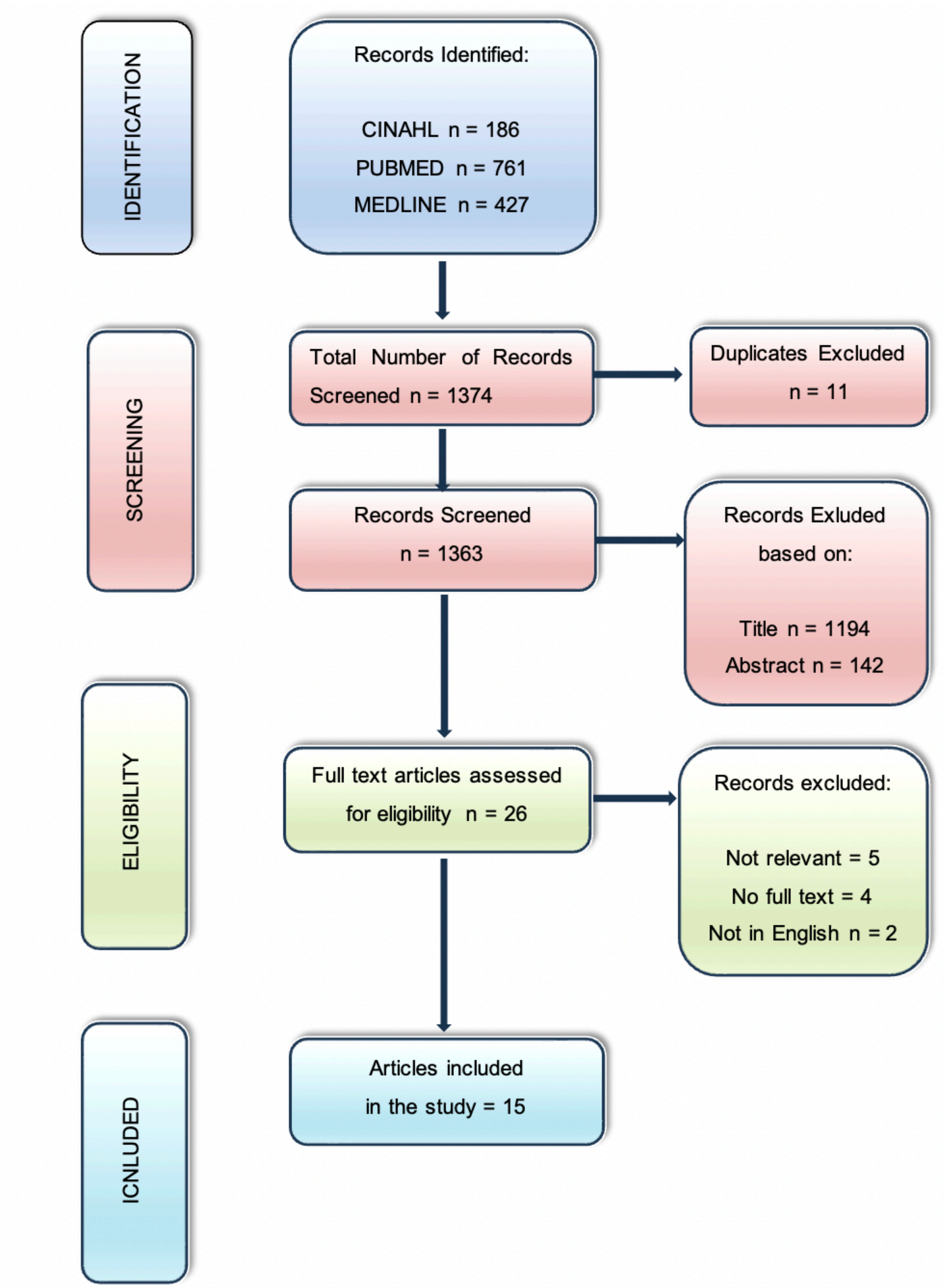

Figure 1: Prisma Flow Chart

5.3 Table of Selected Articles

A table of the chosen articles with the total number of 15 presented in Table 4 (see Appendix 1) was compiled by the authors of this thesis after a thorough and meticulous database search was completed. The final selection of the 15 research studies was based on the inclusion and exclusion criteria discussed priorly (see Table 2).

6 Ethics and Validity

6.1 Ethics

Ethics in research is a fundamental foundation of academic writing. The National Institute of Health Science defines ethics as "norms for conduct that distinguish between acceptable and non-acceptable behavior". (Patino and Ferreira 2018: 183.)

Research is the new knowledge obtained through scientific study, thorough observation, analysis, and examination of scientific articles (All European Academies 2023).

The thesis process started with systematic observation and guidelines based on the code of European ethical guidelines (European University Institute 2022).

The approach used in this thesis is inductive content analysis and narrative synthesis. The integrity of the research is crucial to maintaining the quality and trustworthiness of the research outcomes as it is the basic responsibility while conducting scientific research (All European Academies 2023).

The focus is on the criteria for proper research principles defined by the European Research Council to maximize its quality and reliability (European University Institute 2022).

The retrieval of the studies, collection of relevant information, and use of digitalization are based and regulated according to the European Code of Conduct for Research Integrity (All European Academies 2023).

The major ethical guideline for this reach is based on three components: Integrity, transparency, and accountability (All European Academies 2023).

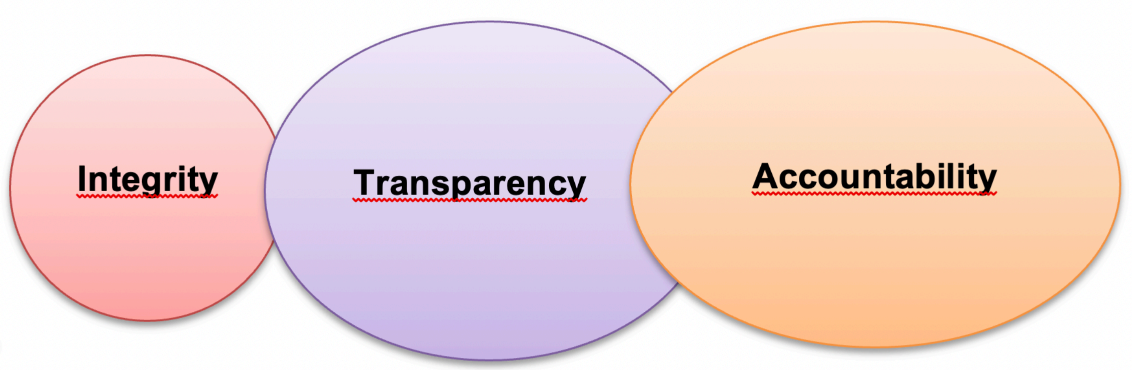

Figure 2: Ethical Guidelines

Good research practices are carried out based on fundamental principles of research integrity. It guides participants instructors as well as organizations in their work as well as their relationship with the practical, intellectual, and ethical norms. (All European Academies 2023.)

According to The European Code of Ethics in Academic Research (European University Institute 2022), good research is based on such factors as reliability, honesty, respect, and accountability. Reliability ensures that the quality of the work is reflected in the design, methodology, and execution of the research work from the beginning to the final stage of work. Honesty is one of the integral elements counted in ethics. It should be reflected in developing, understanding, communicating, and reporting the research outcomes without any prejudice. The aspect of respect in the research work contributes to the integrity of the research and is reflected in the presence of mutual respect between the research colleagues, research participants, and towards research environment. The authors of the research should be accountable from the beginning of the planning phase until the publication, thus demonstrating the aspect of accountability in the research work. (European University Institute 2022.)

According to the Code of Ethics in Academic Research (European University Institute 2022), research misconduct is strictly examined in the academic work of research. Fabrication of the data and information may result in disqualification of the research. Giving falsified information, manipulation of data, and images, and wrong interpretation of the obtained sources are also considered research misconduct. Plagiarism is strictly forbidden in academic research. Producing the knowledge without referencing the origin of the source is considered plagiarism. (European University Institute 2022.)

The authors of this research are accountable for the publication and research work done. It is expected that the authors are solely responsible for the quality and credibility of the research work. The researcher should engage sufficiently during a research process to produce quality academic research. (All European Academies 2023.)

Fairness and trustworthiness of the conducted research are equally important to produce reliable new knowledge for the targeted readers. The researchers should independently work on the research topic without any prejudice, or bias regardless of the demographic environment and context of politics. (European University Institute 2022.)

Teamwork, collaboration among the research participants, and good communication are vital to enhancing the quality of work in academic research, so these aspects of ethical norms should be considered while conducting this research (All European Academies 2023).

6.2 Validity

Concept of validity refers to the ability of the measurement tool to measure exactly what it is proposes to measure (Chetwynd 2022: 392-396). Selection of appropriate instruments that provide valid and reliable measures will maximize the possibility of achieving trustful and reliable knowledge as the result of the research. It is essential, however, for the researcher to understand what tools need to be chosen as the quality of information and knowledge provided by them reflects their psychometric properties. (Souza, Alexandre and Guirardello 2017: 649-659.)

There are several types of validity in relation to research work, with the three main ones being content validity, criterion validity and construct validity. Content validity refers to the degree in which the construct that is being measured is adequately reflected by the instrument content, whereas criterion validity refers to the relation between the score of a tool and an external widely accepted criterion owning same characteristics as the assessment tool. Construct validity, in turn, reflects the degree in which the construct that is being measured is represented by the group of variables. (Souza et al. 2017: 649-659.)

When assessing validity of a literature review, rigorous use of priorly established accurate measurements is the best way to act. In order for the validity of the research to be assessed, sufficient amount of information needs to be provided by the researcher when performing critical analysis of the work of other authors. (Chetwynd 2022: 392-396.)

With regard to this research, validity is ensured by multiple factors, with the first one being the fact that the process of writing of the thesis has been carried out and completed by three researchers. Thus, all stages and phases of the process were processed and discussed by three individuals, minimizing the possibility for errors, that include, but are not limited to: bias, error in implementation techniques, unintentional omitting of or unnecessary inclusion of information or failure to maintain within the structure of the literature review writing process.

The second factor that contributes to the validity aspect of this thesis it the use of only the primary studies, which were found in reliable research databases as well as were confirmed to be based on the agreed inclusion and exclusion criteria. Those studies were thoroughly assessed by the three researchers, with the final selections being made after thorough discussion and mutual agreement. This triple assessment and evaluation processes increased the possibility of the selected studies being suitable for the research in terms of relating to the thesis topic and answering the two research questions set by the researchers. Additionally, an experienced and competent supervisor assigned by Metropolia UAS provided necessary advice and guidance for the researchers, which set ground to complying with the correct literature review writing process, thus also making a significant input into the validity aspect of this thesis

7 Timetable

Table 5: Phases of Thesis Writing Process

Thesis Planning 20 August 2024 – 7 October 2024	Selecting the Research Topic Defying the Objective, Aim, Purpose Formulating Research Questions Validity Check-Up Article Selection Making a Research Proposal

Thesis Execution 8 October 2024 – 8 November 2024	Analysis and Synthesis of Selected Articles
Thesis Completion 8 November 2024 – 25 May 2025	Concluding and Submitting of the Synthesized Report

8 Data Analysis Method

Qualitative inductive content analysis was conducted by the authors of this thesis for the purpose of analyzing the information contained by the 15 selected research studies. Qualitative inductive content analysis is also often called “interpretive content analysis” or “inductive content analysis” without the use of the word “qualitative” and, regardless of the differences in terminology, means the inductive process involving iterative coding. The codes that are used to characterize the data are developed by the researcher during the process of coding, emerging from the data set itself, without being based on the pre-existing concepts and previous research. (Vears and Gillam 2022: 113.) The iterative nature of the coding process means repeatedly coding each document multiple times, with more refined iterations each time. The new aspects are being identified continuously, resulting from the increasing number of the documents being analyzed, leading the researcher to constantly add to and adapt the list of codes throughout the analysis process. (Vears and Gillam 2022: 113-114.)

As described in the same article of Vears and Gillam (2022), the process of the inductive content analysis begins with the thorough reading through and familiarizing oneself with the document, followed by identifying the meaningful fragments of text (a type of content relevant to the research question), which can be referred to as “meaning units”. Subsequently, it is essential to have a closer look at the meaning units and break them into smaller parts, making it possible to identify the various ideas it contains, thus creating subcategories. Next step is refining the subcategories, noting, for example, which of them should remain as separate subcategories and which may be collapsed into one due to being similar or if any of the refined subcategories need further specification due to still being too vague. The final phase in the process of the inductive content analysis is bringing the categories and subcategories together in a way that will offer an overall meaning, demonstrating how different content categories relate to each other, thus creating the interpretation of the phenomenon, which is being investigated and producing the answer to the research question. (Vears and Gillam 2022: 117-124.)

Two separate inductive content analysis processes were conducted in order to explore and answer the two research questions set for this thesis:

1. What is the role of a nurse in early detection of autism in infants during routine health check-ups?

2. What are the competencies and tools that a nurse can benefit from in early detection of autism in infants during routine health check-ups?

Each of the 15 selected studies was thoroughly read through by each of the three authors of this thesis, identifying the meaning units - the fragments of the text containing the information relevant either to the 1st or to the 2nd research question. Furthermore, each meaning unit was a subject to undergo the process of coding and subsequent phases of the inductive content analysis (Vears and Gillam 2022: 117-124), ultimately leading to a final stage, where different categories and subcategories were brought together in way that allowed to demonstrate the way how they relate to each other as well as being directly linked to and offering the answer to each of the two research questions separately.

Therefore, all the information relevant to the 1st as well as to the 2nd research question was thoroughly retrieved from the selected studies and the relevance of their contents to the 1st and to the 2nd research question was visually laid out through the use of the meaning units, codes, subcategories, generic categories and main categories. This process is thoroughly presented in Table 6 for the research question number 1 (see Appendix 2) and Table 7 for the research question number 2 (see Appendix 3).

