

Advanced practice nursing roles, tasks, and outcomes in ophthalmology – a scoping review

Master's thesis

CARING SCIENCE

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Abstract

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The aim of this scoping review was to describe advanced practice nursing roles and tasks in ophthalmology globally and to identify the outcomes for patients, healthcare professionals and leaders. Fourteen articles were identified from CINAHL and PubMed databases. The articles were published between 2012-2022, written in English and described either roles, tasks, or outcomes of advanced practice nursing in ophthalmology. Material was analyzed by using inductive content analysis. Majority of the articles were conducted in the United Kingdom, while quantitative methodology was the most common choice for research methodology. The results of this scoping review are that in ophthalmology, advanced practice nurses have roles, which are linked to coordination, counselling, management, and autonomous practice. The most common tasks are clinical procedures, history taking, triaging and acute eye care, management plan and prescription of medicines. The outcomes of advanced practice nurse role are comparable what is previously known about topic. The advanced practice nurses enable faster access to services, reduce waiting times and improve patient satisfaction. However, despite of positive outcomes, for some patients the role is still unfamiliar. The role of advanced practice nurse in ophthalmology seems well established in the United Kingdom, however, further research is needed how the role could be implemented in the Finnish healthcare system.

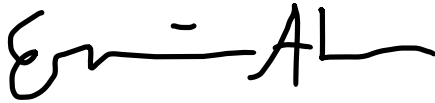
Foreword

”More than machinery, we need humanity. More than cleverness, we need kindness and gentleness.”

- Charlie Chaplin, The Great Dictator (1940)

Writing a thesis can sometimes feel like walking on a lonely road, but luckily, I have received so much kindness and gentleness during my journey and now I have reached my destination. I would like to thank my family, friends, fellow students, colleagues, and superiors for your support. I would also like to thank my thesis supervisor and other teachers at Åbo Akademi University for this two-year journey.

I have not received any funding, scholarship, or grants during this thesis process.

A handwritten signature in black ink, appearing to read 'Eveliina Ahokas'. The signature is stylized with a long horizontal line extending from the end.

Eveliina Ahokas

12.5.2023

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1 Introduction

The International Council of Nurses defines advanced practice nursing as “enhanced and healthcare services and interventions provided by nurses, who in an advanced capacity, influence clinical healthcare outcomes and provide direct healthcare services to individuals, families and communities”. (International Council of Nurses, 2020) The abbreviation APN can either refer to advanced practice nursing as a profession or an advance practice nurse as a professional (Finnish Nurses Association, 2016). APN is an umbrella term, which includes various types of roles, such as Clinical Nurse Specialist (CNS) and Nurse Practitioner (NP), which are the most common roles internationally (Jokiniemi et al., 2020). However, the countries are in different stages of role development and there is diversion in the scope of practice, responsibilities, entry requirements and practice boundaries (International Council of Nurses, 2020). Also various job titles are in use, which causes confusion (Jokiniemi et al., 2020).

The board of Finnish Nurses Association set up an expert working group in 2013, whose task was to determinate the meaning of international term APN in Finland. The expert working group also had other tasks, such as describing the roles and job titles, and defining the competence requirements and type of training required for working as advanced practice nurse in Finnish settings (Finnish Nurses Association, 2016). Development of advanced practice nursing is crucial, because healthcare systems are facing several challenges, such as long waiting lists, insufficient access to services, lack of doctors and increased costs. Establishment of advanced practice nurse role in the organization can help to answer to these challenges by maximizing the use of advanced education, in-depth nursing knowledge and expertise. (Jokiniemi et al., 2020)

According to the article of Ansah et al. (2019) the prevalence of chronic eye diseases increases with age, and it is expected that more eye care services are needed globally as the population is aging. Properly organized eye care services are essential, especially for elderly people, because lowered vision can decrease quality of life and make independent living difficult. Consequently, this can increase the burden of the families taking care of their elderly and cause more expenses to healthcare. If the services are not properly planned to meet the increased demand, it can also increase the morbidity, lead to unmet healthcare needs, extend waiting times, and compromise the quality of care.

According to the knowledge of the author, the advanced practice nurse role is not established as such in the Finnish ophthalmic units. However, there are registered nurses, who perform advanced clinical procedures, such as administration of intravitreal injections. HUS Helsinki University Hospital started to educate registered nurses to administer intravitreal injections in the beginning of 2014 alongside with the doctors but nowadays the majority of injections are given by the educated nurses (Ahvenniemi & Pessinen, 2020). The advanced roles seem to be well established in the British healthcare system. Moorfields Eye Hospital is located in London and there most of the nursing personnel have undertaken specialist studies and other qualifications, usually at degree or master's level. Some of the educated nurses perform advanced procedures, such as minor eyelid surgeries and YAG laser capsulotomies (Feeney et al., 2010). The role of advanced practice nurse in ophthalmology is also established in Australia. According to the article of Kirkwood et al. (2006) a nurse practitioner was responsible for assessing the patients for visually disabling cataract. The nurse practitioner was also responsible for specialist postoperative care of cataract surgery patients. According to the article, there were several positive outcomes: waiting times were reduced, the patients were satisfied, and the service was cost-effective to the hospital. The patients who were cared by the nurse practitioner had better surgery results. As described above, the advanced practice nurse role in ophthalmology can include various tasks and duties. Development of advanced roles in nursing is generally important, not only because of benefits to healthcare services or society, but to safeguard the attractiveness of the nursing profession. Clinical career opportunities with advanced tasks will increase well-being at work (Finnish Nurses Association, 2016). In the study of Wisur-Hokkanen et al. (2015) they explored the advanced practice nurses' experiences of the content of their nursing care. According to the study, the self-confidence of the participants was strengthened, because they had the opportunity to work more independently in the advanced practice nurse role and they were able to take more responsibility for the care and treatment of the patients.

The aim of this scoping review is to describe the roles and tasks of advanced practice nurses working in ophthalmology globally and to identify the outcomes for patients, healthcare professionals and leaders.

2 Background

The development of advance practice nursing started during the 1940s-1960s in the United States of America and spread from there first to other English-speaking countries, such as Canada, the United Kingdom and Australia. In the Nordic countries the development of advanced practice nursing started evolving in the early 2000s (Finnish Nurses Association, 2016; Sheer & Wong, 2008). Advance practice nursing was evolved to answer the need for specialized care, especially in rural areas lacking for doctors (Lowe et al., 2012). However, the lack of doctors continues, waiting times in healthcare are long and chronically ill patients have more demanding care needs (Finnish Nurses Association, 2016; Lowe et al., 2012). According to the Finnish Nurses Association's report (2016) the new roles in nursing are needed to answer the changing health needs of the population, to improve the access to healthcare and to provide healthcare services, which are cost-efficient and high quality. The healthcare sector is also dealing with the availability, recruitment, and retention of the nursing personnel. On global spectrum, the number of nurses in advanced roles is low, but advanced practice nursing and different roles can act as an innovate way to increase the attractiveness of the nursing profession, when there are more advancement opportunities also in clinical careers.

2.1 Advanced Practice Nursing

Advanced practice nursing can be defined as comprehensive healthcare services and interventions, which are provided by nurses with advanced skills in clinical practice, leadership, education, and research. Advanced practice nursing is built on nursing principles with an aim to provide safe and competent patient care to individuals, families, and communities. Advance practice nursing is characterized by a higher level of formal education, a master's degree is considered to be the minimum entry level. Apart from additional education, advanced practice nursing is based on complex-decision making skills, expanded clinical competencies and knowledge base equal to expert (International Council of Nurses, 2020).

2.2 Advanced Practice Nurse

Advanced practice nurse is a nurse, who has a wider range of autonomy, skills, and duties, which are beyond the level of a generalist nurse (International Council of Nurses, 2020). Advanced practice nurses

are often specialized in some are of clinical nursing and they are able utilize research data and develop evidence-based practices (Finnish Nurses Association, 2016).

