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Non-Invasive Urine Sample Collection in Toddlers:

An Educational Video for Nursing Students

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ABSTRACT

Non-invasive Urine Sample Collection in Toddlers – An Educational Video for Nursing Students
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Taking urine samples from children is a complex procedure influenced by the child's age and developmental stage, which may vary significantly among individuals. Pediatric nurses face the dual challenge of selecting an appropriate technique to ensure high-quality samples while effectively interacting with pediatric patients and their families. These interactions require sensitivity and skill to minimize discomfort and build trust.

This thesis focused on creating an educational video to guide English-speaking nursing students in facing possible challenges, aiming to enhance their technical competencies and communication skills for better outcomes. It offered a comprehensive, evidence-based compilation of knowledge regarding urine sample collection methods from children between 1.5 and 2.5 years old, integrating various perspectives on care into a unified, cohesive framework. The project aimed to demonstrate a non-invasive method of collecting urine samples from preschool-aged children (18 to 30 months). It highlighted the impact of timely and accurate diagnosis on patient health and well-being, as well as the effects of sample quality on diagnostic accuracy and the challenges associated with current techniques. Additionally, the project provided guidance and strategies for engaging with pediatric patients, considering the developmental stages of children and the implementation of family-centered care. The authors were able to meet the aims and objectives of the thesis. The educational video provides valuable evidence-based knowledge and covers different aspects of pediatric nursing.

This project-based thesis was conducted using a hybrid methodology, combining the agile and waterfall methods. This thesis was done in collaboration with Satakunta University of Applied Sciences. The educational video will be available for students to use as a support tool for their professional studies. The purpose and objectives of the thesis were met.

Keywords: urine sample collection, invasive and non-invasive methods, toddler developmental stage (18 months to 30 months old), pediatric nursing, and educational video.

CONTENTS

1 INTRODUCTION

In Finland, urinary tract infections are more prevalent in infants under 1 year old regardless of their gender, while for preschool/school-aged children, girls are more likely to get them (Urinary Tract Infections: Käypä hoito guideline, 2024). Globally, there is a rise in antibiotic resistance to UTI-associated bacterial infections, particularly to commonly used antimicrobial medicines. (Cag et al., 2021.) Although antibiotic treatments might reduce the recurrence of UTIs, they can't, unfortunately, prevent the changes in the kidney tissue (Urinary Tract Infections: Käypä hoito guideline, 2024). Early diagnosis and appropriate antibiotic therapy are then crucial to avoid kidney injury. (Cag et al., 2021.) This matter raises the need for accurate diagnostics, which are directly affected by the quality of the samples. However, children are a vulnerable category of patients that often require more attention and adapted care. Hence, there is a need for updated material to educate about pediatric nursing and highlight the impact of family-centered care on the outcomes and the quality of care. (Diviney & Jaswon, 2020.)

The purpose of the project-based thesis was to produce an educational video for nursing students on collecting an uncontaminated urine sample from pediatric patients using bag sampling, a non-invasive method. The objectives of the project-based thesis were to provide a step-by-step demonstration of the bag sampling technique for toddlers aged 1.5 to 2.5 years old, strengthen the students' evidence-based knowledge of pediatric nursing, promote patient safety by emphasizing the importance of sample quality for the diagnosis, and improve the quality of care and patient satisfaction by demonstrating family-centered care. The thesis was done in collaboration with Satakunta University of Applied Sciences.

2 THEORETICAL BACKGROUND

2.1 Urinary Tract Infections and Pediatric Nursing

Urinary tract infections are among the most common bacterial infections in children (Urinary Tract Infections: Käypä hoito guideline, 2024). UTIs result in symptoms that differ depending on the location of the infection. Infection of the kidney and ureter may present with malaise, fever, lethargy, abdominal pain, vomiting, and loin tenderness. Other symptoms, such as pain during urination, suprapubic pain, frequent urination, and urgent urination, are associated with infections in the bladder. Gram-negative bacteria cause most UTIs. Escherichia coli, the leading uropathogen in children, causes at least 80% of the cases. The infection is more widespread in females and uncircumcised male infants. (Kaufman et al., 2019.) To confirm a diagnosis of UTI, you need to order a urine culture. The interpretation of the child's bacterial culture depends on the quality of the sample, the number of bacteria detected, and the extent of bacterial growth. (Urinary Tract Infections: Käypä hoito guideline, 2024.)

How children respond to medical procedures is significantly influenced by children's developmental stages. By 18 months and up to 30 months, the children's autonomy starts to appear. Continued strict parenting and trust in the child-parent bond enable the child to deal with environmental obstacles more decisively and eagerly on their own. The child's temperament is more apparent; they may be cooperative and sociable or unfriendly. (Malik & Marwaha, 2022.)