The brief examples of the Table 6 and Table 7 are as follows:

Research Question 1: What is the role of a nurse in early detection of autism in infants during routine health check-ups? (main category: **Role**)

Meaning Unit	Code	Subcategory	Generic Category	Main category
It is important that nurses not dismiss any parental concern related to child development that could be attributed to ASD (art.1, p.46)	Consideration of parents/caretakers' concerns in ASD risk assessment of an infant	Addressing parental concerns	Attendance to Parental Concerns	Role
Awareness of evidence-based recommendations for ASD screening can help nurses **advocate for patients** (art.1, p.47)	Awareness of ASD screening recommendations helps nurses to **advocate for their patients**	Awareness of best practices is essential in **nursing advocacy**	Nursing Advocacy	Role
The AAP recommends that clinicians perform developmental screening using a validated tool during well-child visits conducted at nine, 18, and 24 or 30 months of age, noting any subtle red flags in infants who have a sibling with ASD (art. 1, p.42)	Developmental screening recommendations	Screening Practices	Identification of ASD	Role

Figure 3: Table 6. Analysis of the Meaning Units (Research Question Number 1)

Research Question 2: What are the competencies and tools that a nurse can benefit from in early detection of autism in infants during routine health check-ups? (main category: **Competencies / Tools**)

Meaning Unit	Code	Subcategory	Generic Category	Main Category
Awareness of evidence-based recommendations for ASD screening can help nurses advocate for patients with ASD (art.1, p.47)	**Awareness of ASD screening recommendations** helps nurses to advocate for their patients	**Awareness of best practices** is essential in nursing advocacy	Professional Competence	Tools / Competencies
Absolute Indications for ASD Diagnostic Evaluation Referral15, 46 Behavior Indicator Referral Time Frame No gesturing (waving bye-bye and pointing) By 12 months No babbling By 12 months No single words (excluding echolalia or labeling) By 16 months No spontaneous two-word phrases (excluding echolalia) By 24 months Any loss of language or social skills (regression) Any age((art.1, p.46)	Nurses should have knowledge of absolute ASD indicators at different ages in early childhood	Knowledge of ASD indicators in early childhood	Knowledge	Tools / Competencies
Contrary to popular belief, ASD can be neither diagnosed nor excluded through having a simple exchange with a child (art.1, p. 44)	Understanding limitations of a simple exchange in identifying ASD	Knowledge of ASD identification limitations	Knowledge	Tools / Competencies
Over 90% (n = 325) of MCH nurses who completed the training satisfaction survey agreed or strongly agreed with statements that the training	Nurses have positive feedback on the training received in early autism identification and using	Professional training in early autism identification and use of a specific ASD screening tool.	Professional Training	Tools / Competencies

Figure 4: Table 7. Analysis of the Meaning Units (Research Question Number 2

9 Results

After conducting the qualitative inductive content analysis of the contents of the selected articles (total number of 15), the authors of this thesis were able to create a compilation of outcomes with relation to the 1st as well as to the 2nd research question.

9.1 The role of a nurse in early detection of autism in infants during routine health check-ups

9.1.1 Attendance to Parental Concerns

Parental concerns may play a crucial role in identifying ASD in an infant. Parents/caregivers spent most of the time with the child, thus having the maximum chance of noticing any abnormalities in various situations. In many cases, it is the parents/caregivers who initiate the identification of developmental disorders by expressing awareness, concerns and acceptance regarding their child's health problems (Dunlap and Filipek 2020: 987). Thereby, parental concerns need to be thoroughly addressed, rather than dismissed or overlooked in favour of the assessment agenda (Halpin 2016: 321). Similar considerations were presented in the study of Dunlap and Filipek (2020), with the addition of noting that parental reporting of ASD concerns and diagnostic pursuit may be deterred or influenced by things like race or denial and grief from the side of the parents/caregivers.

The aspect of parental concerns, pointing out the initial ASD symptoms, was seen as a possible ASD indicator especially with relation to the early ASD detection, as was reported in the study of Arastoo et al. (2020).

9.1.2 Nursing Advocacy

The nurses have expressed perceiving themselves as individuals, who are guided by ideology and values in their profession, being representatives and defenders of the population, preventing the weak members of society becoming weaker. The nursing advocacy also gets reflected in promoting treatment and minimizing the bureaucracy involved in obtaining it, which results from the nurses' knowledge about and access to various resources in the community. (Kerub et al. 2021: 1394, 1396.) The awareness of the evidence-based recommendations for ASD screening was also seen to be essential in nursing advocacy (Dunlap and Filipek 2020: 47).

9.1.3 Identification of ASD

The nurses see themselves as medical professionals who play an important role in identifying the children with developmental concerns and deciding on further actions (Kerub et al. 2021: 1394). The nurses perform the child's behavioural assessment (Barbaro et al. 2022: 5) as well as risk assessment analysis and risk diagnosis (Kilicaslan, Karatas, Kulu and Solmaz 2024: 829), ensuring that the ASD risk evaluation is done systematically to allow for the timely detection of any abnormalities (Barbaro et al. 2022: 6).

In some places of the world the nurses are given the exact time frame regarding the specific age of their patients when the ASD evaluation is recommended to be conducted. The study of Weill, Zavodny and Souders (2018) refers to the American Association of Pediatrics (AAP), which recommends every child to be screened for ASD at the ages of 18 and 24 months. Similar time frame, the 2nd year of life, was also referred to in the article of Barbaro et al. (2022), with the addition of reporting the nurses using multiple checklists in performing the ASD evaluation.

Referring to the recommendations of the AAP was also presented in the article of Dunlap and Filipek (2020), with the difference of mentioning the conduction of the ASD specific screening, using a validated tool, at the age of 18 months, followed by the screening at 24 or 30 months, with paying special attention to the infants who have a sibling diagnosed with ASD. Further recommendations of the AAP, referred to in the same study, also included conducting the ASD specific screening, using a validated tool, at any subsequent visit in which concerns about ASD are raised. The nurses in that same study were reported to be instructed to conduct the ASD evaluation of their patients in the cases when a negative screen does not dissolve the concerns of the primary healthcare provider or the parents/guardians; if there are multiple ASD risk factors and if the screen yielded positive results. In the latter case, it is strongly recommended to have the patients undergo a formal ASD evaluation.

However, there currently seems to be no worldwide protocol as to at what exact age the specific ASD screening should be conducted and the nurses are rather given general instructions, without mentioning of any specific patient age. Thus, in the study of Reece, Johnson, Dunlap and Honargoher (2024) it was reported that the nurses were instructed to complete systematic assessment and observation (comparing results to the results obtained in previous visits), aiming to notice any possible subtle nuances that could potentially indicate developmental problems such as ASD. Reviewing of family history, and its influence on typical development are also advised to be considered in the assessment.

In some countries, such as Israel, there is only one sole institution that deals with ASD identification: the Maternal and Child Health Centres (MCHCs). The MCHCs are also the institution where the infants and children are brought for their routine health check-ups. Thus, the employees of the MCHCs, the maternal and child health nurses (MCHNs) are in a unique position, both beneficial (due to regular observations of the child’s development from birth) and highly responsible (there is no one else who potentially could initially identify ASD). This creates a special need for the MCHNs to be adequately trained in ASD assessment, being able to offer the doctors valuable insight on children’s health status. (Kerub et al. 2021: 1394.) Similar findings were presented in the article of Arastoo et al. (2020), which described the benefit of having adequately trained nurses acting as reliable ASD evaluators, assisting doctors in making an ASD diagnosis more easily, thus leading to earlier intervention. The high level of responsibility of the nursing work in this position was also agreed on in the same study, stating that such nurses can raise awareness of developmental concerns (incl. ASD) earlier, thus promoting earlier identification of ASD.

The nurses are also often entrusted by the doctors to perform less urgent tasks, such as conducting ASD assessments, while the doctors are busy dealing with emergencies and “life or death issues”, which require immediate medical attention, as was described in the study of Kerub et al. (2021).

In some places, nurses were seen as the second line in ASD identification, with the PEDS Online screening tool being the first. Children, who performed poorly in PEDS Online screening were then seen evaluated by the nurses. (Glascoe 2015: 51.) Occasionally, nurses proceeded to conduct the ASD evaluation not only individually, but also in a group setting, such as the functioning of the child as a member of their nursery school group. In case if the ASD re-evaluation was seen to be necessary, the nurses made all the needed arrangements. (Horiuchi et al. 2023: 988-989.)

9.1.4 Leadership/Decision Making

Being a nurse is a responsible profession, which, among other qualities, includes the aspect of leadership and decision-making. This was presented in the article of Reece et al. (2024: 2), which describes nurses being in a position to consider all factors to support parents and caregivers, determining further need for care and best course of action. Similar findings were presented in the study of Horiuchi et al. (2023), where the nurses were described as characters playing main role in well-child visits, deciding on follow-up strategies.

The aspect of leadership also gets reflected in the efforts made by the nurse to create a calm and stress-free environment within the nurse-patient relationship, promoting a positive routine that all the parties involved would follow and the whole patient care process and coordinating care would be based on. This would allow for the most trustful, efficient and productive collaboration between families and medical professionals. (Weill et al. 2018: 24).

Another component of leadership in nursing was also described in the study of Halpin (2016). The nurses, being in a unique role and position within the child's health team, have the potential to lead the process of assessment and diagnosis in a way that will positively shape parents' experiences. This undoubtedly is an important factor, largely contributing to the creating of positive and calm routine and environment that the care process ideally should be based on.

Leadership and decision-making in nursing, however, is not without its challenges. The study of Gilbert, Gore, Hawke and Barbaro (2023) describes situations, where the nurses experienced difficulties in decision-making aimed on directing their patients to accessing diagnosis and support. Nurses in situations like that were in a position of making a choice whether to make an appropriate referral (e.g., for diagnosis) that might not be received well by families or referring families to a service that they were more likely to accept.

The findings of the article of Horiuchi et al. (2023) also reported occasional insufficiencies in decision-making and follow-up strategy planning in nursing, which might result in some families not seeing a doctor, although it is expected that all families consult with a medical doctor to have their child screened for any developmental concerns.

9.1.5 Promoting the Receival of the ASD Diagnosis

The importance of promoting the receival of the ASD diagnosis through early identification of children was emphasized in the article of Gore, Gilbert, Hawke and Barbaro (2024: 2), which underlines that early identification of children with a high likelihood of autism can lead to referral for diagnostic services and access to early supports. According to the study of Gilbert et al. (2023), the nurses actively promote further progress in the process of receiving the official ASD diagnosis as well as support and services. The same study describes the nurses having a Referral Pathways poster to help with this issue. This was designed to be displayed in the nurses' rooms, to support the nurse workforce and parents/caregivers to understand how best to pursue further diagnostic assessment.

9.1.6 Linking Patients with Services/Treatments

This aspect of a role of a nurse in early autism identifiction during routine pediatric health check-ups was presented in seven of the chosen 15 studies. The study of Kerub et al. (2021) describes the nurses stating that they aim to identify the children with developmental delays and try to link them up with the best possible caregivers and treatments in the field. The nurses sometimes use visual aids (like Referral Pathways poster) to help present the pathway of care process to parents/caregivers (Gilbert et al. 2023: 5).

As it was reported in the article of Reece et al. (2024: 3), the nurses constantly used relevant working techniques (e.g. early ASD detection practices), aimed to link patients to necessary services sooner. The same study also highlighted the importance of timely connecting of young patients with the necessary services and treatments with some examples of what those could be, such as occupational therapy, presented in the study of Weill et al. (2018). In order to connect the patients with the needed services/treatments, the nurses need to act as mediators between the two, as was described in the study of Reece et al. (2024). The position of the mediator was also described in a little more depth in the article of Kerub et al. (2021), stating that the nurses, having the knowledge about and access to various resources in the community, help promote treatment and minimize the bureaucracy involved in its obtaining.

9.1.7 Communication with/Education of Parents/Caregivers

A nurse has an important role in communicating with and educating the parents/caregivers, largely due to the reason that a nurse is expected by parents/caregivers to be the one to turn to when seeking advice/expressing concerns regarding child-rearing. Alongside educating the parents regarding ASD, nurses are also expected to provide general guidance regarding child's normal development as was expressed by parents/caregivers. (Horiuchi et al. 2023: 990.)

The aspect of communication and education, fulfilled by a nurse within the framework of the early ASD identification, consists of several components. A nurse is expected to provide the parents/caregivers with information and necessary advice as well as educate them on various issues related to ASD (Kerub et al. 2021: 1394, 1397). It is also expected that the nurse will increase parental awareness of ASD (Arastoo et al. 2020: 5). Through efficient communication with the parents/caretakers, the nurses aim to raise relevant concerns and initiate ASD evaluation process (Horiuchi et al. 2023: 988).

In some situations, as it was described in the study of Glascoe (2015), the nurses were the ones to assist the parents/caregivers in tasks related to ASD evaluation, such as, for example, filling an online ASD surveillance tool or paper forms/charts, asking for additional clarifications and offering interviews if forms were incomplete as well as gathering vital health information.

The aspect of communicating with parents/caregivers was also presented in the study of Horiuchi et al. (2023) by mentioning the efforts made by nurses to maintain a good relationship with parents/caregivers in order for the nurses to efficiently perform their duties.

Communicating with the parents/caregivers also included aspects not directly related to ASD, such as the use of language advantage of the nurses in providing translation needed by non-English speaking patients when communicating with families (Glascoe 2015: 50).

Two opposite points of view were mentioned regarding the matter of nurses sharing relevant and important ASD related information during the communication with the parents/caregivers:

The study of Horiuchi et al. (2023) described a situation, where, in particular cases, nurses can intentionally refrain from discussing the early ASD signs noticed in the infant. This can happen in the situation where the parents/caregivers are not concerned, are unaware of or reluctant to accept that there are some concerns about the health condition of their infant. However, it has been mentioned in the same study, that, in the situation where the parents/caregivers initiate the discussion of ASD with relation to their infant, the nurses are eager to actively participate in the discussion as well as start planning of any further necessary actions. It is solely the initiation of such a discussion that is aimed to be avoided by the nurses. The nurses are, however, ready to step in with guidance and advice whenever parents will openly indicate their wish to proceed with this issue.

The opposite point of view, however, states, that it is assumed by the nurses themselves, that, having specific information and practical expertise around autism, they have a moral and professional duty to share it with parents, expressing any concerns that they might have (Halpin 2016: 320).

9.1.8 Educating Coworkers

It was noticed in the research of Kerub et al. (2021), that nurses who become proficient in the use of ASD screening tools improve their diagnostic abilities and can help teach other nurses how to use them as well. This would help multiple members of the work team become more skillful and proficient in identifying early autism signs in infants, leading to a larger coverage range, better overall success rate and ultimately larger number of children receiving necessary medical attention and further help earlier in life.

9.1.9 Creating the Network of Connections Between Institutions

It was noticed in the study of Kerub et al. (2021), that ASD specialized nurses aim to create a network of connections between various institutions in their community to make it easier for sharing information and arranging/coordinating patient care. This can minimize the unnecessary delays and obstacles as well as facilitate and accelerate the process of getting the patients connected to necessary treatments, services and specialists, ultimately leading to the overall better outcome for the children and families.

9.1.10 Nursing Accessibility

In some situations, as it was mentioned in the research of Kerub et al. (2021), the healthcare system, presented by public or health care nurses, needs to practice proactive approach in delivering service to community members. The nurses would not wait until (and if) young children would be brought to them by their parents/caregivers. Instead, nurses would be the first ones to reach out and gain access to all the families with small children in the community, identifying developmental problems in children when parents are not able to do that and there is no one else who potentially could do it (e.g. pre-school educators).