There are different advanced practice nurse roles depending on the country of practice. Most common ones are clinical nurse specialist, nurse practitioner, nurse anaesthetist and nurse midwife. In the USA all of these roles are well recognized, whereas in the other countries, the clinical nurse specialist and the nurse practitioner are most identified roles (Sheer & Wong, 2008). In Finland, the role of clinical nurse specialist was first advanced nursing role introduced in healthcare and more commonly known compared to nurse practitioner (Jokiniemi, Heikkilä, et al., 2022). In this scoping review, the role of advanced practice nurse is mainly explored from the perspective of clinical nurse specialist and nurse practitioner.

2.2.1 Clinical Nurse Specialist

Clinical nurse specialist (CNS) is one of the most known roles within advanced practice nursing. Clinical nurse specialist is able to provide complex, specialized care while improving the quality of healthcare services. Besides direct patient care, the role often includes indirect care, such as education, research, and support of other nurses. Clinical nurse specialist has often extended role in implementation of changes and improvements in healthcare systems. Clinical nurse specialist's scope of practice is beyond the level of generalist and specialised nurse due to mastery of a certain specialty and advanced critical thinking and decision-making skills. Clinical nurse specialist is able to evaluate how different disease patterns, technological solutions, environmental conditions and political influences impact into nursing care (International Council of Nurses, 2020).

A graduate degree (master's or doctoral) is the preparation level for the role of clinical nurse specialist. However, differentiating specialised nurse and clinical nurse specialist is not always simple, because different titles are used globally and, in some countries, there are nurses with comprehensive experience and expertise in a certain specialty, who however do not have a university or other relevant degree (International Council of Nurses, 2020).

2.2.2 Nurse Practitioner

Nurse practitioner (NP) is a generalist nurse, who has a graduate degree (master's or doctoral) and can work as an autonomous clinician. Nurse practitioner is educated to diagnose and treat different

populations, often in primary healthcare, but also in other diverse settings, such as ambulatory and home care. Care provided by nurse practitioner is a person centred and holistic, and is based on guidelines and nursing principles, focusing also on prevention, health, and patient education. However, the role varies between the countries due to differences in legislation. In many English-speaking countries, such as in the USA and New Zealand, nurse practitioners can independently diagnose, order and conduct laboratory tests, prescribe medications, treat and coordinate the care of their patients (International Council of Nurses, 2020).

Nurse practitioner education varies among countries. A master's degree is considered to be minimum entry level, but education should also include specific studies, such advanced physical assessment, advanced clinical reasoning, pharmacology, and professional leadership. Also supervised clinical practice is recommended (International Council of Nurses, 2020).

2.3 Advanced Practice Nursing in Finland

The first clinical nurse specialist roles were established at the university hospitals in the early 2000s (Finnish Nurses Association, 2016). In 2020, it was estimated that there were over 100 clinical nurse specialists, who mainly worked at the university hospitals. The number of nurse practitioners is estimated to be approximately 400. This number is based on completed master's degrees at the universities of applied sciences (Jokiniemi et al., 2020; Jokiniemi, Heikkilä, et al., 2022). However, defining the exact number of advanced practice nurses in Finland is hard, because the roles are not regulated, and various job descriptions and titles in use (Jokiniemi et al., 2020; Jokiniemi, Heikkilä, et al., 2022; Wisur-Hokkanen et al., 2015). However, the importance of advanced practice nursing and its different roles have been recognized at a national level. The Finnish Nurses Association set up in 2013 an expert working group to determinate the meaning of advanced practice nursing in Finland and to describe different roles and job titles. Their task was also to determinate the competence requirements for different roles. The final report was published in 2016. In the report advanced practice nursing is defined as “independent clinical nursing and health promotion as well as the related ethical decision-making, teaching and instruction, consultation, evidence-based practices, management, cooperation, research and development” (Finnish Nurses Association, 2016).

In the report of Finnish Nurses Association, they describe a model for clinical nursing career and recommend that different organizations should arrange their nursing positions in accordance with a

model to ensure consistent development of different roles on a national level (Finnish Nurses Association, 2016). However, developmental work related to role descriptions and competencies still continues in Finland. Ministry of Social Affairs and Welfare released in 2021 report, where advisory board was set up to make proposals on clinical nursing specialties and relevant competences. The report concentrates on specialist nurse's role definition and factors related to it, such as competences, educational needs and adaptation to working life, however, challenges in current education, healthcare system and legislation are similar to advanced practice nursing (Ministry of Social Affairs and Health, 2021).

2.4 Outcomes of Advanced Practice Nursing

Maier et al. (2016) conducted a scoping review, in which the studies suggest that up to 93% of primary care services could be delivered safely by the nurse practitioners. This result cannot be directly generalized into specialized healthcare, but it shows that nurse practitioners could fill unmet needs in healthcare system. Globally healthcare systems are under the pressure due to increase of chronically ill patients and their high care needs, not to mention lack of healthcare personnel and long waiting times (Finnish Nurses Association, 2016; Lowe et al., 2012; Maier et al., 2016). In the article of Wisur-Hokkanen et al. (2015) they explored promoting factors in the development of APN practice in Finland. In the article the participants stated that they were able to provide more holistic care to their patients and had more deeper understanding of the patients' state of health through careful observation and listening. The participants gained more self-confidence already during the education, which was further strengthened when they were given opportunity to work more independently. Due to stronger self-confidence the participants were able to step up and offer their consultation help to colleagues, which was needed especially in situations, where the patient's state of health was deteriorating while waiting for the doctor. Compared to the nurse practitioner's role, the clinical nurse specialists tend to have less direct patient care, but they are important in facilitating the usage of evidence-based practices in the healthcare organizations and in coordinating the care of patients with complex needs (Jokiniemi, Heikkilä, et al., 2022). The clinical nurse specialists also promote co-operation between different units and improve the flow of information, which will eventually show in mutual understanding of patient care processes and integrated practices. This will further enable movement of personnel between different units (Jokiniemi, Kärkkäinen, et al., 2022)

The patients are usually satisfied with the services provided by the advanced practice nurse. In the article of Wisur-Hokkanen et al. (2015) some patients groups even preferred the advanced practice nurses over the doctors, such as young parents with children and elderly people, because the advanced practice nurses had more time for them. To have more time for the patients is also mentioned in the article of Eriksson et al. (2017), where they explored the patients' experiences in Swedish primary care. The patients felt that the advanced practice nurses genuinely listened to them and were interested of them. The patients described that they were not always taken seriously by the doctor and that the atmosphere at the doctor's appointment felt rushed, whereas the advanced practice nurse was described to be more relaxed, but efficient. Besides this, the patients were able to see the advanced practice nurse with short notice, which was positive experience since they often had to sit for long time in waiting room.

Woo et al. (2020) examined in their article registered nurses' perception against advanced practice nursing in Singapore. Most of the registered nurses agreed that increased supply of APNs would have positive outcomes on the quality of healthcare by improving factors such as effectiveness of care, patient-centricity, waiting times, cost-effectiveness, safety, and equality. The registered nurses considered that having the advanced practice nurse role in healthcare had improved the public image of nursing. However, actual interest of becoming an advanced practice nurse was low within the participants. The greatest concern was related to the need to study and the second one was that the interested registered nurses were not identified as suitable candidates for the role by their supervisors.