An additional benefit, contributing into the increased likelihood of nursing accessibility in particular communities such as a Bedouin community in Israel, as was found in the study of Kerub et al. (2021), comes from a combination of multiple components. The main component would be the fact that the majority of these nurses originate from the same community, which increases the acceptability of the nurse by the community members as well as makes it easier to function on multiple levels when working with/within the community.

9.2 The competencies and tools that a nurse can benefit from in the early detection of autism in infants during a routine health check-up

9.2.1 Professional Competence

Professional competence of the nurses, involved in the early ASD identification, was seen to be consisting of multiple aspects. These include the awareness of evidence-based recommendations for ASD screening (Dunlap and Filipek 2020: 47) as well as consistency in using those practices (Reece et al. 2024: 3). Professional competence also includes active integration and use of newly acquired knowledge and skills in work practice (Gilbert et al. 2023: 1) and ability to differentiate between similar looking symptoms, that might or might not originate from the ASD (Weill et al. 2018: 23). Professional competence was also seen as being a reliable coordinator of the whole multidimensional patient care process, providing the patient with the necessary information and connections as well as advocating for the patient rights (Kerub et al. 2021: 1394, 1396). Professional competence was also thought to include the aspect of providing of holistic care to patients and families for as long as it is considered necessary (Halpin 2016: 320-322).

Apart from having the sufficient level of the practical expertise (Gore et al. 2024: 9), professional nursing competence in the frame of early ASD identification is also considered to be the initiative of the nurses to constantly improve and develop their professional capabilities as well as understanding how this can be achieved (Kerub, Haas, Meiri, Davidovitch and Menashe 2020: 1557). It is also the ability to function professionally and independently in the operational space, fulfilling the diverse and highly responsible duties (Kerub et al. 2021: 1394-1395).

9.2.2 Knowledge

Knowledge was seen to be an important aspect in the early identification of ASD. It was reported that the nurses must have general knowledge of typical developmental milestones of a child as well as any deviations from the normal range, which could potentially indicate ASD (Weill et al. 2018: 23). Similar results were presented in the studies of Kerub et al. (2021) and Kilicaslan et al. (2024). Nurses need to also have the knowledge of absolute ASD indicators at different ages in early childhood (Dunlap and Filipek 2020: 46).

It was also considered to be beneficial for the nurses to have knowledge about conditions that are often seen tightly linked to ASD, so that more close attention would be paid to ASD identification in these cases (Weill et al. 2018: 26). Some examples of such conditions were presented in the same study and included: speech/language delay, microcephaly, seizures, congenital anomalies, dysmorphic features, family history of developmental disabilities, family history of psychiatric problems. It is important for the nurses to also know, however, that ASD can be neither diagnosed nor excluded through having a simple exchange with a child (Dunlap and Filipek 2020: 44). Knowledge of autism community resources was also seen to be beneficial for the nurses' level of confidence in performing the ASD related work tasks (Gore et al. 2024: 9).

The nurses, involved in the early ASD identification, need to aim at constantly enhancing and developing their knowledge of ASD related issues, which could be achieved first through the identification of excisting gaps in the level of ASD related knowledge among the nurses (Kilicaslan et al. 2024: 825, 830) and then through workshops and professional trainings (Gore et al. 2024: 1; Waddington et al. 2021: 5053).

9.2.3 Professional Training

Professional training was seen to be another important aspect in efficient early ASD identification and the need for it was described as well as expressed by the nurses in the study of Kerub et al. (2021). The need for adequate professional training of the nurses, involved with early ASD identification, was also reported in the studies of Kerub et al. (2020) and Arastoo et al. (2020). Many nurses in various regions of the world do receive professional trainings related to the early ASD identification, as was described in the studies of Kerub et al. (2020), Barbaro et al. (2022) and Gore et al. (2024). However, the lack of proper training related to ASD identification was reported by the nurses in the study of Horiuchi et al. (2023).

It was described in the study of Gilbert et al. (2023) that the majority of the nurses (over 90%), who completed the training satisfaction survey, agreed that priorly received professional training in early autism identification and using of the specific ADS screening tool (SACS-R) was highly beneficial and allowed for enhancement and improvement of their work practice. Similar results post training were presented in the study of Kilicaslan et al. (2024), with the addition of significant improvement of self-efficacy for identifying autism signs. Noticeable improvement in confidence in discussing ASD signs with parents post training was also reported in the study of Gore et al. (2024).

9.2.4 ASD Identification Tool(s)

One of the tools or competencies that a nurse can benefit from in early autism detection during routine pediatric health check is the use of ASD identification tool(s) as was described in several of the chosen studies. As was it reported in the study of Barbaro et al. (2022), a situation where the nurses use suitable developmental surveillance tools allows for achievement of high diagnostic accuracy, with 83% positive predictive value, ensuring that most referred children received appropriate support.

The nurses in the study of Kerub et al. (2021) have reported that they feel responsible for identifying each child who is at risk of ASD, but cannot do it without specific ASD identification tools, thus clearly expressing the importance and need of using such tools. The necessity for a standard measure for ASD was also presented in the study of Horiuchi et al. (2023), where the nurses reported experiencing difficulties in identifying children with developmental concerns without the use of a standardized screening method. Lack of ASD identification tools was seen to allow only the children exhibiting significant unusual behaviour (such as screaming or running) to be identified at well-child visits, omitting those with milder symptoms.

The nurses have expressed confidence in the fact that making specific screening for ASD routine will increase the number of identified individuals and help to bridge the gap in ASD identification, thus having supported the idea of using the specific ASD evaluation tools (Kerub et al. 2021: 1395). The nurses from the same study have also compared the results of ASD identification of young children achieved through global developmental screening (a brief general assessment focused on targeted skills) and through the use of ASD identification tools, that are specific to the disorder. As was mentioned in the study, the use of the ASD identification tools involves observations of the child from perspectives not available in the framework of global developmental screening, thus allowing for more reliable results in relation to the ASD identification.

The importance and benefit of using the ASD identification tools was supported in the study of Barbaro et al. (2022), where the nurses reported having being trained to use two specific tools during routine checkups, SACS-R (Social Attention and Communication, Revised), intended for use for ages 16 to 30 months, and SACS-PR (Social Attention and Communication-Preschool), designed to be used for ages 12 to 60 months. The study of Gore et al. (2024) demonstrates similar findings, describing the nurses being provided with SACS-R tool for early detection of social and communication differences. The nurses in both studies of Gilbert et al. (2023) and Barbaro et al. (2022) also reported confidently using the SACS-R on a constant basis, seeing it as effective and beneficial. However, the study of Waddington et al. (2021) described the overall perceived participants' acceptability of the SACS-R tool to significantly decrease from high level post-workshop to follow-up.

Similar findings were presented in the study of Arastoo et al. (2020), but only regarding the use of a different ASD identification tool, ADOS (Autism Diagnostic Observation Schedule), which also was found to be highly beneficial and producing reliable results.

The study of Kerub et al. (2020) has offered the description of two other ASD identification tools, M-CHAT/F (Modified Checklist for Autism in Toddlers with Follow-Up) and GDS (Griffiths Development Scale) that were used by nurses to assess developmental delays in toddlers aged 18–36 months. Same tools were compared with reporting of the M-CHAT/F as being superior to the GDS. I was also found that M-CHAT/F showed higher sensitivity in detecting toddlers with ASD (70.0%) compared to the GDS (50.0%). The combination of these tools was analyzed, stating that using both M-CHAT/F and GDS together made it 93.7% effective at spotting developmental delays, while still being 98% accurate. (Kerub et al. 2020: 1556, 1557.)

The nurses, involved in routine pediatric health check-ups, promoted the ASD identification by initiating the use of a specific ASD identification tool, PEDS Online (Parents' Evaluation of Developmental Status) by inviting the parents to or offering assistance in entering the responses into the online tool, as was described in the study of Glascoe (2015).

However, although according to the findings of the study of Arastoo et al. (2020) there is a low degree of disagreement between the classification of ASD by the ADOS tool and by experienced physicians, the study highlighted the importance of a comprehensive evaluation, given the potential for false positives and false negatives if the ADOS or a similar standardized assessment tool is used alone. Thus, the same study has suggested that any reliable ASD identification tool should not be used alone, but rather in a combination with other tools/sources to avoid false positive/negative results.

Additionally to the availability of multiple well-established ASD identification tools, new tools are constantly being developed, like the one described in the study of Reece et al. (2024), operating principle of which is based on eye tracking. Although the tool is not completely developed yet, it still provides clinicians with excellent quantitative data that can be used as a marker of developmental differences.

9.2.5 Use of Multiple Sources in the ASD Evaluation

The use of a combination of sources in the ASD identification was found more beneficial and reliable rather than the use of a single tool/source, albeit a reliable one. This statement was presented in the reaseach of Arastoo et al. (2020), highlighting the importance of considering both clinical impressions and use of a valid identification tool in ASD evaluation. Similar findings were described in the study of Weill et al. (2018), with the addition of the aspect of parental concerns, which also were seen to be an important component in the combination of sources in ASD identification. Correspondingly, parental concerns were also not seen as a sufficient and reliable source to use in ASD evaluation alone. Although an immediate response was advised with regard to the parental concerns, it was also suggested to use the source of parental concerns in the frame of a comprehensive evaluation that includes data from other sources, such as early childhood educators, a specialist’s evaluation and standardized evaluation tools. (Arastoo et al. 2020: 5.)

9.2.6 Confidence

Confidence was described as an important competency that a nurse would benefit from in early ASD identification in routine pediatric health check-ups. According to the study of Kerub et al. (2021), the nurses benefit greatly from sufficient level of confidence as they often work independently, performing highly responsible tasks.

However, the level of confidence of the nurse was found to be prone to fluctuations, as was described in the study of Waddington et al. (2021). One of the affecting factors was presented in the study and was seen to be the attendance of a specific workshop on identification of early ASD signs. The nurses were seen to experience a significant increase of confidence in ASD identification and discussing early signs with parents from pre- to post workshop with a subsequent significant decrease in the level of confidence post workshop to follow-up. However, the level of confidence remained higher than pre-workshop.

The study of Gore et al. (2024) has pointed out two factors, contributing to the increase of conifdence level in the nurses, involved in early ASD identification. Those factors were seen to be the knowledge of the available community resources related to the management of ASD in children, and professional training, which promoted the increase in confidence level when discussing the ASD signs with parents/caregivers.

Another factor, which could possibily affect the level of the ASD identification related confidence in the nurses, was described in the study of Horiuchi et al. (2023). The attitude of the parents/caregivers towards the identification of ASD in their child was seen to have potential to either support the nurses in their confidence to initiate discussion about ASD related issues or hinder the confidence of the nurses with relation to this matter.

However, it is not always that the nurses themselves feel that they have a sufficient level of confidence in identifying and discussing ASD related matters. As was presented in the same article of Horiuchi et al. (2023), the nurses, among other healthcare providers, expressed the lack of professional confidence in early identification of ASD and reported experiencing difficulties in identifying children with potential ASD at 18 months, reporting the need to wait to older age when ASD related behaviours became evident.

9.2.7 Stress Resilience

As it was found in the research of Kerub et al. (2021), stress resilience is an essential nursing competency. In certain places and facilities, public health nurses are involved in the early autism identification additionally to multitude of other working tasks related to the health of women, children and families. The nurses often work alone and make professional decisions independently. Performing of multiple heterogenous highly responsible duties as well as corresponding with expectations to meet particularly high standards requires the nurses to be calm, focused and stress resilient.

9.2.8 Cultural Competence

When working with some communities, such as Bedouin community in Israel, described in the study of Kerub et al. (2021), adequate cultural competence of a nurse is found to be crucial in terms of enabling a successful contact and productive cooperation between the nurse and the patients/families during the various stages and levels of the nursing care delivery process.

Cultural competence also might affect the nurse in choosing suitable ASD evaluation tools. In particular cases, as was described in the research of Arastoo et al. (2020), only the use of culturally appropriate ASD evaluation tools would allow for achieving reliable results.

9.2.9 Flexible Approach

The study of Horiuchi et al. (2023) described a situation, where in some cases, when ASD is suspected, it was not seen possible for the nurses to initiate the topic of autism and draw parental attention to existing concerns. Nurses felt that they could not voice the need of autism evaluation of the infant. In certain cultures and communities, this line of action is likely to cause parental discontent and reluctance to admit that there is a valid reason to be concerned about their child's health condition. Thus, there was a need for the nurses to be flexible in trying to find the best suitable way to direct parental attention to concerns. That way the nurses try to make the parent the initiator of ASD identification, which sometimes was seen by the nurses as the only way to make the problems get seen and enable proceeding with the ASD identification.

10 Discussion

Early identification of autism spectrum disorder (ASD) solely depends on parental involvements and engagements as well as nursing advocacy. Parents are the first line of contacts who are in a close interaction with their children considered to be the first one to observe the developmental irregularities which can be considered as a red flag for crucial starting point for diagnosis and further evaluation. Additionally, those concerns raised by the parents must be addressed with attention to enable early intervention. Sometimes, factors such as cultural influences, denial, emotional challenges could challenge their reporting (Dunlap and Filipek 2020; Halpin 2016).

Public health Nurses (PHNs) are endowed with an instrumental and influential role in assessing and identifying the developmental delays through behavioural assessments, risk analysis, and use of specialized screening tools. The screening protocols may differ geographically in different countries in a global viewpoint, however the guidelines such as APP recommended routine screenings at 18 and 24 months, supported by further assessments in line with the concerns arise

(Weill et al. 2018; Barbaro et al. 2022).The nurses get proper trainings, orientations and collaboration with professional doctors. Hence, the public health nurses can play a significant pivotal role in timely diagnosis and providing necessary nursing interventions (Kerub et al. 2024; Arastoo et al. 2020).

The nursing competence greatly relies on the professional competence, leadership and decision-making capabilities which are integrated to nursing practice. Public health nurses (PHNs) working in the related field assess various factors to guide families and concerned people towards effective care pathways, often taking principal roles during well-child visits to establish follow-up strategies (Reece et al. 2024; Horiuchi et al. 2023). Nurses who are trained with effective leadership demonstrate the good reflection in fostering stress-free environments, which facilitates trust, confidence and cooperation between families and healthcare providers (Weill et al. 2018). However, decision making is not easy, and it can be challenging when balancing professional recommendation and family preferences, with gaps in follow-up planning creating additional obstacles (Gilbert et al. 2023; Horiuchi et al. 2023).

While discussing the role of a nurse in early identification of autism spectrum disorder (ASD), nurses play a central role by enhancing their professional development and nursing competence promoting a sustainable collaboration across the institution. Trainings and education among the coworkers in using ASD screenings tools expands the diagnostic proficiency across the team which enables other steam member to identify early autism signs effectively leading to improve medical attention for concerned children. (Kerub et al. 2021).

Strengthening of the nursing competence and progress in professional development achieved through ASD education and ASD related professional trainings play a significant role in creating improvements in the aspects of self-efficacy and work confidence as well as the diagnostic capabilities of the nurse while using the tools such as SACS-R (Girlbert et al. 2023; Gore at al. 2024). However, there is a gap in availability as well as accessibility of professional ASD related nursing training, which emphasizes the need for additional standardized educational opportunities for the nurses (Horiuchi et al. 2023). The aspects of nursing confidence and competence greatly influence patient outcomes in terms of receival of the official ASD diagnosis. Those aspects are seen to be significantly enhanced by the ASD related professional nursing trainings as well as the fact of nurses' knowledge of the community resources (Kerub et al. 2021; Gore et al. 2024; Horiuchi et al. 2023).

There is a need to highlight the complexity as well as multiplicity of aspects of the role of the nurse in early ASD identification as well as to outline the need for the continuous focus of attention on education, collaboration and support regarding the input of nursing care into early detection of ASD in infants.

11 Conclusion

The results of this descriptive literature review revealed that the nurses play a significant and multifaceted role in the early detection of ASD in infants during regular health check-ups. The dimensions of the role of the nurse within the framework of this task include the detection of the developmental issues, considering parental concerns, and advocating for intervention at an early stage. This thesis study also brought to attention the necessity for ASD relevant professional nursing training, the use of evidence-based practices, and the use of standardized ASD screening tools to improve accuracy of diagnosis and allow for early referral to specialty care. Perhaps one of the most significant achievements of this study is the emphasis on understanding that the nurse is uniquely positioned as the entry point as well as the key figure withing the child's health assessment team, continuously and regularly being in close contact with the children and families as well as coordinating the whole process of care delivery.

Thus, the nurses are in the best position to observe and follow the dynamics of the child's development, interpret parental concerns, picking up on subtle signs of ASD that may or may not be easily detectable. This enables the nurses to effectively assist in the early identification of ASD by conducting thorough developmental check-ups and ensuring timely referrals. Despite the challenges such as insufficient amount of training in ASD, time limitations, and inconsistencies in screening practices, the nurses have a vital role in connecting early parental concerns to an eventual ASD diagnosis (Kerub et al. 2021; Dunlap and Filipek 2020).

The examined literature also highlights the importance of providing the nurses with extensive training programs on ASD issues that would improve their screening skills as well as increase the level of competence regarding the ASD aspects. It has been assumed that the nurses, being appropriately educated and applying the universal measures of ASD screening like the Social Attention and Communication Surveillance-Revised (SACS-R), are able to make a considerable input into the increase of the rates of early autism detection (Gilbert et al. 2023; Barbaro et al. 2022).

In addition, including the sufficient ASD training into the nursing educational programs has been found to enhance the aspects of professional competence, self-efficacy and confidence in discussing the ASD symptoms with the parents (Gore et al. 2024). There is a need for policy and institutional changes to help facilitate the detection of ASD early. Also, the collaboration between educators, policymakers, and clinicians can make routine ASD screenings an immutable component of the children's standard healthcare. Sufficient amount of evidence has been gathered to demonstrate that collaboration across the disciplines facilitates easier access to earlier help for the affected children. It also reduces the duration of the time period required to achieve the official ASD diagnosis, which results in better outcomes for children with ASD (Kilicaslan et al. 2024; Horiuchi et al. 2023).

For the future purposes, this study could use some recommendations for contributing towards the topics such as, for example, broadening the horizons of nursing-led ASD screening internationally. More studies need to be conducted to explore the ASD screening practices in diverse healthcare environments, including low-resource and developing countries, to identify differences in access to nursing-led screening initiatives.

Another topic that is likely to deserve more attention is examining the nurse-led ASD early screening programs. Early detection of autism is proved to be beneficial, however, more of the long-term research should verify how much the nursing care and assistance is effective for patient outcome when diagnosed with autism through early screening versus later diagnosis.

Developing the ASD screening tools also is seen by the authors of this thesis as an important contributing factor into the improvement of the ASD related nursing care as well as better patient outcome. In the future, the existing ASD tools could be refined as well as new and more advanced ones could be developed, benefitting the use of AI and technology to aid the nurses in pediatric assessments.

Lastly, this study highlights the need for further research in nursing care related to early ASD detection, studying the long-term effects of early autism detection programs from the nursing perspective as well as developing the measures to improve universal access to official autism assessment. By empowering the nurses with the ASD relevant awareness, necessary competencies and tools as well as appropriate working environment in their respective organizations, early ASD detection will be enhanced and secured within healthcare systems. This will increase the chance for better outcome for the ASD affected children and their families as well as general public and communities.

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Appendices

Appendix 1. Table 4: Summary of Selected Articles

Appendix 2. Table 6: Qualitative Inductive Content Analysis (Research Question nr. 1)

Appendix 3. Table 7: Qualitative Inductive Content Analysis (Research Question nr. 2)

Table 4: Summary of Selected Articles

Study	Aim	Sample	Research Design/Methods/Analysis	Major Findings	Limitations
1 Dunlap and Filipek 2020 USA	The study aimed at discussing ASD epidemiology, developmental surveillance, screening and diagnosis of early sign of ASD, to find out the early intervention nurses can take when children are suspected of ASD.	Data from a total of 816 school-age children who had intelligence quotient (IQ) scores above 70 and had been diagnosed with ASD by a trained clinician based on gold standard diagnostic measures and criteria outlined in the Diagnostic and Statistical	Cross-section analysis of the 2016 National Survey of Children's Health	Nearly one-third of reported ASD wandering cases are either fatal or require medical attention. The early intervention of ASD produces the best outcomes for nurses to take the possible future action and developmental surveillance and screening are the fundamental prerequisites for identifying ASD.	Interpretation are made only with available literature and data.
2 Gilbert *et al.* 2023 Switzerland	The study aimed at describing the training of maternal and child health nurses in early identification of autism in infants and toddlers.	Data from 325 nurses who completed the training satisfaction survey agreed or strongly agreed with statements that the training was clear and of high quality. Most nurses also reported that the training was well-presented and that they would recommend it to a colleague. In the 6 months following the training, a total of	The research method is based on qualitative and quantitative analysis of The MoSAIC (monitoring the social attention, interaction, and communication) program and analysis made based on online pre-workshop module, face-to face-instructor-led workshop, online post workshop modules, training satisfactory survey and follow up surveys.	Nurses with early identification of autism training can perform satisfactorily in early identification of autism than those who are not trained. Nurses with early identification of ASD training improve their competencies.	The participants only represent the regional state of Victoria in Australia. The outcomes of the research can be taken as a reference

		82,581 SACS-R assessments were conducted by the MCH workforce, reflecting that MCH nurses had successfully integrated SACS-R assessments into their work practice after receiving the early autism identification training.			
3 Reece *et al.* 2024 USA	The research aimed at how nurses can play an instrumental role in identifying cognitive, linguistic and behavioral functioning of the autistic children in early identification of autism and intervention.	Data from more recent survey suggest that a nurses can anticipate that out of every 1,000 children,11 will likely have an ASD, which roughly translates to 1 in every 36 children.14 Gender differences have also noted in the literature with males being diagnosed 3 to 4 times more often than females, and females are typically diagnosed later with a higher incidence of intellectual impairment.	Developmental screening is carried out using questionnaires and checklists to examine and assess the child's overall development. From the longitudinal study conducted by Jones and Klin36 suggested that children later diagnosed with ASD demonstrated a decline in eye fixation between 2 and 6 months compared with typically developing children	The available data suggest that there is an extensive delay between when parents first report developmental concerns to when a child is finally evaluated and receives a formal autism diagnosis.	The checklist for developmental screening was mainly focused on children aged 18 to 24 months so it does not cover the children over and under that age group. Among the most common screening tools listed by the AAP are the Modified Checklist for Autism in Toddlers, Revised with Follow-Up (M-CHAT R/F), the Social Communication Questionnaire (SCQ), and the Screening Tool for Autism in Toddlers and Young Children (STAT) however the interpretation of different screening tools are slightly different.
4	The research is aimed at providing information	Data are analyzed based on the existing	A qualitative approach is applied to analyze the data from	Based on Family history, there are siblings with ASD	Children with ASD engaged in unusual behavior counted

Weill *et al.* 2018 USA	for nurse practitioners on assessment and screening of early detection of autism, and highlight the responsibilities of coordinating services, and family support.	source from the literature. The behavioral assessment of ASD is compared and analyzed with the context of gender as figured out With ASD occurring in 1 in 42 males and 1 in 189 females, primary care providers (PCPs) commonly encounter individuals with ASD; however, it is not always easy to identify. The assessments were also made based on age. For example, ASD can be diagnosed as early as 15 months of age, but only 20% of children with ASD are identified before age 3, and at least one-third of children are diagnosed after age 6. A delay in diagnosis is concerning, as early intervention leads to the best long-term prognosis.	the visitors of primary care settings. Basically, the children with the age group of 18 to 24 months are assessed and analyzed.	(10%-25% recurrence in families) or close relatives with developmental or psychiatric diagnoses	for only about 11% of the time. And did not react most of the time (89%), therefore, demonstrated behaviors that were reassuring as typical (for instance, responsive when called). All children in the ASD group responded to their name at least once, whereas 50% of controls did not react. Therefore, the behavioral test only covered about 60% of the response. the limited range (39%), experts missed 39% of children who should have received a referral for ASD.
5 Alruwaili *et al.*	The article aimed at assessing the Knowledge about Childhood Autism among Health Workers (KCAHW).	The data sample consisting of 300 pediatric nurses were initially targeted, however only 273 pediatric nurses	The Qualitative analysis approach is adopted to analyze the data including survey and questionnaire distributed to the participants to assess their	Among the 273 pediatric nurses' participants,75.82% were female nurses ranging the age group 30-50 yrs of age. About 41.04% pediatric	The sample size is limited. Only 273 pediatric nurses participated in the assessment. It is a regional survey namely known as “A Golf

2023 Egypt		participated in the survey out of 326 interested.	awareness and perceived knowledge of ASD.	nurses represent the age group 18-30 yrs of age group. The highest work experienced participants of the nurse represent about 37.36% of the participants with (5yrs or less) work experience. Among the 273 participants of pediatric nurses, more than half (59.67%) work in public hospitals. Nurses with high levels of education and trainings (master's degree nurses=21.5%) achieved the highest knowledge levels, compared to those with bachelor´s degree (20.2%) and basic diploma (18.1%). The perceived knowledge of pediatric nurses regarding the assessments and evaluation of early autism spectrum syndrome found to be average .	State Survey" so the acceptability of the findings to other populations or region could be biased.
6 Waddington *et al.*	The study aimed to determine whether a 1-day training for Well-Child/Tamariki Ora nurses in developmental	Data from total of 175 New Zealand Well-Child/Tamariki Ora nurses who attended a 1-day training in developmental	Non-experimental pre- and post-tests surveys were used on the day of the workshop, while the follow-up survey was distributed 3 months later for the Wellington cohort, and 8	Nurses of all levels of experience and confidence may benefit from autism-specific training.	Response rate for the follow-up survey was low Follow-up period different for two locations (3 months and 8 months)

2021 USA	surveillance for autism using the SACS-R tool was acceptable and feasible in a NZ context.	surveillance for autism using the SACS-R tool in two locations, Auckland and Wellington. However, only 56 individuals completed the follow-up survey, resulting in a response rate of 32% for the follow-up survey. .	months later for the Auckland cohort (due to the initial follow-up falling during a period of Covid-19 lockdown). Analyses were conducted in SPSS (v. 27). Descriptive statistics were calculated for demographic characteristics, sub- scales and item-level responses. Non-parametric inferential tests were used. Use of Mann–Whitney U tests, Wilcoxon signed rank tests, Spearman's correlations.	Nurses increased their autism knowledge and confidence in identifying and discussing early signs of autism during developmental surveillance training; they also found the SACS-R to be highly acceptable. This suggests that implementation of the SACS-R in a NZ context is feasible and acceptable.	Lack of a comparison group who did not participate in the training Data for knowledge of early signs in the Wellington cohort was not useable Referral rates or the psychometrics properties of the SACS-R within this NZ sample were not examined Impact of the training on children and families was not assessed
7 Kerub *et al.* 2021 UK	Identification of strategies that improve ASD detection in Israel's Bedouin comminuty by investigating the social and policy factors that affect diagnosis.	70 PHNs from the MCHCs and 20 paediatricians who worked at HMOs in the Bedouin communities to participate in the FGs. Twelve nurses and seven physicians (16 women and 3 men, 7 Bedouins and 12 Jews) took part in the FGs. Participants' experi- ence of working with Bedouin populations ranged from 2 to 26 years (*m*	Qualitative approach and thematic analysis In-depth interviews with 18 Israeli policy makers, directors of healthcare and welfare institutions, diagnosticians and caregivers. The interviewees played active roles in decision-making at the government and district levels and were involved in identifying children with ASD and providing diagnostic services to children in southern Israel.	The findings reveal multilevel strategies that help to identify and diagnose ASD. In order to reduce the gaps between ethnic and other populations in terms of the diagnosis of autism, it is necessary to identify and change the policy factors that influence access to services for children with ASD at every ecological environment level in the Bedouin community and to incorporate PHNs from the Bedouin community in future services. The	Since not all of the research participants were from the Bedouin community, participants' responses might not be representative of the Bedouin population.