2.5 Ophthalmic Nursing

Ophthalmology as a specialty is unique, because it includes patients from all ages, from preterm babies to elderly people. Care needs of these patients are caused by various reasons, such as trauma, acute or chronic disease or need for rehabilitation (Shaw & Lee, 2017). According to the report of WHO (2019) eye conditions are very common and all who live long enough will experience at least one eye condition during their lifetime. Globally, the number of people suffering from vision impairment or blindness is estimated to be at least 2.2 billion. It is also estimated that at least 1 billion of these people have a vision impairment, which could have been prevented. In Finland, the number of people with vision impairment is estimated to be around 50 000-60 000. The biggest group consists of elderly over ages 85 and over. The three most common eye conditions in Finland are age-related macular degeneration, hereditary retinal dystrophies and disorders of optic nerve and visual pathways (Finnish Federation of the Visually Impaired, 2021). Globally, the leading causes of vision impairment are age-related macular degeneration,

cataract, diabetic retinopathy, glaucoma and uncorrected refractive errors (World Health Organization, 2022). However, not all eye conditions cause vision impairment and global estimates of the number of people with at least one eye condition are lacking (World Health Organization, 2019)

Lack of healthcare professionals is one of the biggest challenges when considering the availability of eye care services. According to the report of WHO (2019) the use of eye care services is reported to be greater in high-income countries compared to low- and middle-income countries. The use of eye care services is impacted by the factors such as the availability, accessibility, affordability, and acceptability of services. Non-medical healthcare professionals, such as ophthalmic nurses and optometrists are important especially in the management of different eye conditions. Nurse-led clinics can increase the coverage of health services. In the article of Atkison-Briggs et al. (2022) they explored diabetes eye screening coverage and patient adherence to national eye screening recommendations in a nurse-led clinic operating with Indigenous Australians. According to the article, Indigenous Australians have higher risk to develop diabetes compared to non-Indigenous Australians and most of the people with diabetes live outside major urban areas. Nurse-led clinic combined eye screening and diabetes education, which was personalized according to the screening results. The results were that the patient adherence was improved, and acceptable eye screening coverage was reached.

Ophthalmic nursing requires not only good knowledge about different eye conditions and their treatment, but also knowledge regarding other specialties, such as neurology, endocrinology, rheumatology, and oncology, since all these include diseases which can cause eye symptoms. At the advanced level, ophthalmic nurses are also responsible for managing some patient groups, such as patients with stable glaucoma, cataract, or ophthalmic emergencies. Ophthalmic nursing has some characteristics, which differentiates it from other specialties. As mentioned earlier in this section, patients with eye conditions can be from any age group, which means that the nurse should be familiar with special requirements related to age, especially in children and elderly. The nurse should also have knowledge how to approach and care for visually impaired people (Shaw & Lee, 2017). The possibility of becoming blind can be very stressful for the patients, especially if their eye condition is chronic or not curable, such as wet age-related macular degeneration. Treatment process can also cause stress for the patients, which can be alleviated with good nursing care. In the article of Emfors et al. (2017) the patients receiving treatment for wet age-related macular degeneration experienced good nursing care, when the ophthalmic nurse was respectful and engaged, encouraged them to participate in planning and decision making, and created confidence.

Shaw and Lee (2017) describe ophthalmic nursing tasks in British healthcare system. They offer a comprehensive list of tasks in different settings, including outpatient clinic, emergency clinic, day surgery unit and ward. The list includes tasks such as taking conjunctival swabs, removing sutures, removing and inserting contact lenses, installing drops and ointments, testing for dry eyes, applying eye bandaging, taking and recording visual acuity, examination of the eye with a torch or a slit lamp, removal of conjunctival and superficial corneal foreign bodies, irrigation of the eye and performing minor surgeries. Besides these tasks, also measuring the vital signs and taking laboratory tests are considered to be part of ophthalmic nursing, because the patients may have other underlying conditions, which can cause eye symptoms. Other nursing tasks, which are more general, however equally important, when treating patients with eye conditions are history taking, patient education and health promotion.

3 Previous research

The role of advanced practice nurse in ophthalmology is not previously studied in Finland. There are theses concerning nurse-led intravitreal injection services, however the roles and tasks described in them are more of the level of specialist nurse than advanced practice nurse. Even though the Finnish Nurses Association (2016) has defined in their report the education requirements and job descriptions for specialist nurses and advanced practice nurses, in practice, the difference between these two roles is vague, because current legislation does not recognize advanced roles in nursing. Because of lack of national consensus, it is up to the different organizations to determine which level of nursing roles they employ and which titles they prefer to use (Jokiniemi et al., 2020). Viholainen (2018) conducted qualitative research in her master's thesis about the content, significance, and developmental needs of the role of clinical nurse specialist in HUS Helsinki University Hospital. She interviewed eleven clinical nurse specialists and three Nurse Directors. The results were that CNSs had six different main roles, which were: (1) developer of nursing; (2) contributor of nursing operating plan; (3) educator; (4) researcher; (5) supporter and (6) partner. According to the participants, the most important tasks of clinical nurse specialists were development of evidence-based practices, renewal of nursing care and promotion of know-how among nursing staff. None of the research participants were involved in direct patient care, which reflected their responses of tasks of clinical nurse specialist. The research pointed out that the role of clinical nurse specialist is still unfamiliar to many, and it should be brought into knowledge of leaders and other healthcare professionals.

In global settings, there are countries, such as the United Kingdom, where the development of the ophthalmic advanced practice nurse role has been going on for several years. In addition to the examples mentioned in the introduction section, the ophthalmic nurse practitioner role is seen relevant in eye conditions, which require long-term follow-up, such as melanocytic uveal tumors. In the study of Sandinha et al. (2012) they set up a nurse-led ocular oncology unit as a trial. Nurse practitioners working in the unit were skilled nurses with many years of experience in ophthalmology. The lead nurse in the unit received training in ocular slit-lamp examination, ophthalmoscopy, ultrasonography, and interpretation of ocular photographs. The results were similar compared other studies focusing on nurse-led clinics: the patients were satisfied with the service and the workload of the doctors was decreased. However, the study states that the number of the patients that the ophthalmic nurse practitioners examined was small, because of selection criteria. Another problem is that the role of ophthalmic nurse

practitioners does not necessarily exist in every ocular oncology clinic and there may only be ophthalmologists present.

Another eye-related condition which requires long-term follow-up is diabetes. A study conducted in Australia states that the prevalence of diabetes is increasing, which also increases the workload of ophthalmic units, because regular eye reviews are needed among diabetic population. A nurse-led diabetic retinopathy screening clinic was established and the ophthalmic nurse practitioners reviewed patients, who had already been seen in an eye clinic previously and who were due for yearly diabetic eye examination. The nurse practitioners took a full ophthalmic history from the patients attended to the clinic, which included examinations such as measuring visual acuity and intraocular pressure, inspection of pupils and anterior segment with slit-lamp. After these examinations, the pupils were dilated with eye drop and fundal examination was performed by using slit lamp biomicroscope and a lens. The presence and severity of any diabetic retinopathy was recorded. Besides the actual eye review, the patients were emphasized about the importance of blood sugar control and regular follow-ups. The nurse practitioners booked follow-ups after the assessments. Certain patients were signed up for nurse-led clinic, but more demanding patients were referred to ophthalmologists according to agreed standards. In the study there was a high concordance of diabetic retinopathy assessment between ophthalmologist and ophthalmic nurse practitioner, which lead to continuity of nurse-led clinic (Kirkwood et al., 2006).

Long waiting lists in ophthalmology seems to be global phenomena, so as lack of healthcare professionals. Slight et al. (2009) describe in their article the situation in New Zealand, where glaucoma clinical nurse specialist role was established in a large metropolitan hospital to answer growing glaucoma waiting list. The role of the clinical nurse specialist was to assess all patients referred for first specialist assessment of glaucoma with certain criteria and make a clinical decision as to the degree of risk for glaucoma. After the assessment the patients were either referred to a consultant clinic, or rebooked to the nurse specialist clinic, or discharged from the clinic. Besides assessing new patients, the nurse specialist also reviewed stable glaucoma or glaucoma suspect patients, which released appointment times for ophthalmologist. There was a decrease in waiting list after the establishment of nurse specialist role, however the impact of the role was lower in more complex cases, which needed to be referred to consultant clinic. The study pointed out that besides lowering the number of the patients waiting for first assessment, the nurse specialist can provide one-on-one education for the patient and the family, which often improves concordance to treatment. Increased concordance has several positive outcomes, which

are not only related to better health results, but also in decreased demand of outpatient services. The clinical nurse specialist role has the potential to contribute considerably to the cost-effective utilization of healthcare resources.