		= 11 for nurses, *m* = 16 for physicians). 18 policy makers and directors of healthcare and welfare institutions, diagnosticians and caregivers were interviewed.	Additionally, 3 focus groups (FG) were conducted, incl. 2 FG with PHNs from MCHCs (public health nurses from maternal and child health centres)	development of culturally appropriate policies, screening and interventions is required to serve the needs of Bedouin children and their families.	
8 Arastoo *et al.* 2020 Switzerland	Study aimed to examine the relationships among *a priori* parental ASD concern, ADOS (Autism Diagnostic Observation Schedule) classification, and a physician specialist's diagnosis.	Participants were 134 toddlers (enrolled at age 23–39 months) with various developmental concerns whose parents were seeking a neurodevelopmental evaluation at a university-affiliated clinic with expertise in autism and neurodevelopmental disorders between May 2013 and June 2014. Participants were included if they were between 24 and 39 months at the time of their scheduled evaluation, were scheduled for or recently had a clinical	Parent report at the initial telephone intake provided the information used to assign children to one of two study groups: "*a priori* ASD suspicion" group (if parents reported a specific suspicion of ASD) and "no *a priori* ASD suspicion" group (if parents reported any other developmental concern without specific concerns for ASD). ADOS was conducted during a study visit by a developmental psychologist A diagnosis was made at a separate clinic visit by a developmental-behavioral	Results illustrate the importance of educating parents about typical development and specific symptoms that indicate risk for ASD or other neurodevelopmental disorders. For primary care providers, community health workers, and early childhood educators, our results highlight the importance of responding immediately to parent concerns about their toddler's development to provide timely referral for further evaluation. This research supports a call for increased efforts by national organizations,	Inclusion criteria were focused on a restricted age range (24-39 months old at the time of evaluation, with some children enrolled at 23 months and scheduled for evaluation at 24 months or later), and results may vary in younger or older age groups. ADOS may be difficult to administer in low resource settings, where community health workers are already over-burdened and the costs of administering the ADOS may be prohibitive.

		evaluation for ASD at this clinic, and were English speaking.	pediatrician or a pediatric neurologist who was blind to ADOS classification results. Contingency tables summarized the frequency distributions of participants across ADOS classification, parental *a priori* ASD	primary health providers, early childhood educators, and community health organizations to educate parents about child development and encourage parents to express their concerns to their primary care providers as early as possible. This emphasis on parent education –along with timely responses from providers—may further existing trends toward earlier identification of ASD, and other neurodevelopmental disorders, and hence, generate opportunities for earlier and more personalized intervention approaches, which may help improve long-term outcomes.	
9 Glascoe 2015 USA	The goals of this study are to (a) inform clinicians embarking on evidence-based screening initiatives about what to expect when using quality tools, including provision of information on identification rates by age, patient mix, and well-visit up- take, and	Participants were professionals in 79 clinics across 20 U.S. states and elsewhere in North America, collectively serving 20,941 families via a Web-based screening ervice, PEDS Online, which offers developmental-behavioral/mental health and autism	Personnel at 22 of the 79 clinics were either interviewed or observed in person to identify implementation strategies. Settings included private practices in general pediatrics and family medicine; public health departments and community health centers; out-patient teaching-hospital continuity clinics; and other	Problematic screening results were found in more than 1 out of 5 children, and rates of screening test failures increased with children's ages. Clinics, even those serving families with limited education or lack of facility with English, found a variety of ways to make use of online screening services.	

	(b) describe the various implementation methods used by other clinics.	screens with automated scoring, report writing, and a mineable database.	services such as emergency departments or nonemergent crisis call centers. Electronic health records (EHRs) were in use by more than 50% of sites, but EHRs were not integrated with Web-based screening services at any of the sites. Instead, clinicians used online screening via a Web browser and copied/pasted results into EHRs, or, in the case of sites without EHRs, they printed results to include in paper charts.		
10 Horiuchi *et al.* 2023 UK	Study aims to describe the barriers and facilitators of incorporating ASD identification during well-child visits in Japan.	In two municipalities of Yamanashi Prefecture were recruited: all public health nurses (n = 17) and paediatricians (n = 11) involved in the well-child visit in each municipality and caregivers of children who also participated in the visits during the study period (n = 21).	Qualitative study that conducted semi-structured in-depth inter- views. Thematic analysis was conducted	Non-standardization of screening methods, limited knowledge and skills on screening and child development among healthcare providers and poor coordination among healthcare providers and caregivers are the main barriers to effective early detection of ASD through well-child visits. The findings suggest the importance of promoting a child-centred care approach through the application of evidence- based screening measures and effective information sharing.	Several limitations of the findings should be considered. The contents, style and methodologies applied during well-child visits can vary across municipalities that are delegated to provide maternal and child health services in their jurisdiction. Although researchers were able to engage all stakeholders in the target areas, they only included two municipalities in a specific prefecture. It is reported that several municipalities have adopted standardized screening tools to be used during well-child visits.

					Therefore, the findings of this study may not be relevant in some municipalities.
11 Kilicaslan *et al.* 2024 UK	To assess the knowledge of nurses in family health centers in southeast Turkey about childhood autism.	361 nurses from family health centers in Şanlıurfa, Turkey, selected based on inclusion criteria such as availability during data collection.	Descriptive, cross-sectional study using a structured questionnaire (KCAHW) and statistical tests (e.g., Mann-Whitney U, Kruskal-Wallis) to analyze knowledge scores in relation to demographics and previous training.	Knowledge scores on autism were influenced by factors like gender, education level, prior mental health experience, previous autism training, and awareness of national autism programs. However, many nurses scored low in certain knowledge areas, indicating insufficient knowledge overall.	The study focused only on nurses in one region of Turkey and excluded comparison with other provinces. It also didn't include other healthcare professionals in family health centers, limiting broader generalizations.
12 Gore *et al.* 2024 Switzerland	To examine how maternal and child health nurse training affects nurses' knowledge, self-efficacy in identifying autism in infants, and confidence in discussing autism with parents in Victoria, Australia.	302 maternal and child health nurses participated, with follow-up surveys post-training for 38 nurses to assess changes.	A cross-sectional survey design, with a Training Needs Survey (TNS) and Implementation Survey to assess baseline and post-training competencies. Statistical tests evaluated correlations and predictors of key competencies.	Training improved nurses' confidence in identifying autism and discussing it with parents. Prior training and knowledge of community resources were linked to better self-efficacy and confidence.	Limited pre/post-training sample size (38 matched responses) and potential self-report bias, focus was only on Victorian nurses, limiting broader application.
13 Halpin 2016 UK	To explore the unique role and perspective of nurses in a multidisciplinary team assessing pre-school children for autism.	Six specialist nurses in one NHS trust involved in pre-school autism assessment, with backgrounds in various nursing fields, including learning disabilities and mental health	Critical reflective inquiry with three phases (descriptive, reflective, and critical/emancipatory) involving written reflections, one-on-one discussions, and group analysis to examine beliefs, values, and practices of the nurses	Nurses contribute a holistic, empathetic approach focused on family support, helping families navigate the assessment with honesty and advocacy, often bridging gaps in understanding between the family and the clinical team.	Because the study only used a small group from one organization and the researcher was involved in the reflections, the results might not apply to other groups or situations.

14 Barbaro *et al.* 2022 USA	To assess the diagnostic accuracy of the Social Attention and Communication Surveillance–Revised (SACS-R) and SACS-Preschool (SACS-PR) tools for early autism detection in a community-based sample.	13,511 children aged 11-42 months were monitored using SACS-R and SACS-PR during routine health visits; those identified at high autism likelihood were referred for diagnostic assessments.	Diagnostic accuracy study; participants were assessed at 12, 18, 24, and 42 months. Diagnostic accuracy of the tools was evaluated by comparing outcomes with standard assessments. Sensitivity, specificity, and PPV were calculated	SACS-R+PR demonstrated high diagnostic accuracy, with sensitivity reaching 96% when SACS-PR follow-up was added. Autism prevalence in the sample was 3.3% by age 42 months, higher than previously reported rates.	Some children lacked university diagnostic assessments, requiring estimation for data. Contact was lost with some participants, and the tools used were expensive and time consuming, which might make them hard to use in real life situations.
15 Kerub *et al.* 2020 USA	To compare the effectiveness of two screening tools, M-CHAT/F and GDS, in identifying autism spectrum disorder (ASD) among toddlers in Israel.	The study included 1,591 toddlers aged 18-36 months from clinics in southern Israel, screened by trained nurses using both M-CHAT/F and GDS tools for developmental assessment.	Comparative study analyzing screening accuracy (sensitivity, specificity) of M-CHAT/F and GDS. Medical records reviewed to identify false negatives, and referral decisions assessed by experienced nurses.	M-CHAT/F showed higher sensitivity (70%) and specificity (98.2%) for ASD than GDS (sensitivity 50%, specificity 96.6%). Combining tools improved sensitivity for other developmental delays but did not increase ASD detection.	Low ASD prevalence limited sample size for accurate sensitivity estimation, high loss to follow-up affected results, referrals were based on retrospective nurse evaluations, impacting consistency .

Table 6. Research Question 1: What is the role of a nurse in early detection of autism in infants during routine health check-ups?

Meaning Unit	Code	Subcategory	Generic Category	Main category
It is important that nurses not dismiss any parental concern related to child development that could be attributed to ASD (art.1, p.46)	Consideration of parents/caretakers' concerns in ASD risk assessment of an infant	Addressing parental concerns	Attendance to Parental Concerns	Role
Awareness of evidence-based recommendations for ASD screening can help nurses **advocate for patients** (art.1, p.47)	Awareness of ASD screening recommendations helps nurses to **advocate for their patients**	Awareness of best practices is essential in **nursing advocacy**	Nursing Advocacy	Role
The AAP recommends that clinicians perform developmental screening using a validated tool during well-child visits conducted at nine, 18, and 24 or 30 months of age, noting any subtle red flags in infants who have a sibling with ASD (art. 1, p.42)	Developmental screening recommendations	Screening Practices	Identification of ASD	Role
The AAP further recommends that clinicians perform ASD-specific screening using a validated tool at both 18- and 24-month well-child visits and at any subsequent visit in which concerns about ASD are raised (art. 1, p.42-43)	ASD-specific screening recommendations	Screening Practices	Identification of ASD	Role

Nurses should ensure that patients are evaluated for ASD when: •primary care provider or parent concerns remain after a negative screen. •there are two or more ASD risk factors. •a screen is positive. In such cases, referral for formal ASD evaluation (to be completed by a developmental pediatrician, child neurologist, child psychologist or psychiatrist) is highly recommended, as is early intervention if deemed appropriate. (art.1, p.43)	Ensuring evaluation and referral if ASD is suspected	Evaluation and Referral if ASD is suspected	Identification of ASD	Role
It's important that nurses not dismiss any parental concerns related to child development that could be attributed to ASD. Parental reports of unusual behaviors have been found to be significant predictors of later ASD diagnosis. Nurses should also be aware that denial and grief may deter parental reporting of ASD concerns or diagnostic pursuit. Race, too, can influence such parental reporting (art.1, p.47)	Addressing parental concerns and awareness of influencing factors	Parental engagement, addressing concerns	Attendance to Parental Concerns	Role
The process of accessing diagnosis and supports were key	Nurses experienced difficulties in decision-making	Challenges in decision-making	Leadership / Decision-making	Role

barriers identified in the metropolitan group. Participants reported difficulty in deciding between making an appropriate referral (i.e., for diagnosis) that might not be received well by families or referring families to a service that they were more likely to accept (art. 2, p.8)	aimed to direct their patients to accessing diagnosis and support.			
Nurses refer children for diagnosis, as well as support and services. This was designed to be displayed in nurses' rooms, to support the Nurse workforce and parents/caregivers to understand how best to pursue further diagnostic assessment. **Referral Pathways poster (**art.2, p.5)	Nurses promote further progress in the process of receiving an official ASD diagnosis	Promoting further progress in the process of receiving ASD diagnosis	Promoting Receiving an ASD Diagnosis	Role
Nurses refer children for diagnosis, as well as **support and services**. This was designed to be displayed in nurses' rooms, to support the Nurse workforce and parents/caregivers to understand how best to pursue further diagnostic assessment. **Referral Pathways poster (**art.2, p.5)	Nurses connect children to necessary support and services.	Connecting to necessary support and services.	Linking Patients with Services/Treatments	Role
Through consistent use of early ASD detection practices, providers can help **connect children to early intervention services soone**r (art.3, p.3)	In their work, nurses can use necessary techniques aiming to connect children with needed services sooner	Working techniques aimed to link patients to necessary services sooner	Linking Patients with Services/Treatments	Role

Children with ASD most often demonstrated significant growth in social communication skills when exposed to some form of early intervention (art.3, p.3)	Nurses should promote prompt access of children diagnosed with ASD to necessary form of early intervention	Promoting prompt access of children diagnosed with ASD to necessary services and treatments	Linking Patients with Services/Treatments	Role
NPS are positioned to act between children, essential diagnoses, or services (art. 3, p.1)	Mediator between children and services	Performing collaborative case and linking patients to necessary services/treatments	Linking Patients with Services/Treatments	Role
NPS and other PCPs are positioned to consider all factors to support parents and caregivers, determine the next best course of action (art.3, p.2)	Supporting parents and caregivers, determining further need for care and best way to act	Performing and planning of family-centered care	Leadership / Decision-making	Role
Nurses should assess and update thoroughly the developmental progress since the previous visits, review family history, and its influence on typical development, and observe the child to notice possible subtle nuances (art.3, p.2)	Complete systematic assessment and observation aiming to notice any possible subtle nuances (that could potentially indicate developmental problems such as ASD)	Developmental monitoring, pointing out worrying signs	Identification of ASD	Role
The American Association of Pediatrics (AAP) recommends every child has an ASD-specific screening at 18 and 24 months of age (art.4, p.22)	Nurses can recommend ASD specific screening at the age of 18 and 24 months.	Recommending ASD-specific screening at certain ages	Identification of ASD	Role
Refer all children diagnosed with ASD for OT to assist with sensory differences and deficits in play and self-help skills (art.4, p.23)	Nurses can refer children diagnosed with ASD to OT (occupational therapy)	Linking children with ASD to necessary support service(s)	Linking Patients with Services/Treatments	Role

In collaboration with a family, the NP has a central role in promoting a positive routine, creating a calm environment, and coordinating with specialists-**Management of the child with** ASD (art.4, p.24)	Nurses lead the process of care creating and promoting a positive environment and coordinating care	Nurse is **in lead** when it comes to creating and promoting of calm, positive routine and environment as well as coordinating care	**Leadership** / Decision-making	Role
We identify the children with developmental delays and try to link them up with the best possible caregivers and treatments in the field or provide them with the necessary information. We also advise patients about their rights regarding what they are entitled to receive. (D6, policy maker) (at.7, p. 1394)	Identification of developmental delays in children	Identification of problems	Identification of ASD	Role
We identify the children with developmental delays and **try to link them up with the best possible caregivers and treatments in the field** or provide them with the necessary information. We also advise patients about their rights regarding what they are entitled to receive. (D6, policy maker) (at.7, p. 1394)	Linking developmentally delayed children up with best caregivers/treatments	Linking patients with necessary services/treatments	Linking Patients with Services/Treatments	Role
We identify the children with developmental delays and try to link them up with the best possible caregivers and treatments in the field or **provide them with**	Providing affected children and caregivers with information and necessary advice	Providing affected children and caregivers with necessary information and advice	Communication with/ Education of Parents/Caregivers	Role

the necessary information. We also advise patients about their rights regarding what they are entitled to receive. (D6, policy maker) (art.7, p. 1394)				
The public health nursing service plays a unique role in the Israeli healthcare system, as the fact that the MCHCs (Maternal and Child Health Centres) are the **sole institution involved in ASD detection** (art.7, p. 1394)	Sole institution (and its employees – Public Health Nurses: PHNs) in Israel involved in ASD detection	Unique position in ASD identification	Identification of ASD	Role
Our advantage at the MCHCs is that we see the general development of the child. We need nurses to be professionally trained as long as we are the **sole institution in the healthcare system involved in detecting ASD**. We still need the doctors in the primary clinics in order to refer children to specialists. But the nurses can guide the doctors at the general clinics and say, “I’ve seen a child with A, B, C.” (D6, policy maker) (art. 7, p.1394)	Sole institution (and its employees – Maternal and Child Health Nurses: MCHNs) in Israel involved in ASD detection	Unique position in ASD identification	Identification of ASD	Role
Our advantage at the MCHCs is that we see the general development of the child. We need	Close/frequent contact with the child/caregivers allows	Assisting doctors in identification of ASD	Identification of ASD	Role

nurses to be professionally trained as long as we are the sole institution in the healthcare system involved in detecting ASD. We still need the doctors in the primary clinics in order to refer children to specialists. But the **nurses can guide the doctors** at the general clinics and say, “I’ve seen a child with A, B, C.” (D6, policy maker) (art. 7, p.1394)	nurses to offer doctors valuable insight on children’s health status			
We are individuals who work in professions governed by ideology and values. We, as representatives and defenders of the population, should take a strong stance on these values. Otherwise, it will further weaken persons in populations that are already weak. (D19, policy maker) (art. 7, p. 1394)	In their work, nurses are guided by and act out of benefit of their patients	Promoting best interests of disadvantaged communities	Nursing Advocacy	Role
In the format in which we work, you're simply in a madhouse during work ... you can't think ... you don't want to miss meningitis or myocarditis, life or death issues, and say, let's see if the child is developing properly ... no. **We therefore trust those we need to trust who examine the child at the MCHCs**. (D20,	Doctors rely on nurses in ASD assessment	Assisting doctors in identification of ASD	Identification of ASD	Role

a paediatrician in an FG) (art. 7, p. 1395)				
Specific ASD screening involves observations of the child from perspectives not available in the framework of global developmental screening. **Nurses who become proficient in the use of ASD screening tools improve their diagnostic abilities and can help teach other nurses how to use them as well**. (art. 7, p. 1395)	Nurses can teach their coworkers skills essential in ASD screening/identification	Educating coworkers in acquiring necessary skills	Educating Coworkers	Role
Specialization at the community level is part of the role of PHNs who specialize in ASD. They must make connections with other institutions in the community in order to promote their area of specialization. (art. 7, p. 1395)	ASD specialized nurses aim to create a net of connections between various institutions in their community to make it easier for sharing information and arranging/coordinating patient care	Creating connections between institutions to make it easier for sharing information, arranging/coordinating patient care	Creating Net of Connections between Institutions	Role
When parents cannot identify their child's problem and the child is not in the education system, the healthcare system must deal with the issue. PHNs should support families in the community and provide them with guidance and resources (art. 7, p. 1395)	Healthcare system (= Nurses) need to be able to reach out and work with all the families with small children in the community, identifying developmental problems in children when parents are not able to do that and there is no one else who potentially could	Proactive approach to connecting and working with families with small children. Nursing becomes accessible to everyone in the community	Nursing Accessibility	Role

	do it (e.g. pre-school educators)			
Part of the professional expertise of the PHNs involves providing treatment to families who need it. Their **knowledge about and access to various resources in the community helps promote treatment** and minimizes the bureaucracy involved in obtaining it. (art. 7, p. 1396)	Nurses play an important role in connecting their patients with necessary treatments and services	Connecting patients to needed treatments and services	Linking Patients with Services/Treatments	Role
Part of the professional expertise of the PHNs involves providing treatment to families who need it. Their knowledge about and access to various resources in the community helps promote treatment and **minimizes the bureaucracy** involved in obtaining it. (art. 7, p. 1396)	Knowledge and expertise of nurses can ease the process of linking to necessary services/treatments as well as shorten the period of time used for this purpose	Easing the process of accessing services/treatments, minimizing Bureaucracy	Nursing Advocacy	Role
The population's compliance with the services of the PHNs at the MCHCs should be leveraged to develop parental knowledge about and awareness of ASD (art. 7, p. 1397)	Population’s willingness to use services of PHNs at MCHCs is a benefit that can be used for developing parental knowledge and awareness of ASD	Nurses should emphasize educating parents/caregivers on issues related to ASD	Communication with/ Education of parents/caregivers	Role
Allocating responsibility for the administration of treatment to a specialist nurse who is familiar with the community may narrow gaps in early diagnosis. This ap-	Unique position of a specialist nurse working with Bedouin community is highly beneficial in terms of early ASD identification and	Acceptability of an ASD specialist nurse by community members makes nursing care accessible	Nursing Accessibility	Role

proach can also reduce inequality in healthcare, contribute to nurses' professional development, increase their professional prestige and attract potential nurses, who are in short supply. Thus, the specialist nurse plays a critical role in performing early screening for ASD and referring children to experts in the community healthcare system (art. 7, p. 1397)	linking patients with services/treatments. The benefit comes from combination of multiple factors, starting with the fact that those nurses themselves originate from the community (which makes it easier to function on multiple levels when working with/within the community)			
Community professionals, such as early childhood educators or public health community workers may **help bridge the gap between early and late identification by raising awareness of developmental concerns earlier** (art. 8, p. 5)	Nurses as public health community workers can raise awareness of developmental concerns (incl. ASD) earlier, thus promote earlier identification of ASD	Nurses can raise awareness about developmental concerns earlier, thus promoting earlier ASD identification	Identification of ASD	Role
It also highlights the importance of community health education to increase parent awareness of early symptoms of ASD in order to improve parent knowledge and ability to recognize early symptoms of ASD, as it is likely that parent knowledge about development and ASD differs widely across communities and countries. (art. 8, p. 5)	Nurses as representatives of community health education should increase parental awareness in ASD	Nurses should increase parental awareness of ASD	Communication with/ Education of parents/caregivers	Role

In a review on different ages of diagnosis by physician, Daniels and Mandell (27) noted greater parental concern about initial symptoms as a factor associated with earlier ASD diagnosis. This finding highlights the importance of attending to parent concerns in an effort toward aiding early identification and diagnosis. (art. 8, p. 5)	In ASD assessment, it is important for a health care provider (incl. nurse) to attend to any parental concern, which can initiate earlier ASD diagnosis	Attending to parental concerns in ASD assessment is important.	Attendance to Parental Concerns	Role
The study demonstrates that experienced physician diagnoses of ASD are highly consistent with the ADOS, a "gold standard" research tool for the identification of ASD. In addition, it demonstrates the utility of the ADOS as a tool for identifying ASD that can be used as part of a diagnostic evaluation, suggesting that in practice areas where access to physicians with expertise in neurodevelopmental disorders is limited, **having trained ADOS evaluators may assist primary care physicians, educators, and public health professionals in making an ASD diagnosis more easily, thus leading to earlier intervention.** (art. 8, p. 5)	Nurses as public health professionals can be successfully trained to help perform ASD assessment using ADOS, which may result in earlier ASD identification and facilitate earlier interventions	Nurses help in ASD identification by using reliable tool(s)	Identification of ASD	Role
For clinics working with non–English-speaking families, the presence of bilingual (most often	Among other employees, nurses can use their ability	Use of language advantage to provide translation needed by	Communication with / Education of parents/caregivers	Role

English- Spanish speaking) staff was common. Bilingual staff were varied in professional backgrounds and included phy-sicians, skilled nurses, medical technicians, and receptionists. (art. 9, p. 50)	to speak an additional lan-guage for the benefit of pa-tients, translating necessary instructions and information to non-English speaking pa-tients	non-English speaking patients when com-municating with fami-lies		
Next, **skilled nurses** positioned at (much more pri- vate) nursing stations entered parents' re-sponses into PEDS Online, **of-fering an interview** if forms were incomplete or if evidence of limited literacy was present (e.g., no words written on the PEDS Response Form and skipped questions on other measures). **Nurses also often clarified parents' comments and answers** to items and pasted final results into EHRs or printed them out for paper charts. (art. 9, p. 51)	Nurses offered interviews to parents/caregivers in case if necessary forms were in-complete, or it was other-wise necessary	Nurses communicated with parents/caregiv-ers obtaining neces-sary information	Communication with/ Education of par-ents/caregivers	Role
Measures were sometimes (more frequently in clinics) com-pleted in examination rooms, in which case **nurses or other staff accompanied families into examination rooms, helped them finish partially completed forms, gathered re-sponses by interview or on paper**, entered results into	Nurses assisted partici-pants in filling necessary forms, gathered responses and other vital health infor-mation	Nurses communicated with parents/caregiv-ers obtaining neces-sary information	Communication with/ Education of par-ents/caregivers	Role

PEDS Online, and also **gathered vital health information**. (art. 9, p. 51)				
A few practices used a gated screening process wherein PEDS Online was used as the front-line series of screens. **Children performing poorly were then seen by a nurse practitioner or developmental specialist for additional assessment** (art. 9, p. 51)	Nurses participated in additional ASD assessment of children who performed poorly in PEDS Online screening procedure.	Nurses participated in ASD assessment when it was seen necessary	Identification of ASD	Role
Public health nurses, paediatricians and caregivers from both municipalities reflected that the identification of developmental disorders is driven by caregivers' sense of concern, acceptance and awareness regarding their child's development. (art. 10, p. 987)	Nurses facilitate identification of ASD when parental concerns were expressed	Nurses responded to caregiver's concerns	Attendance to Parental Concerns	Role
Public health nurses, especially, try to maintain their relationship with caregivers by avoiding negative statements as they also have a responsibility to provide advice on child-rearing, offer psychological support for caregivers and identify children at risk of child maltreatment (art. 10, p. 988)	Nurses try to maintain a good relationship with parents/caregivers in order to perform their duties	Nurses try to maintain good relationship with parents/caregivers	Communication with/ Education of parents/caregivers	Role
I usually ask trigger questions such as 'How is your child doing during meals, daily routine, or shopping?' or 'How is your child	When ASD is suspected, nurses try to raise concerns	Nurses try to raise concerns in parents	Communication with/ Education of parents/caregivers	Role

doing at home?' Through these questions, mothers realize their concerns. ... and then, a few months later, I'd probe deeper into what the mother had noticed. (ID10) (art. 10, p. 988)	in parents while communicating with them and asking trigger questions.	through communication		
If the child is three years old and attending nursery school, we can check the child's performance in a group examination at the nursery school after asking for permission to do so. (ID31) (art. 10, p. 988)	Nurses can check the child's behaviour not only by assessing the child individually, but also by observing the child in a group setting	Nurses can assess the child for ASD both individually and in group settings	Identification of ASD	Role
During the conference, there was a discussion after the child's check-up. For example, we decided not to forget about the children we talked about who were not that far behind but were still moving slowly or those whose body control was a bit of a problem. It's just our decision. We do things like color the mother–child card and the medical questionnaire with a marker and note why they are colored in so that we can make sure the children are reevaluated next time. (ID28) (art. 10, p. 988-989)	When suspecting ASD, nurses involved in children's check-ups made arrangements to ensure re-evaluation during the following check-up.	Nurses ensured re-evaluation when ASD was suspected	Identification of ASD	Role
Public health nurses played a central role in well-child visits, especially in group consultations. They were the main actors	Nurses play main role in well-child visits, deciding on follow-up strategies	Nurses were key decision makers in well-child visits	Leadership / Decision-making	Role

who decided on follow-up strategies based on a child's assessment. Although paediatricians and psychiatrists were involved in the well-child visits, they were rarely part of the decision-making process nor were they informed about the decision made by public health nurses. (art. 10, p. 989)				
... we [paediatricians] have to screen for medical prob- lems and make sure that the families consult with a medical doctor. It seems that public health nurses work well to organize discipline at home, but there are a lot of families who haven't seen a doctor at all, so we have to be careful about that. (ID36) (art. 10, p. 989)	Although nurses are key decision-makers, there are occasional insufficiencies in follow-up strategy planning	Occasional insufficiencies in decision-making and follow-up strategy planning	Leadership / Decision-making (lack of)	Role
In both cases, the assessment results and healthcare providers' concerns or decisions were rarely shared with caregivers, especially when they did not have a sense of concern, awareness or acceptance regarding the child's developmental problems. (art. 10, p. 989)	Nurses and other healthcare providers occasionally have not shared the ASD assessment results, concerns and decisions with parents/caregivers	Insufficiency / Lack of relevant communication/ education of parents/caregivers	Communication with/ Education of Parents/caregivers (lack of)	Role
I would talk with a public health nurse if I have any difficulty in child-rearing. I imagine that they would accept those consultations about home environment and	Parents/caregivers felt comfortable talking to their pub-	Nurse is expected by parents/caregivers to be the one to turn to	Communication / Education of Parents/Caregivers	Role

measures of child-rearing. (ID21) (art. 10, p. 990)	lic health nurses, expressing concerns and/or seeking advice	when seeking advice/expressing concerns regarding child-rearing		
I thought it would be good to have something like a booklet of common patterns of behavior for children at 18 months. (ID46) (art. 10, p. 990)	Alongside educating parents regarding ASD, nurses are also expected to provide general guidance regarding child's normal development as was expressed by parents/caregivers	A need for guidance about child's normal development was expressed for parents/caregivers	Communication / Education of Parents/Caregivers	Role
Nurses should perform risk assessment analysis and risk diagnosis (art. 11, p. 829)	ASD Risk Assessment	ASD Risk Assessment	Identification of ASD	Role
Early identification of children with a high likelihood of autism can lead to referral for diagnostic services and access to early supports (art.12, p.2)	Promoting receiving of an ASD diagnosis through early identification of children, which will be highly beneficial for children (e.g. allowing access to early supports etc.)	Promoting receiving of an ASD diagnosis through early identification of children	Promoting Receiving an ASD Diagnosis	Role
Nurses have a unique role in the child health team, which involves working with families in a way that positively influences parents' experiences of assessment and diagnosis (art.13, p.320)	Nurses can find best approach to working with families, ensuring positive influence on parents' experiences of assessment and diagnosis	Nurses have the potential to lead the process of assessment and diagnosis in a way that will positively	**Leadership** / Decision-making	Role

		shape parents' experiences		
Participants believe they have specific information and practical expertise around autism which they have a moral and professional duty to share with parents. (art.13, p. 320)	Knowledge Sharing with parents/caregivers	Knowledge sharing with parents/caregivers	Communication with / Education of parents/caregivers	Role
Respect for parents' views. This includes an intention to listen to parents and address their concerns, rather than prioritizing the assessment agenda (art.13, p.321)	Prioritizing parental concerns rather than assessment agenda	Listening to parents and addressing concerns	Attendance to Parental Concerns	Role
Developmental surveillance for children using multiple checklists across the second year of life (art.14, p.10)	ASD surveillance model using multiple checklists	ASD Surveillance model	Identification of ASD	Role
Nurses observed behaviors such as eye contact, response to name, and use of gestures, and categorized them as typical or atypical to determine the likelihood of autism (art.14, p.5)	Behavioral assessment, ASD risk assessment	ASD risk evaluation based on behavioural assessment	Identification of ASD	Role
Nurses regularly check for signs of developmental delays or autism, helping to quickly refer children to specialists for further evaluation (art.14, p. 6)	Systematic monitoring, pointing out worrying symptoms, acting accordingly	Regular ASD risk assessment, ensuring access to further evaluation	Identification of ASD	Role

Table 7. Research Question 2: What are the competencies and tools that a nurse can benefit from in early detection of autism in infants during routine health check-ups?