Besides working with chronic eye conditions, the role of ophthalmic nurse practitioner can be established in emergency care. In the article of Kirkwood et al. (2005) an ophthalmic nurse practitioner led emergency eye clinic was established to increase the capacity of clinical services, which released the ophthalmologists for other duties, such as running consultative clinics and perform surgeries. The clinic took place in Flinders Medical Centre, which is a university-based teaching public hospital servicing the southern areas of Adelaide and South Australia. Before the establishment of nurse-led clinic, the scope of practice was defined by the senior ophthalmology staff and cases beyond that scope were referred into subspecialty ophthalmology clinics. In order to secure the continuity of care, the scope of practice also included administration of ophthalmic medicines and ordering laboratory tests. The scope of practice was extended to include administering topical steroids with agreed clinical situations and ordering corneal scrapes for herpes simplex and microbial analysis after postgraduate studies in pharmacology and comprehensive anterior segment training. Similar to other studies mentioned previously in this thesis, the assessment performed by the ophthalmic nurse practitioner included taking detailed patient's history, visual acuity, and a slit-lamp examination of anterior segment. Additional assessments were carried out if the patient's history, clinical signs, or symptoms indicated so. These assessments were measuring the intraocular pressure with Goldmann tonometry, refraction, testing the colour vision with Ishihara plates, evaluation of extraocular movements, testing the visual fields and indirect ophthalmoscopy examination using a lens. After the assessment the nurse practitioner continued care of the patient or referred him/her to the ophthalmologist. The role of the nurse practitioner included assessment and treatment of various eye conditions such as, trichiasis, dry eyes, allergic conjunctivitis, blepharitis, contact lens-related abrasion. Besides clinical assessment, the ophthalmic nurse practitioners provided patient education and health promotion within each visit. During the study, there was a high concordance between the ophthalmic nurse practitioner and the ophthalmologist, who confirmed the diagnoses and treatment plans determined by the nurse practitioner. According to the study there are several advantages of the establishment of the ophthalmic nurse practitioner role, such as expansion of ophthalmic workforce and increased access to emergency eye care. The ophthalmic nurse practitioners can provide safe care without need for ophthalmologist assessment or unplanned reattendance. The nurse-led clinic can also be cost-effective option and when comparing the junior registrars who often operate in emergency eye clinics

within public hospitals, the nurse practitioners are often more familiar with clinical settings and more experienced in managing patients with ophthalmic conditions (Kirkwood et al., 2005).

According to the article of Kyriacos et al. (2009) the key role of ophthalmic nurse practitioner is prevention of avoidable blindness. Blindness can result as decreased independency, but also as loss of income, dignity, and self-worth. In the article they examined the clinical skills required for the ophthalmic nurse practitioners working in tertiary level hospitals in Western Cape, South Africa. Initial problem was that there were educated ophthalmic nurse practitioners, but the role was undefined and there was uncertainty, were these professionals able to work in full range of their skills at tertiary level. Besides examining required skills for ophthalmic nurse practitioners, the study was also interested in perceptions of relevant healthcare professionals towards these skills. There was an agreement among all respondents that the ophthalmic nurse practitioners should be able to take patient histories, use a Snellen chart, irrigate eyes, insert and remove an ocular prosthesis, educate patients and manage chemical burns. However, there were differences among subgroups of professionals with certain competencies. Skills such as usage of diagnostic B-scan, probing and syringing lacrimal duct, management of corneal rust ring were some of those, which were not seen as competencies expected from the ophthalmic nurse practitioners. According to the article, residents, nurse managers and technicians were more cautious over the ophthalmic nurse practitioner role than the ophthalmologists and other nurse practitioners. This might be due to lack of knowledge of the role itself. Failure to utilize the full capacity of skills that the nurse practitioners have can act as a barrier to role development. Limited understanding of the clinical skills required for the ophthalmic nurse practitioners results in insufficient use of highly skilled nurses. The skills required from the ophthalmic nurse practitioners should be optimized to enhance quality of care, increase the number of patients assessed, shorten waiting times and release the ophthalmologists from some basic examinations (Kyriacos et al., 2009).

4 Aim and research questions

The aim of this scoping review is to describe the roles and tasks of advanced practice nurses working in ophthalmology globally and to identify the outcomes for patients, healthcare professionals, and leaders.

The research questions are:

- 1) What are common roles and tasks of the advanced practice nurses working in ophthalmology?
- 2) What outcomes does the role of advanced practice nurse in ophthalmology have for patients, healthcare professionals and leaders?

5 Method

Scoping review is a research method, which identifies and maps relevant information regarding the topic of interest (Peters et al., 2021). A scoping review aims to provide an overview of existing information rather than produce critically appraised and synthesized results (Munn et al., 2018). This review method was selected, because knowledge related to advanced practice nursing roles in ophthalmology is scattered. Arksey and O'Malley (2005) introduced the original framework for conducting scoping reviews, which has later been extended by the authors such as Levac et al. (2010) and Peters et al. (2020). The original framework included five steps. Peters et al. (2020) have proposed enhancements, which has increased the number of steps up to nine. The steps are: (1) defining the objectives and questions; (2) developing the inclusion criteria; (3) describing the search design; (4) searching for the evidence; (5) selecting the evidence; (6) extracting the evidence; (7) analysis of the evidence; (8) presentation of the results; (9) summarizing the evidence in relation to the purpose of the review. JBI Manual for Evidence Synthesis (Peters et al., 2020) was followed when conducting this scoping review. The PRISMA-ScR was used to describe the search process.

5.1 Design and context

The search design should be as comprehensive as possible within the limits of time and resources. Both published and grey literature relevant to the research topic are identified (Peters et al., 2020). Grey literature is a group of literature, which is not published through commercial publishers. It can include literature, such as theses and dissertations, reports, and other documents, which are published by government agencies, academic institutions, and other groups (Aromataris & Munn, 2020). Opinion essays and medical papers were decided to be excluded from this scoping review. CINAHL, PubMed and Google Scholar were selected for screening evidence by the author. All healthcare settings were accepted in this scoping review because ophthalmic nursing can be provided both in primary and specialized healthcare.

5.2 Selection process

Two online databases (CINAHL and PubMed) were used to screen the research evidence. The main search terms were: (1) ophthalmic nurse/nursing; (2) advanced practice nurse/nursing; (3) clinical nurse specialist; (4) nurse practitioner combined with ophthalmology related search terms, such as "ophthalmology", "ophthalmic", "ocular" and "eye or eyes". The main search terms were combined also

with related search terms “roles or responsibilities or duties or jobs” and “outcomes or effects” to answer the research questions. These search terms were selected to obtain relevant evidence and they were discussed together with the librarian.

Inclusion criteria for the articles were: (1) published between 2012-2022; (2) written in English; (3) full-text available and (4) the content relevant to the research questions. These inclusion criteria were selected to limit the amount of research results and to ensure the usage of most recent knowledge essential to the thesis topic.

Google Scholar was used to search grey literature. Compared to PubMed and CINAHL, Google Scholar has restricted possibility to set limiters, which resulted in very high number of search results. This was repeatable with all search terms. First 20 results of each search were assessed, and it was distinct that most of the articles were not relevant to the topic or there were no full-text available.

The search process was conducted one database at the time. Advanced search was used in both CINAHL and PubMed. The search terms and inclusion criteria were used in both databases, however the relevancy and the number of articles varied according to the database. The first step of search process was application of search terms. After that the inclusion criteria were added as limiters. Duplicates were removed in this point. In case the number of results was decent (less than 20), all the articles were read through, but if the number was higher, the articles were first assessed according to their headings and summaries. In this point, the articles which were not relevant to the topic were excluded. The selected articles were then discussed with the thesis supervisor and some articles were excluded, because they did not meet the inclusion criteria. After this process, altogether fourteen articles were selected for further analysis.