Meaning Unit	Code	Subcategory	Generic Category	Main Category
Awareness of evidence-based recommendations for ASD screening can help nurses advocate for patients with ASD (art.1, p.47)	**Awareness of ASD screening recommendations** helps nurses to advocate for their patients	**Awareness of best practices** is essential in nursing advocacy	Professional Competence	Tools / Competencies
Absolute Indications for ASD Diagnostic Evaluation Referral15, 46 Behavior Indicator Referral Time Frame No gesturing (waving bye-bye and pointing) By 12 months No babbling By 12 months No single words (excluding echolalia or labeling) By 16 months No spontaneous two-word phrases (excluding echolalia) By 24 months Any loss of language or social skills (regression) Any age((art.1, p.46)	Nurses should have knowledge of absolute ASD indicators at different ages in early childhood	Knowledge of ASD indicators in early childhood	Knowledge	Tools / Competencies
Contrary to popular belief, ASD can be neither diagnosed nor excluded through having a simple exchange with a child (art.1, p. 44)	Understanding limitations of a simple exchange in identifying ASD	Knowledge of ASD identification limitations	Knowledge	Tools / Competencies

Over 90% (n = 325) of MCH nurses who completed the training satisfaction survey agreed or strongly agreed with statements that the training was clear and of high quality. Most nurses also reported that the training was well-presented and that they would recommend it to a colleague. In the 6 months following the training, a total of 82,581 SACS-R assessments were conducted by the MCH workforce, reflecting that MCH nurses had successfully integrated SACS-R assessments into their work practice after receiving the early autism identification training (art. 2, p.1)	Nurses have positive feedback on the training received in early autism identification and using the SACS-R ADS screening tool.	Professional training in early autism identification and use of a specific ASD screening tool.	Professional Training	Tools / Competencies
In the 6 months following the training, a total of 82,581 SACS-R assessments were conducted by the MCH workforce, reflecting that MCH nurses had successfully integrated SACS-R assessments into their work practice after receiving the early autism identification training (art. 2, p.1)	Nurses successfully integrated newly acquired skills in use of SACS-R into their work practice.	Upgrade of professional competence through successful integration of use of a specific ASD screening tool into the work practice	Professional Competence	Tools / Competencies
Almost all participants (n=102, 91.1%) reported that they were currently using the SACS-R tool. Of those who reported not using the tool at the time of	Active regular use of SACS-R tool in work practice	Utilization of a specific ASD identification tool in work practice	ASD Identification Tool(s)	Tools / Competencies

their response (n=10, 8.9%), four (40%) were MCH nurse students who were not currently on clinical placement and an additional four (40%) noted that using SACS-R was not applicable in their role (e.g., MCH phone line counsellor, MCH team leader who does not conduct KAS assessments). Most participants reported that they automatically use the SACS-R in their daily work (n=94, 94.0%) and that they intend to continue to use SACS-R (n=96, 96.0%). Almost all participants agreed that they are confident they can use (art.2, p.14)				
Through **consistent use of early ASD detection practices**, providers can help connect children to early intervention services sooner (art.3, p.3)	Consistent use of early detection practices	Timely care	Professional Competence	Tools / Competencies
Although eye tracking for ASD identification is still in its infancy, Mastergeorge35 reports that tracking eye gaze still provides clinicians with excellent quantitative data that can be used as a marker of developmental differences. (art.3, p.3)	Beneficial ASD identification tool that is based on eye tracking	Beneficial ASD identification tool	ASD Identification tool(s)	Tools / Competencies

This study demonstrates the importance of formal screening tools in addition to clinical impressions and parental concerns for proper developmental evaluation to examine caregivers' concerns and investigate further when necessary (art.4, p.22)	In comprehensive ASD evaluation, it is important for nurses to not rely on parental concerns solely, but also on data from other sources and tools	In ASD evaluation, nurses should rely both on parental concerns and data from other sources and tools	Use of Multiple Sources in ASD Evaluation	Tools / Competencies
Children with hearing loss do not respond to any sounds, while children with ASD preferentially ignore human sounds (art.4, p.23)	Nurses should be able to differentiate the ASD symptoms from similar symptoms typical to other conditions	Ability to differentiate ASD symptoms from similar non-ASD symptoms	Professional Competence	Tools / Competencies
A child with ASD will not have a mutual connection. By the 15-month visit, the typically developing child should gesture to “request” an object and attempt to engage the caregiver to obtain a desired item. As a child gets older, pointing and speech add to this social connectedness. (art. 4, p.23)	Nurses must have general knowledge of typical developmental milestones of a child as well as any deviations from normal which could indicate ASD	Knowledge of normal developmental milestones and deviations that could possibly indicate ASD	Knowledge	Tools / Competencies
Speech/language delay is frequently found in children with ASD, and this is often the parents’ first developmental concern. Careful speech/language evaluation identifies red flags	Speech language delay counted as the red flag of ASD	Knowledge of signs typical to ASD	Knowledge	Tools / Competencies

pointing to developmental delay and a possible ASD diagnosis (art. 4, p.23)				
ASD plus any one of the listed items increases the probability of a genetic disorder. Microcephaly • Seizures • Congenital anomalies • Dysmorphic features • Family history of developmental disabilities • Family history of psychiatric problems (art. 4, p.26)	It is beneficial for nurses to have knowledge about conditions that are often seen closely linked to ASD to provide additional help and necessary advice to their patients	It is beneficial for nurses to have knowledge about conditions often seen closely linked to ASD	Knowledge	Tools / Competencies
Wilcoxon signed ranks tests revealed **significant improvement in participants' knowledge of typical development**, knowledge of early signs, and general autism knowledge from pre-workshop to post-workshop (art. 6, p. 5053)	Improvement in knowledge of typical development (pre-workshop to post-workshop)	Improvement in knowledge	Knowledge	Tools / Competencies
Wilcoxon signed ranks tests revealed **significant improvement in** participants' knowledge of typical development, **knowledge of early signs**, and general autism knowledge from pre-workshop to post-workshop (art. 6, p. 5053)	Improvement in knowledge of early signs (pre-workshop to post-workshop)	Improvement in knowledge of early signs	Knowledge	Tools / Competencies
Wilcoxon signed ranks tests revealed **significant improvement in participants'** knowledge of typical	Improvement in general autism knowledge (pre-workshop to post-workshop)	Improvement in knowledge of general autism	Knowledge	Tools / Competencies

development, knowledge of early signs, and **general autism knowledge** from pre-workshop to post-workshop (art. 6, p. 5053)				
There was **no significant change** from post-workshop to follow-up for participants' **knowledge of typical development** or knowledge of early signs (ar. 6, p. 5053)	No further change in knowledge of typical development (post-workshop to follow-up)	Knowledge increased in workshop subsequently remains on that level with no further changes	Knowledge	Tools / Competencies
There was **no significant change** from post-workshop to follow-up for participants' knowledge of typical development or **knowledge of early signs** (art. 6, p. 5053)	No further change in knowledge of early signs (post-workshop to follow-up)	Knowledge increased in workshop subsequently remains on that level with no furhter changes	Knowledge	Tools / Competencies
There was a significant decrease in participants' general autism knowledge from post-workshop to follow-up, although this remained above pre-workshop levels (art.6, p. 5053)	Significant decrease in general autism knowledge (post-workshop to follow-up), although level still above pre-workshop	Knowledge increased in workshop has subsequently decreased (by follow-up), but level still above pre-workshop	Knowledge	Tools / Competencies
Overall participant **confidence in identifying and discussing early signs of autism with parents increased significantly** from pre- to post-workshop and decreased significantly from post-workshop to follow-up but remained above pre-workshop levels (art.6, p.5053-5054)	Significant increase of confidence in ASD identification and discussing early signs with parents (pre- to post-workshop)	Increase of confidence in ASD identification and discussing early signs with parents achieved in workshop	Confidence	Tools / Competencies

Overall participant **confidence in identifying and discussing early signs of autism with parents** increased significantly from pre- to post-workshop and **decreased significantly** from post-workshop to follow-up but remained above pre-workshop levels (art.6, p.5053-5054)	Significant decrease of confidence in ASD identification and discussing early ASD signs with parents (post-workshop to follow-up), but levels still higher than pre-workshop	Further decrease of confidence in ASD identification and discussing early ASD signs with parents (but level still above pre-workshop).	Confidence	Tools / Competencies
Overall perceived participants' acceptability of the SACS-R tool significantly decreased from high level post-workshop to follow-up (art.6, p.5054)	Significant decrease of perceived acceptability of SACS-R tool (post-workshop to follow-up)	Decrease of perceived acceptability of SACS-R tool after workshop	ASD Identification Tool(s)	Tools / Competencies
The MCHC (Maternal and Child Health Clinic) has a clear goal. We should identify every child who is not developmentally normal. We cannot identify autism. Therefore, it is clear that additional tools are needed for the early detection of autism so that we can provide broader and more comprehensive service for needy communities. (D19, policy maker) (art. 7, p. 1394)	Compliance of MCHCs with identicifation of any abnormalities in children. Difficulties in identification of autism, neccecity for additional autism indentification tools.	Need for reliable ASD identification tools	ASD Identification Tool(s)	Tools / Competencies
There is a need to develop an official government policy for the professional training of PHNs (Public Health Nurses) in ASD screening (art. 7, p. 1394)	Need for an official government policy for the professional training of nurses in ASD screening	Need for professional training	Professional Training	Tools / Competencies

We identify the children with developmental delays and try to link them up with the best possible caregivers and treatments in the field or provide them with the necessary information. We also advise patients about their rights regarding what they are entitled to receive. (D6, policy maker) (art.7, p. 1394)	Indentifying developmental delays in children	Sufficient professional competence that allows identifying developmental delays	Professional Competence	Tools / Competencies
Our advantage at the MCHCs is that **we see the general development of the child**. We need nurses to be professionally trained as long as we are the sole institution in the healthcare system involved in detecting ASD. We still need the doctors in the primary clinics in order to refer children to specialists. But the nurses can guide the doctors at the general clinics and say, "I've seen a child with A, B, C." (D6, policy maker) (art. 7, p.1394)	Evaluating general development of a child, pointing out any deviations/abnormalities	Sufficient professional knowledge regarding normal/abnormal development of a child	Knowledge	Tools / Competencies
Our advantage at the MCHCs is that we see the general development of the child. **We need nurses to be professionally trained** as long as we are the sole institution in the healthcare system involved in detecting ASD. We still need the doctors	Need in sufficient professional training of nurses	Professional Training	Professional Competence	Tools / Competencies

in the primary clinics in order to refer children to specialists. But the nurses can guide the doctors at the general clinics and say, "I've seen a child with A, B, C." (D6, policy maker) (art. 7, p.1394)				
This is one of the places where the **nurse is most independent**. Her operational space should be highly professional because **she works in a highly diverse space and she is often alone there**. (D34, policy maker) (art. 7, p.1394)	Nurses often work independently with high level of responsibility	Confidence in working independently with high level of responsibility	Confidence	Tools / Competencies
This is one of the places where the nurse is most independent. **Her operational space should be highly professional** because she works in a highly diverse space and she is often alone there. (D34, policy maker) (art. 7, p.1394)	Nurses should perform work tasks highly professionally	High professional level of nurses	Professional Competence	Tools / Competencies
PHNs in these facilities deal with a wide range of issues related to the health of women, children and the family. They **work independently and make professional decisions on their own**. Therefore, **they are required to meet particularly high standards**. (art. 7, p. 1394)	Stress resilience is essential in independent performing of multiple heterogenous highly responsible work tasks as well as corresponding with expectations to	Stress resilience is essential in independent performing of multiple highly responsible heterogenuos work tasks as well as corresponding with expectations to meet particularly high standards	Stress Resilience in Work Practice	Tools / Competencies

	meet particularly high standards			
PHNs in these facilities deal with a wide range of issues related to the health of women, children and the family. **They work inde- pendently and make professional decisions on their own. Therefore, they are required to meet particularly high standards**. (art. 7, p. 1394)	Nurses should perform work tasks highly profes-sionally	High professional level of nurses	Professional Compe-tence	Tools / Competencies
Despite the lack of policy regarding professional training in ASD diagnosis, **nurses often take the initiative to develop their professional capabilities** independently, **adding to their professional skills**. Since ASD screening is a dynamic field, the **nurses must constantly be aware of new information and tools they can use to develop their professional expertise and identify disorders that might previously have eluded them**. (art. 7, p. 1395)	Nurses make sure to in-dependently continuosly educate themselves and improve their profes-sional level	Continuos improvement of professional competence of nurses	Professional Compe-tence	Tools / Competencies
Making specific screening for ASD routine for PHNs will increase the number of identified individuals and help to bridge the gap in ASD identification (art. 7, p. 1395)	Routine specific ASD screening performed by nurses will allow more children that are affected to be indentified	Specific ASD screening	ASD Identification Tool(s)	Tools / Competencies