The literature search was conducted in January 2023. Altogether 1530 articles were identified from CINAHL and PubMed. After application of the inclusion criteria, 1345 were excluded. Duplicates were removed from the remaining 185 articles, which decreased the number to 157. The articles were screened according to the titles and abstracts, which lead to exclusion of 59 articles. A total of 98 articles were retrieved for consideration and after a full-text review, 81 articles were excluded.

17 articles were included and discussed with the thesis supervisor, which lead to exclusion of three more articles, because they were written from the registered nurse perspective, not the advanced practice nurse.

Altogether 14 articles from CINAHL and PubMed databases were included. Selection of these articles was based on the inclusion criteria and their relevancy to the research questions. The search process is summarized in the PRISMA-ScR diagram shown in Figure 1.

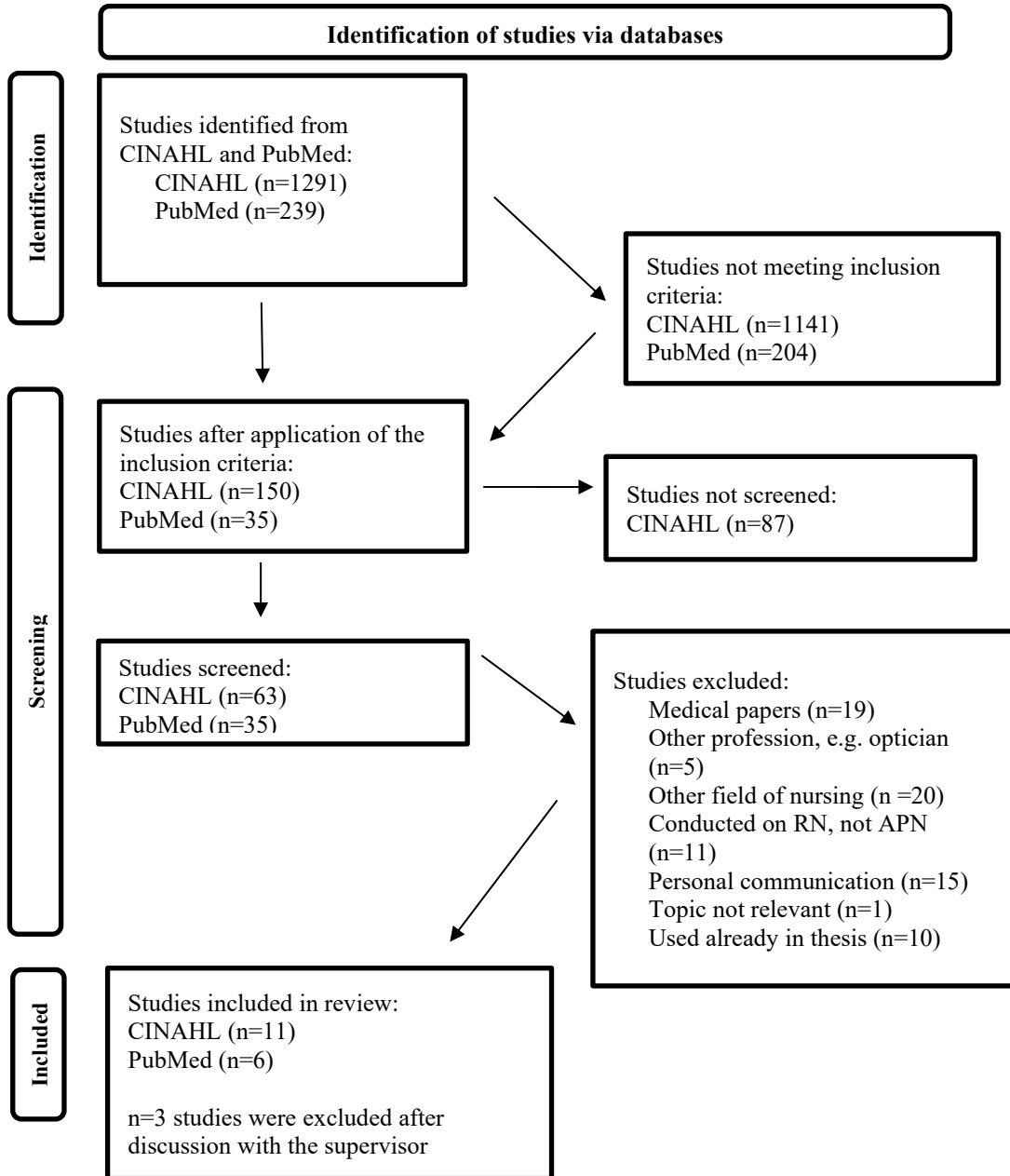


Figure 1. The PRISMA-ScR diagram. The search process.

5.3 Data collection and material

Data extraction was performed according to JBI Manual for Evidence Synthesis guidelines (Peters et al., 2020). The summary of the results can be seen in Appendix 1. Data extraction table. Data was extracted by one author.

5.4 Data analysis

The included articles (n=14) were analyzed by using inductive content analysis to identify roles, tasks, and outcomes. First step of inductive content analysis is open coding, where headings are written in the text while reading it. Headings are used to create categories, which are then grouped in higher order headings. The aim of grouping data is to reduce the number of categories by combining those that are similar into higher order categories (Elo & Kyngäs, 2008). In this scoping review, higher order categories are based on the research questions. These categories are the different roles of advanced practice nurses, the identified tasks of the advanced practice nurses and the outcomes for different stakeholders. The sub-categories below different roles of advanced practice nurses are autonomous practitioner, coordinator, counsellor, and manager. The sub-categories below the identified tasks of the advanced practice nurses are clinical procedures, history taking, triaging and acute care, management plan and prescription of medications. The sub-categories below the outcomes are efficient care, high quality care for the patients, improved patient satisfaction and improved access to care. The analysis process and created categories were discussed with the thesis supervisor and based on that discussion, the names of the categories were modified.

6 Ethical considerations

According to the guidelines of Åbo Akademi University (2022), an ethical assessment is not needed for scoping review since there is no interaction with the research subjects. The topic for this thesis emerged from practice and it was discussed with the author's superiors. The guidelines of HUS (2022) state that if the thesis is conducted as a review, and no data is collected from the employees or the patients, a research permit is not required.

The research must be conducted according to the responsible conduct of research. The national guidelines created by the Finnish National Board on Research Integrity TENK (2023) were followed during the whole writing process.

Selection of the included articles was based on the inclusion criteria and their relevancy to research topic. No articles were excluded because of age, ethnicity, gender or race of the initial writers or the study participants. Citations and references were marked carefully according to the guidelines of the Finnish National Board on Research Integrity TENK (2023), because published literature was utilized while conducting this scoping review.

7 Results

Altogether 14 articles from CINAHL and PubMed databases met the criteria for review. The included articles were published between 2013 and 2021. Almost all the articles (n=13) were conducted in the United Kingdom, which may demonstrate established position of ophthalmic nursing in the country. There was only one (n=1) article, which was conducted outside of the United Kingdom. The article described different roles, tasks and outcomes of advanced practice nurses working in the Pacific Island Region, including countries such as Fiji, Kiribati, Papua New Guinea, Samoa, Solomon Islands, Tonga, and Vanuatu. The most used professional title was nurse practitioner (n=7) and its variations, such as specialists nurse practitioner (n=1), ophthalmic nurse practitioner (n=1), advanced nurse practitioner (n=2) and hospital development nurse practitioner (n=1).

All types of articles were accepted to this scoping review, except opinion essays and medical papers, which were already excluded during the search process. Ten of the articles were regarded as research studies and remaining four were descriptive articles, with no actual research design. Most of the included research studies had a quantitative design. Quality appraisal was not conducted on included articles.

In this scoping review, inductive content analysis was used to form categories, which describe the roles, the tasks, and the outcomes of advanced practice nursing in ophthalmology.

7.1 The different roles of advanced practice nurses

Four main roles were identified from data. First of them was a coordinator's role. As a coordinator, the advanced practice nurse acted as a professional link between the service users and the providers. For example, the role of advanced practice nurse in tissue donation was to monitor and predict the requirements for transplantation in order to meet the needs of the recipients. Coordination was needed to ensure that all the possible parties were informed and able to recognize the potential donors (Winstanley et al., 2020). In remote areas, the advanced practice nurse was often responsible for coordination of both preventive and acute eye care services, including organizing the patient transfers to more specialized healthcare facilities (Machin, 2017).

Second role identified from data was the counsellor's role. The advanced practice nurse offered counselling to the patients, but also to other healthcare professionals and family members (Mapani, 2013;

Winstanley et al., 2020). As a counsellor the advanced practice nurse offered psychological support for the patients and helped them to connect with relevant third-sector organization. Health promotion was considered as part of counselling, for example the advanced practice nurses educated patients with diabetic retinopathy about good glycaemia control during the follow-up visits (Mapani, 2013). The counsellor's role was important in tissue donation. The family members of the potential donor needed counselling in order to make an informed decision about donating tissue for transplant (Winstanley et al., 2020).

Third role was a manager. The nurse-led clinics were often run by the advanced practice nurses (Dunlop et al., 2020; Gallagher, 2017; Hasan et al., 2017, 2020; Hughes, 202). Besides running the nurse-led clinics, the advanced practice nurses also had more traditional management positions at the hospitals. In the Pacific Island Region, the advanced practice nurses were responsible for development and facilitation of the national eye plans (Machin, 2017).

Fourth role identified from data was an autonomous practitioner. During the analysis, this role seemed to appear more often compared to the other roles. The advanced practice nurses who had an autonomous role often worked in the nurse-led clinics (Dunlop et al., 2020; Gallagher, 2017; Hasan et al., 2017, 2020; Hughes, 2020). In some units, the advanced practice nurse acted as a member of a multidisciplinary team consisting of several healthcare professionals, even though their role was autonomous (Bubb et al., 2021; Moussa et al., 2023; Raman et al., 2021). The autonomous practitioner role was common in high volume clinics, such as emergency services and cataract pre-assessment clinics (Rattanasirivilai & Shirodkar, 2021). The role was in some cases very extent, and the advanced practice nurses had additional authorizations, such as right to prescribe (Dunlop et al., 2020; Hughes, 2020; Machin, 2017). In most of the cases, the autonomous practitioner did not have prescription rights, but he/she was otherwise responsible for assessment and management of the patients (Bubb et al., 2021; Machin, 2017; Moussa et al., 2023). The advanced practice nurses were in some remote areas the first point of contact and retained a position as the primary referral point (Machin, 2017)

There were two examples in data concerning a situation, where the patients were not familiar with the role of advanced practice nurses and had prejudices towards the role. Some patients felt that the advanced practice nurses are less educated and experienced than the doctors. These patients preferred to be treated by the doctors (DaCosta et al., 2014; Gallagher, 2017).

7.2 The identified tasks of advanced practice nurses

The most common tasks of the advanced practice nurses in ophthalmology were grouped into sub-categories, such as clinical procedures, history taking, triaging and acute eye care, management plan and prescription of medicines. Clinical procedures was the most extensive sub-group of tasks, in which the most common procedure was administration of intravitreal injections (DaCosta et al., 2014; Hasan et al., 2017, 2020; Machin, 2017; Mapani, 2013; Rattanasirivilai & Shirodkar, 2021; Simcock et al., 2014) This sub-category included other clinical tasks, varying from more general tasks such as assessment of the patients to more specific and complex procedures, such as performing YAG laser capsulotomy (Moussa et al., 2023; Rattanasirivilai & Shirodkar, 2021). Most of clinical procedures were performed at the hospital settings, however there was one example, where the patient assessment was carried out remotely by using medical video consultation software, which was loaded to the patients' smartphones or computers (Hughes, 2020).

History taking may not seem like an advanced task, however its importance cannot be underestimated. Patient's history was assessed during the follow-up visits, which provided a chance for the advanced practice nurse to discuss health issues and possible treatment options with the patient (Hughes, 2020; Mapani, 2013). History taking enabled creation of holistic view of the patient's situation and helped to clarify the reasons behind the condition and assess its impacts on the patient (Dunlop et al., 2020). History taking promoted safety in situations, where tissue was transferred from a donor to a recipient. The quality of tissues was ensured by ruling out any chances of contracting any transmissible illness (Winstanley et al., 2020).

Triaging and acute care emerged as one of sub-group of tasks. Acute care and ability to provide it was highlighted in situations, where the advanced practice nurse was the first point of contact (Machin, 2017). Triaging was actively conducted and advanced practice nurses involved were confident with their skills (Rattanasirivilai & Shirodkar, 2021). Triaging alleviated patients' access to relevant clinics, where to further care of the patients were conducted. In case of acute situation, the advanced practice nurse was able to obtain consent, request medical imaging, order investigations and refer the patients for further assessment (Mapani, 2013).

The advanced practice nurses were often responsible for creating a management plan for the patients. The management plan entailed documentation of findings, diagnosis, and treatment options. Creation of management plan required good decision-making and communication skills from the advanced practice nurses, who also conducted surgical plans including consent taking, if surgical treatment option was considered (Dunlop et al., 2020). The management plan was formulated to meet the needs of each individual patient, even though the treatment options may be standard (Bubb et al., 2021) Besides creating management plan for individual patients, in some countries the advanced practice nurses were responsible for creating a national management plan to meet the eye care needs (Machin, 2017).

Not all the advanced practice nurses have right to prescribe due to legislative reasons (Machin, 2017). However, right to prescribe was often prerequisite for running nurse-led clinics. It allowed the advanced practice nurses to treat the patients from the beginning to the end, which was considered motivating for the nurses themselves (Hughes, 2020). The medicines that the advanced practice nurses were able to prescribe varied from country to country, most common medicines that they were able to prescribe were topical anesthetics, diagnostic ophthalmic dyes and topical mydriatics (Machin, 2017). In one example, if the patient did not required medical care, the advanced practice nurse took over, prescribed the needed medications and either organized follow-up visits or discharged the patient (Dunlop et al., 2020).

7.3 The outcomes for different stakeholders

Different outcomes of the role of advanced practice nurse were identified from data. Mostly the outcomes were described from the patient perspective. In many cases, care provided by the advanced practice was considered to be high-quality and the patients were satisfied (Bubb et al., 2021; DaCosta et al., 2014; Dunlop et al., 2020; Gallagher, 2017). The patients were satisfied, because waiting times were shorter, care was consistent and the healthcare professional stayed the same during the whole treatment process (Hasan et al., 2017; Mapani, 2013). From the patient perspective, the advanced practice nurses provide safe care, with minimal or no complications (DaCosta et al., 2014; Raman et al., 2021; Simcock et al., 2014). There was one example, where the patients treated by the advanced practice nurse had better treatment results compared to the patients treated by the ophthalmologist (Moussa et al., 2023). In many cases, where the advanced practice nurse and the doctor assessed the patients individually, they reached

high level of agreement regarding examination, diagnosis and management (Bubb et al., 2021; Dunlop et al., 2020)

There were couple outcomes related to time of the patients. The patients felt that the advanced practice nurses had more time to listen them and answer their questions (Gallagher, 2017). The role of advanced practice nurse enabled patients' faster access to eye care services (Raman et al., 2021). Especially in the rapid access clinics, the patients were assessed and treated within the same day (Mapani, 2013).

The role of advanced practice nurse was often established to answer increased demand of services. The throughput in nurse-led clinics was comparable to the number of new patients, which were usually seen by the doctor. This lead to shorter waiting lists (Dunlop et al., 2020; Hughes, 2020). The number of performed procedures often increased, when the advanced nurse nurses were introduced to the unit (DaCosta et al., 2014).