Specific ASD screening involves observations of the child from perspectives not available in the framework of global developmental screening. Nurses who become proficient in the use of ASD screening tools improve their diagnostic abilities and can help teach other nurses how to use them as well. (art. 7, p. 1395)	Advantages of specific ASD screening VS global developmental screening	Specific ASD screening	ASD Identification Tool(s)	Tools / Competencies
Specialist nurses from within the community accompany the family from the identification stage to the diagnostic stage and until the child is placed in a suitable framework. Their understanding of the culture helps prevent misdiagnoses and improves the chances of making an accurate diagnosis. They are also capable of conveying medical information to the family in a manner that accords with their cultural norms. (art. 7, p. 1395)	When working with the bedouin community, it can be crucial to have an ASD specialised PHNs who, themselves, originate from bedouin comminuty	Cultural competencies of a specialized ASD nurse can be essential in their work practice	Cultural Competence	Tools / Competencies
Part of the professional expertise of the PHNs involves **providing treatment to families who need it**. Their knowledge about and access to various resources in the community helps promote treatment and minimizes the	Nurses provide treatment to families who need it	Nurses provide treatment to families who need it	Professional Competence	Tools / Competencies

bureaucracy involved in obtaining it. (art. 7, p. 1396)				
Although it is critical to respond immediately to parental concerns, these concerns may be better understood if used as part of a comprehensive evaluation that includes data from other sources (e.g., early childhood educators, a specialist's evaluation and standardized evaluation tools). (art. 8, p. 5)	In comprehensive ASD evaluation, it is important for nurses to not rely on parental concerns solely, but also on data from other sources and tools	In ASD evaluation, nurses should rely both on parental concerns and data from other sources and tools	Use of Multiple Sources in ASD Evaluation	Tools / Competencies
Study demonstrates that experienced physician diagnoses of ASD are highly consistent with the **ADOS**, a "gold standard" research tool for the identification of ASD. In addition, it demonstrates the **utility of the ADOS as a tool for identifying ASD that can be used as part of a diagnostic evaluation**, suggesting that in practice areas where access to physicians with expertise in neurodevelopmental disorders is limited, having trained ADOS evaluators may assist primary care physicians, educators, and public health professionals in making an ASD diagnosis more easily,	For those performing ASD assessment (incl. nurses), it is reasonable to use ADOS, a "golden standard" research tool for ASD identification, that produces reliable results	It is reasonable to use a reliable ADS identification tool(s) in ASD assessment	ASD Identification Tool(s)	Tools / Competencies

thus leading to earlier intervention. (art. 8, p. 5)				
Although our data demonstrate that there is a low degree of disagreement between the classification of ASD by the ADOS and by experienced physicians, they also call attention to the **importance of a comprehensive evaluation, given the potential for false positives and false negatives if the ADOS or a similar standardized assessment tool is used alone.** (art. 8, p. 6)	ADOS, although being a reliable ASD identification tool, should not be used alone, but in a combination with other tools/sources to avoid falce positive/negative results.	It is reasonable to use multiple tools/sources in ASD evaluation rather than a single tool.	ASD Identification Tool(s)	Tools / Competencies
This points to the necessity of considering whether or not screening tools are culturally appropriate for the communities in which they are applied. (art. 8, p. 6)	In ASD evaluation, it is reasonable to use of culturally appropriate tool(s) to achieve reliable results.	It is reasonable to use culturally appropriate ASD evaluation tool(s).	Cultural Competence	Tools / Competencies
Clinic staff (who were varied in terms of professional backgrounds but most often included skilled nurses) then entered parents' responses into PEDS Online. (art. 9, p. 50)	Among other employees, nurses were entering parents' responces into PEDS Online.	Nurses facilitated the use of PEDS online by entering there relevant information.	ADS Identification Tool(s)	Tools / Compenetcies
Measures were sometimes (more frequently in clinics) completed in examination rooms, in which case nurses or other staff accompanied families into examination	Nurses were entering parents' responces into PEDS Online.	Nurses initiated the use of a specific ASD identification tool	ADS Identification Tool(s)	Tools / Competencies

rooms, helped them finish partially completed forms, gathered responses by interview or on paper, **entered results into PEDS Online**, and also gathered vital health information. (art. 9, p. 51)				
Healthcare providers wait for caregivers to initiate a discussion about the child for fear of negative reactions or rejection from caregivers. (art. 10, p. 988)	Nurses do not feel confident to initiate ASD identification until parental concerns are expressed	Nurses do not feel confident to initiate ASD identification (Lack of confidence)	Confidence	Tools / Competencies
Detection of developmental disorders, including ASD, as a result of caregiver concern is not an issue when caregivers already have concerns about the child (art. 10, p. 988)	Nurses feel confident to initiate ASD identification when parental concerns are expressed	Nurses feel confident to initiate ASD identification	Confidence	Tools / Competencies
I usually ask trigger questions such as 'How is your child doing during meals, daily routine, or shopping?' or 'How is your child doing at home?' Through these questions, mothers realize their concerns. ... and then, a few months later, I'd probe deeper into what the mother had noticed. (ID10) (art. 10, p. 988)	When ASD is suspected, nurses try to find the best suitable way to direct parental attention to concerns. That way the nurses try to make the parent the initiator of ASD identification (which is seen by nurses as the only way to make it possible to proceed with ASD identification)	Nurses incorporate flexible approach to finding best ways to make the problems get seen	Flexible Approach	Tools / Competencies

Without a standardized screening method, it became difficult to identify children with developmental concerns as only those exhibiting significant unusual behaviour, such as screaming or running, were identified at well-child visits. Public health nurses, paediatricians and caregivers emphasized the necessity of a standard measure for ASD screening. (art. 10, p. 989)	Nurses and other profes-sionals expressed the need for a standard measure for ASD screening.	Nurses expressed a need for standardized ASD identification tool(s)	ASD Identification Tool(s)	Tools / Competencies
Both public health nurses and paediatricians thought they did not receive proper training to perform ASD screening (art. 10, p. 989)	Nurses reported lack of proper training related to ASD identification	Lack of Professional Trai-ning	Professional Training	Tools / Competencies
Most of the healthcare providers reported that they did not know about or had no confidence in early identification of children with potential ASD. They considered that it would be difficult to identify children with potential ASD at 18 months and had to wait to older age when ASD related behaviours became evident. (art. 10, p. 990)	Most healthcare provid-ers, incuding nurses, ex-pressed lack of profes-sional confidence in early identification of ASD.	Lack of professional confi-dence in early ASD identi-fication	Confidence	Tools / Competencies
Nurses underwent a workshop in ASD screening and M-	Knowledge development	Training in ASD screening	Professional Training	Tools / Competencies

CHAT administration. (art. 15, p 1555	through professional training			
M-CHAT/F tool improved sensitivity and specificity over the GDS for detecting ASD. (art. 15, p 1556)	Improvements in ASD detection through utilizing M-CHAT/F screening tool	Benefits in utilizing a specific ASD detection tool	ASD Identification Tool(s)	Tools / Competencies
Maternal and child health nurses were trained to use the **SACS-R and SACS-PR tools** during routine checkups (art. 14, p. 1)	Nurses received training in SACS-R and SACS-PR tools	Professional training in utilizing of screening tools for early autism	ASD Identification Tool(s)	Tools / Competencies
Maternal and child health nurses were **trained** to use the SACS-R and SACS-PR tools during routine checkups (art. 14, p. 1)	Nurses received **training** in SACS-R and SACS-PR tools	Professional training in utilizing of screening tools for early autism	Professional Training	Tools / Competencies
SACS-R showed high diagnostic accuracy, with an 83% positive predictive value (art.14, p. 8)	Diagnostic accuracy of a SACS-R ASD identification tool	High Screening effectiveness through utilization of specific ASD detection tool	ASD Identification Tool(s)	Tools / Competencies
Nurses believe that nursing is characterized by holistic care (art.13, p.320)	Holistic approach	Patient-centered care	Professional Competence	Tools / Competencies
The nurse is there to support and carry it, until they have enough support to cope. Critical reflective inquiry is a useful tool for reflection on nursing practice (art.13, p. 321-322)	Emotional support and reflective practice	Empathy and family support. Self-assessment and improvement	Professional Competence	Tools / Competencies

Nurses believe they have **specific information** and practical expertise" article 12	In their work, nurses benefit from **specific information** and practical expertise	Specific information	Knowledge	Tools / Competencies
Nurses believe they have specific information and **practical expertise**" (article 12, p. 9)	In their work, nurses benefit from specific information and **practical expertise**	Practical expertise	Professional Competence	Tools / Competencies
"Significant increase in self-efficacy for identifying autism signs post-**training**" (art. 12, p. 9)	Significant improvement in self -efficacy for identification of ASD signs after training	Improvements in ASD signs detection after training	Professional Training	Tools / Competencies
"Confidence in discussing autism signs with parents improved after **training**" article 12 p.9	Nurses experienced improvement of confidence in discussing ASD signs with parents (**after training**)	Improvements in confidence after training	Professional Training	Tools / Competencies
"**Confidence** in discussing autism signs with parents improved after training" article 12 p.9	Nurses experienced improvement of **confidence** in discussing ASD signs with parents (**after training**)	Improvements in **confidence** after training	Confidence	Tools / Competencies
SACS-R tool was provided for early detection of social and communication differences article 12 p. 5	Nurses benefitted from utilizing the SACS-R ASD identification tool	Benefitting the use of a specific ASD identification tool	ASD Identification Tool(s)	Tools / Competencies

"**Knowledge** of autism community resources enhanced the nurses' confidence" art. 12, p.9	**Knowledge** of autism community resources is seen beneficial for enhancing the nurses' confidence	**Knowledge** of local resource is beneficial for nurses' confidence	Knowledge	Tools / Competencies
"Knowledge of autism community resources enhanced the nurses' **confidence**" art. 12, p.9	Knowledge of autism community resources is seen beneficial for enhancing the nurses' **confidence**	Knowledge of local resource is beneficial for nurses' **confidence**	Confidence	Tools / Competencies
Nurses play a vital role in monitoring and supporting development in infancy and early childhood Nurses should evaluate children's skills and developmental levels according to age (article 11, p.824,829)	General knowledge of normal child development is the basis for understanding any deviations from normal (incl. ASD)	General knowledge of child development is essential in knowing what is or is not normal	Knowledge	Tools / Competencies
Use of the Knowledge about Childhood Autism among Health Workers (KCAHW) questionnaire (art. 11 p. 825, p. 830)	Use of KCAHW questionnaire helps to identify gaps in ASD related knowledge among health workers (incl. nurses) in order to proceed with necessary upgrades	Identification of excisting gaps in **knowledge** of nurses is essential for necessary upgrades	Knowledge	Tools / Competencies
Autism Spectrum Disorder Screening and Follow-up Program (art. 11 p. 825, p. 830)	Screening and Follow-up Program is beneficial for nurses in upgrading their	Professonal training received through the Screening and Follow-up	Professional Training	Tools / Competency

	skills in screening of ASD as performing necessary follow-ups	Program is beneficial for nurses		
MCHNs received **training** on the early signs of autism and in the use of the Social Attention and Communication Surveillance-Revised (SACS-R) tool (art.12, p.1)	Nurses received **professional training** on early sign of autism and the use of SACS-R ASD identification tool	**Professional training** related to knowing the early signs of autism as well as using the specific ASD identification tool	Professional Training	Tools / Competencies
MCHNs received training on the **early signs of autism** and in the use of the Social Attention and Communication Surveillance-Revised (SACS-R) tool (art.12, p.1)	Nurses received professional training on **early sign of autism**	Improvements in **knowledge of early signs of autism** in nurses achieved through professional training	Knowledge	Tools / Competencies
Knowledge of community resources was the best predictor of confidence in speaking with parents/caregivers about autism (art.12, p.1)	Confidence in discussing ASD related issues with parents/caregivers	Confidence in discussing ASD related issues with parents/caregivers	Confidence	Tools/Competencies
"Significant increase in self-efficacy for identifying autism signs post-training" (art. 12, p. 9)	Significant improvements in self -efficacy for identification of ASD signs after training	Increase in confidence of ASD signs detection after training	Confidence	Tools/Competencies
MCHNs received training on the early signs of autism and in the **use of the Social Attention and Communication Surveillance-Revised (SACS-R) tool** (art.12, p.1)	Nurses received professional training in the use of SACS-R ASD identification tool	Nurses acquired/improved skills in using a specific **ASD identification tool** through receiving a professional training	ASD Identification Tool(s)	Tools / Competencies

Nurses should be able to evaluate children's skills and developmental levels (article 11 p.829)	Nurses need to have sufficient general knowledge of children's development	Sufficient general knowledge of child development	Knowledge	Tools / Competencies
Autism Spectrum Disorder Screening and Follow-up Program article 11 p.830	Nurses benefit from ASD Screening and follow-up program	Beneficial training program in ASD screening and follow up	Professional Training	Tools / Competencies
Use of the Knowledge about Childhood Autism among Health Workers (KCAHW) questionnaire (art.11, p.825)	KCAHW questionnaire is beneficial to determine the knowledge of ASD related issues among health workers	Knowledge of ASD related issues among health workers	Knowledge	Tools / Competencies
Maternal and child health nurses were trained to use the Social Attention and Communication Surveillance–Revised (SACS-R) and Preschool (SACS-PR) tools during routine health checkups to monitor for autism (art. 14, p.2)	Educating nurses on autism indicators and screening methodologies	Utilizing developmental assessments alongside autism-specific tools	Professional Training	Tools / Competencies

Developmental surveillance tools used by nurses achieved high diagnostic accuracy, with 83% positive predictive value, ensuring that most referred children received appropriate support (art. 14, p. 10)	Diagnostic accuracy achieved through the use of developmental surveillance tools	Effectiveness of using relevant tools in developmental assessments	ASD Identification Tools	Tools / Competencies
M-CHAT and GDS screening were conducted by the nurses at the clinics to assess developmental delays in toddlers aged 18–36 months (art. 15, p. 1554)	Screening implementation	Use of evidence-based tools	ASD Identification Tool(s)	Tools / Competencies
M-CHAT/F showed higher sensitivity in detecting toddlers with ASD (70.0%) compared to the GDS (50.0%) (art. 15, p. 1556)	Benefits in using the M-CHAT/F ASD screening tool compared to the GDS ASD screening tool	Some ASD Identification Tools have proven to be more effective/beneficial than the others	ASD Identification Tool(s)	Tools / Competencies
There was moderate inter-nurse agreement (Fleiss Kappa = 0.435) on referrals, highlighting the **need for standardized referral guidelines** and complementary training (art. 15, p. 1557)	Need for standardized referral guidelines was expressed by nurses	Need for standardized referral guidelines	Professional Competence	Tools / Competencies
There was moderate inter-nurse agreement (Fleiss Kappa = 0.435) on referrals, highlighting the **need for** standardized referral guidelines and **complementary training** (art. 15, p. 1557)	Need for professional training was expressed by nurses	Need for professional training	Professional Training	Tools / Competencies

Using both M-CHAT/F and GDS together made it 93.7% effective at spotting developmental delays, while still being 98% accurate (art. 15, p. 1557)	Combination of ASD screening tools is seen to be beneficial	Enhanced detection through the use of combined tools	ASD Identification Tool(s)	Tools / Competencies