However, all the outcomes of the role were not positive. There were organizational challenges, since the establishment of the advanced practice nurse role required creation of a protocol, further training and education, and arrangement of a mentor. All of this demanded time and effort from the organization. A possibility for increased usage of supportive services was mentioned too (Dunlop et al., 2020). Another negative outcome was that even though there was often a high agreement between the doctor and the advanced practice nurse, there were also patient cases, which were misdiagnosed by the advanced practice nurse. The advanced practice nurse should work alongside with the medical professionals to gain more experience and expose to diverse patient cases (Bubb et al., 2021).

8 Discussion

The aim of this scoping review was to describe the roles and task of advanced practice nurses working in ophthalmology globally and to identify the outcomes for patients, healthcare professionals, and leaders. According to the results of this scoping review, the roles in ophthalmology are linked to coordination, counselling, management, and autonomous practice (Dunlop et al., 2020; Machin, 2017; Mapani, 2013; Winstanley et al., 2020). According to the report of International Council of Nursing (2020), the advanced practice nurse role can be defined with so called four pillars, which are research, education, leadership, and clinical practice. A role related to research was not identified in this scoping review, however other roles fall under these four pillars if liberally interpreted.

Some of the advanced practice nurses in ophthalmology are able to conduct autonomous role in its full extent. Nurse-led clinics are often run by the advanced practice nurses and there the nurses themselves are responsible for overall care of the patients, including assessment, diagnosis, and treatment (Dunlop et al., 2020). Operation of nurse-led ophthalmic clinics have been described already in the early 2000s (Sandinha et al., 2012; Slight et al., 2009). Based on the results of this scoping review, there is not much differentiation in the autonomous role in nurse-led clinics when comparing to earlier studies, but further definition of roles and tasks has happened. However, it should be pointed out that new ways to conduct nurse-led clinics are emerging. A nurse-led keratoconus virtual clinic was set up in response to the Covid-19 pandemic to monitor patients with stable keratoconus. The patient assessments were carried out by using medical video consultation software, which was installed to the patients' smart devices. The patients were satisfied with this kind of service, because it reduced time spent in the hospital (Hughes, 2020).

Data extraction of the included articles demonstrates that the advanced practice nurses in ophthalmology have various titles, from which the nurse practitioner and its variations are the most commonly used (Bubb et al., 2021; DaCosta et al., 2014; Dunlop et al., 2020; Gallagher, 2017; Hasan et al., 2017, 2020; Hughes, 2020; Mapani, 2013; Moussa et al., 2023; Raman et al., 2021; Simcock et al., 2014; Winstanley et al., 2020). The title of nurse practitioner refers to autonomous role according to the report of the International Council of Nurses (2020) and this role was identified also in this scoping review. It should be pointed out that titling was not studied in this scoping review, but it is important to highlight its meaning to the role development. According to Wheeler et al. (2022) having a defined and protected title

provides a frame to the leaders and public to which refer when they are considering the role, tasks, and outcomes of advanced practice nursing. Title protection would also ensure that advanced practice nursing is conducted by the professionals, who meet the regulatory standards.

The level of autonomy varies among the advanced practice nurses. Even though right to prescribe is not adequate counter when considering the level of autonomy, it enables implementation of more comprehensive care and helps to secure continuity of care in situations, where there is for example lack of doctors (Kirkwood et al., 2005). In the report of The International Council of Nursing (2020) right to prescribe is mentioned in several descriptions of the nurse practitioner role as an autonomous professional offering various treatment methods, including medication. In ophthalmic settings, the advanced practice nurses often have limited set of eye drops and medications, which they can prescribe (Machin, 2017). Right to prescribe was identified in this scoping review as one sub-category of tasks related to advanced practice nursing in ophthalmology. In many cases, this task is a prerequisite for running a nurse-led clinic (Hughes, 2020; Machin, 2017). However, it seems more common that there are nurse-led clinics, where the advanced practice nurses implement medication care, but the doctor still retains clinical responsibility for the patient, even though the nurses have an autonomous practitioner role (DaCosta et al., 2014; Gallagher, 2017; Raman et al., 2021).

In the report of the Finnish Nurses Association (2016) it is highlighted that the outcomes of advanced nursing roles must be based on the organizational goals, which are pursued through establishment of new roles. The goals should be concrete and measurable, such as patient satisfaction. In this scoping review, one of the outcomes of the advanced practice nurse role was improved patient satisfaction (DaCosta et al., 2014; Hasan et al., 2017; Mapani, 2013; Raman et al., 2021). Even though factors behind improved patient satisfaction were not thoroughly analyzed in this scoping review, factors such as having more time for the patients, faster access to services, friendly attitude and consistency in care management were identified from the included articles concerning patient satisfaction (DaCosta et al., 2014; Gallagher, 2017; Hasan et al., 2017; Mapani, 2013; Raman et al., 2021). These results are comparable what is previously known about the outcomes of advanced practice nurse role in ophthalmology (Sandinha et al., 2012). Most of the outcomes identified in this scoping review were described from the patient perspective, leaving the outcomes for healthcare professionals and leaders tenuous.

However, the role of advanced practice nurse in ophthalmology is not clear to all stakeholders. In this scoping review, there were two examples describing the prejudices that the patients had towards the role. The patients felt that the advanced practice nurses were less experienced than the doctors (DaCosta et al., 2014; Gallagher, 2017). Prejudices of other stakeholders were not identified in this scoping review, however in earlier research it is recognized that especially residents, nurse managers and technicians may have concerns towards the role of advanced practice nurse, whereas the ophthalmologists showed more acceptance towards the role implementation (Kyriacos et al., 2009). These examples demonstrate that there was and still is lack of knowledge about the role of advanced practice nurse in ophthalmology (DaCosta et al., 2014; Gallagher, 2017; Kyriacos et al., 2009).

9 Methodological considerations

There are some methodological considerations related to this scoping review. First of all, scoping reviews are usually conducted by two or more authors, however in this case there was only one author.

There can be dubious decision made during the process because the author has no previous experience in completing a scoping review or conducting an inductive content analysis. The librarian was consulted during the search process and the selected articles were discussed with the thesis supervisor, who offered her help during the whole writing process, but all the final methodological decisions were left to the author to decide.

It should be also pointed out that some of the articles used in the background section and in the previous research section were conducted over ten years ago, however information in them seemed relevant to the author and this view was confirmed after the analysis of included articles. It seems that even though the roles and tasks have advanced during the years, the advanced practice nurses are performing similar tasks as they were ten years ago.

There were some issues regarding the search process. Most likely there would have been more appropriate search terms available, but in this case the most obvious ones were used due to inexperienced author. All the included articles were either from CINAHL or PubMed and even though Google Scholar was used for evidence screening, no relevant articles meeting the inclusion criteria were found. However, Google Scholar does not provide as many limiters as the other databases do and the amount of evidence was overwhelming for one author. This may had led to exclusion of some relevant articles due to limited time and capacity of one author. Four descriptive articles used in this scoping review are considered as grey literature, however the number is minor, meaning that most likely the full extent of available research is not entirely covered.

Quality appraisal on the included articles was not performed, since it is not mandatory in scoping reviews. All types of research studies and descriptive articles were included in this scoping review. All the included articles met the inclusion criteria, however some of the articles are more strongly related to the studied topic than the others. The aim of this scoping review was to describe the roles and tasks of advanced practice nurses working in ophthalmology globally, however all the included articles except one were conducted in the United Kingdom. It seems that the role is well established in the British

healthcare system and consequently there are many articles written about the topic. It may also be that there were relevant articles written in other countries, but they were excluded due to some reason during the evidence screening and study selection. It should be also noted that there are two articles from the same author (Hasan et al. 2017 and Hasan et al. 2020), which may have impacted the results of this scoping review.

In the report of the International Council of Nurses (2020), advanced practice nursing and its characteristics, including educational preparations have been defined. In this scoping review, careful selection of articles concerning advanced practice nursing roles in ophthalmology was conducted. However, since the advanced practice nurse title and its variations (clinical nurse specialist and nurse practitioner) are not regulated in many countries, such as in the United Kingdom, there may be articles in this scoping review, which participants' educational preparations do not actually meet the recommended level given by the International Council of Nurses (2020).

10 Conclusion

There is variation in the roles of advanced practice nurses working in ophthalmology globally and based on this scoping review, the roles are the most clearly defined in the United Kingdom compared to other countries. The roles recognized in this scoping review are linked to coordination, counselling, management, and autonomous practice. However, there is inconsistency in titling and roles, which makes precise description of the roles of advanced practice nurses difficult, especially in the ophthalmic context, where different healthcare professionals can have similar responsibilities and overlapping tasks. Most of the patients are satisfied to the services of the advanced practice nurses, even though for some the role can be unfamiliar and some patients prefer to be treated by the doctors.

It is estimated that the number of people with different eye conditions will increase in the future due to aging of the population, which will lead to increased need of eye care services. Establishment of advanced nursing roles can be one answer to higher demand, however further training and mentoring are often needed, when the advanced practice nurses are taking over tasks from the doctors. This transition demands time and effort from the healthcare organizations, although once carefully planned, the nurse-led services can reap the benefits.

According to the results of this scoping review, the advanced practice nurses in ophthalmology can provide safe and effective care, which reduces waiting times, improves access to healthcare services and enhances patient satisfaction. These results verify what is previously known about the topic.

The second research question of this scoping review was related to the outcomes. The included articles described the outcomes mostly from the patient perspective. Further research is needed concerning the outcomes for healthcare professionals such as the advanced practice nurses themselves, other nurses, and the doctors, but in addition, how does the role effect the leaders and healthcare organizations. Furthermore, based on this scoping review, the role of advanced practice nurse in ophthalmology seems to be well established in the United Kingdom, but further research is needed how the role could be implemented in the Finnish healthcare system.

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Appendix 1. Data extraction table.

author, year	country	used professional title	advanced role	advanced tasks	outcomes
Bubb et al. 2021	United Kingdom	nurse practitioner	autonomous practitioner manager	interpretation of visual field outcomes and OCT pictures clinical procedures anterior and posterior segment examination clinical procedures diagnosing management plan making a clinical management plan management plan	“high agreement in diagnosis and management plan when comparing the nurse practitioner and the doctor” high-quality care for the patients “the patients were satisfied to be assessed by the nurse practitioner” increased patient satisfaction
DaCosta et al. 2014	United Kingdom	nurse practitioner	autonomous practitioner	administration of intravitreal injections clinical procedures	“safe care with no complications during the follow-up period” high-quality care for the patients “majority of the patients were satisfied with the service” increased patient satisfaction “more intravitreal injections given compared to similar 5-month period the previous year” improved access to care
Dunlop et al. 2020	United Kingdom	specialist nurse practitioner	autonomous practitioner coordinator manager counsellor	history taking history taking slit lamp examination clinical procedures making a clinical management plan management plan patient guidance counselling prescription of medication prescription of medicines organization of follow-up visit or discharging management plan making a surgical plan management plan listing the patient for operation management plan consent taking management plan organization of preoperative assessment management plan	“majority of the patients were satisfied with the consultation performed by specialist nurse practitioner” increased patient satisfaction “the nurse-led clinic output was comparable to the number of new patients usually seen by a doctor” improved access to care “most of the patients were seen within 15-30min” efficient care “high agreement in diagnosis and management plan when comparing the specialist nurse practitioner and the doctor” high quality care for the patients
Gallagher 2017	United Kingdom	ophthalmic nurse practitioner	autonomous practitioner	administration of intravitreal injections clinical procedures	“all the patients thought that the nurse took time to listen to their concerns or questions” more time for the patients
Hasan et al. 2017	United Kingdom	nurse practitioner	autonomous practitioner	administration of intravitreal injections clinical procedures	“the patients were satisfied with the service” improved patient satisfaction
Hasan et al. 2020	United Kingdom	nurse practitioner	autonomous practitioner	administration of intravitreal injections clinical procedures	“the programme has offered the nurses the opportunity to take more responsibility” professional development
Hughes 2020	United Kingdom	advanced nurse practitioner	autonomous practitioner coordinator	video consultation management plan history taking history taking patient guidance	“the patients considered digital service provided by advanced practice nurse to be more efficient than visiting the actual clinic” improved access to care

			counsellor	counselling organization of follow-up visits management plan	
Machin 2017	Pacific Island Region	advanced practice nurse	autonomous practitioner manager	prescription of certain eye drops and medication prescription of medicines prescription of eyeglasses clinical procedures acute eye care triaging and acute care making a management plan management plan administration of intravitreal injections clinical procedures performing refractive and general eye examinations clinical procedures referring management plan	“being the first or only contact of service, especially in remote areas” improved access to care
Mapani 2013	United Kingdom	nurse practitioner	autonomous practitioner coordinator counsellor	management and monitoring patients with stable AMD management plan taking visual acuity clinical procedures administration of intravitreal injections clinical procedures triaging triaging and acute care consent taking management plan requestion of medical imaging management plan referring management plan patient guidance counselling history taking history taking	“follow-up of the patients and treatment (intravitreal injections) could be conducted during the same visit” efficient care “psychological aspects were also taken into consideration in the services provided by the nurse practitioner, the patients were guided to relevant external organizations” individual needs of the patients noted “nurse-led clinics provided extra capacity for the patients requiring urgent appointment” improved access to care efficient care “nurse-led clinics also provided opportunity to expand the professional’s potential” professional growth “the nurse practitioner provided also health promotion during the follow-up visits” individual needs of the patients noted “consistency of the care was promoted in nurse-led clinics since the patients most likely saw the same practitioner in every visit” high-quality care for the patients
Moussa et al. 2022	United Kingdom	advanced nurse practitioner	autonomous practitioner	performing posterior YAG capsulotomy clinical procedures	“smaller portion of the patients required further YAG capsulotomy compared to the patients treated by the ophthalmologist” high-quality care for the patients
Raman et al. 2021	United Kingdom	nurse practitioner	autonomous practitioner	administration of intravitreal implants clinical procedures	“waiting time for receiving intravitreal implants was shorter when performed by the nurse practitioner” improved access to care “the patients were satisfied with the service carried by the nurse practitioner and especially shorter waiting time was appreciated” improved patient satisfaction efficient care
Rattanasirivilai & Shirodkar 2021	United Kingdom	ophthalmic specialist nurse	autonomous practitioner manager coordinator	cataract pre-assessment history taking, clinical procedures administration of intravitreal injections clinical procedures consent taking management plan	“most of the nurses working in advanced roles were satisfied with their current jobs and felt confident with their skill set” professional growth

				<p>prescription of eye drops prescription of medicines assessment of referrals management plan management activities counselling triaging and acute eye care triaging and acute care assessment of glaucoma patients history taking, clinical procedures administration of botulinum toxin injections clinical procedures performing minor operations clinical procedures</p>	
Simcock et al. 2014	United Kingdom	nurse practitioner	autonomous practitioner	<p>administration of intravitreal injections clinical procedures</p>	<p>“most of the intravitreal injections were given by the nurse practitioners and the number is growing” improved access to care</p> <p>“intravitreal injections given by the nurse practitioners are safe and the number of complications is minimal” high-quality care for the patients</p>
Winstanley et al. 2020	United Kingdom	hospital development nurse practitioner, specialist nurse, clinical support nurse	<p>autonomous practitioner</p> <p>coordinator</p> <p>counsellor</p>	<p>coordinating organ and tissue donation management plan providing support, education and advise to other healthcare professionals counselling clinical assessment of potential donors clinical procedures consent taking management plan history taking history taking assessment and authorization of donated tissue clinical procedures</p>	<p>“the nurse practitioners have supported the development of automatic referral system that has enabled to contact more families with whom to discuss the option of tissue donation” efficient care</p> <p>“the nurse assesses the potential donor’s clinical suitability that increases the safety of donated tissue” high-quality care for the patients</p>