They learn pretend play, which includes playing alongside or concurrently with another kid while feeding a doll or conversing on a toy phone. They are generally unable to play cooperatively and creatively with another child, even though they may watch them and mimic their play. During the preschool years, they learn how to control their subjective feelings into a more socially acceptable gesture. (Malik & Marwaha, 2022.)

Childhood illnesses and medical procedures affect the emotional and psychological development of children. Psychological readiness is vital during children's growth phases, especially when they face medical treatments. It effectively lowers anxiety levels, which is essential because heightened anxiety can adversely affect emotional and psychological growth. By informing children about what to expect, they are less inclined to feel fear or distress during medical procedures. Moreover, psychological preparation that is adapted to a child's developmental stage improves their comprehension and coping strategies. Younger children might benefit from straightforward explanations and playful preparation, while older children can manage more in-depth information. This preparation also nurtures a bond of trust among healthcare providers, children, and their parents, which is crucial for helping children feel secure and safe. Additionally, it ensures that children comprehend their rights to informed consent, which empowers them and positively affects their self-esteem and sense of independence. In the end, effective psychological preparation can lessen the long-term emotional consequences of medical procedures, as well-prepared children are less likely to form negative associations with healthcare environments, positively influencing their future experiences with medical professionals. (Matsumori, 2024.)

By recognizing the unique challenges and milestones of this age group, nurses can effectively support not only the medical aspects of care but also the child's overall well-being and satisfaction through the implementation of pediatric nursing practices such as family-centred care which involves these four key concepts: collaboration, respect, communication, and compassion. These attributes help improve the patient’s outcomes, decrease the stress and anxiety of both the patient and their relatives, and increase their satisfaction. (Seniwati et al., 2023.)

Partnership in nursing describes the ability of patients, families, and nurses to form a bond, collaborate, and work together while providing healthcare. Nurses must ensure that the family of the child can collaborate with them during the treatment process. Communication is exchanging information through words,

gestures, attitudes, symbols, etc, particularly when it promotes understanding between people or organizations. The process of communication in nursing practice starts with making the first contact and continues all through the therapeutic alliance between nurses and patients. Nurses are involved in determining the patient's needs, giving health information, consoling the patient, and gaining their trust during conversations. (Seniwati et al., 2023.) Communicating with children involves using appropriate language, listening, comprehending, and respecting them. (Seniwati et al., 2023.)

Communication with parents is also important before taking any samples. A qualitative study has shown that many parents stated there was a total or partial lack of explanations from health care professionals (HCP) regarding the reason behind taking the sample, the instructions to take correct samples, how contamination is avoided, etc. An HCP has also affirmed that sometimes, insufficient time is given to provide the parents with the required knowledge, suggesting that fixed policies and written guidelines are important to help the parents. (Armengol et al., 2024) Respect means focusing carefully on anything or everything in each situation. Respect for individuals in nursing is demonstrated by behaviours, attitudes, and manners that are considerate of each person's dignity. Respect in nursing care involves several ethical principles, such as individuality, self-determination, human decency, and worthiness. Compassion is defined as feeling empathy for the pain or misfortune of others and wanting to help them. Warmth, goodness, and tenderness are qualities referred to as compassion. While nursing care evolves via experience and adaption of current nursing theories, compassionate care is essential. Providing care in the manner that the individual desires is the main goal of compassionate care. Applying compassionate care in nursing practice means managing the relationship between the physical and emotional well-being of patients and the nurses' duty as nursing care providers. (Seniwati et al., 2023.)

2.2 Evidence-based Practices in Urine Collection

According to Alteneiji (2021), employing aseptic techniques during urine collection is crucial for ensuring the accuracy of samples. If these practices are not followed correctly, it can lead to contamination or inaccurate laboratory results. Aseptic techniques involve a set of standardized procedures in healthcare settings aimed at preventing the introduction of pathogens and reducing the risk of infection transmission. It involves preparing and maintaining a sterile field to minimize the risk of contamination during medical procedures, such as surgeries, wound care, and specimen collection. To ensure accurate results and minimize contamination during urine collection, the aseptic technique must be carefully followed (Alteneiji, 2021). The procedure includes the following steps:

1. Gather all required materials, such as sterile containers, antiseptic wipes, and disposable gloves.
2. Practice proper hand hygiene by washing hands with soap and water or applying an alcohol-based sanitizer.
3. Put on factory-clean gloves for protection.
4. Clean the genital area thoroughly: for female patients, wipe from front to back using antiseptic wipes or clean water. For male patients, clean the tip of the penis with antiseptic wipes or clean water.
5. Handle the sterile container carefully, ensuring that the inside of the container and its lid are not touched.
6. Put the sample to a sterile collection container.
7. Seal the container securely without touching the interior.
8. Write the name, date and time of collection in a label and stick it to the the container.
9. Send the container for testing to the laboratory promptly to maintain its integrity and ensure accurate test results.
10. Document the whole procedure, noting any relevant observations and the time of collection.

Urine specimen collection methods for children will vary based on the child's developmental stage and ability to void. These may be further summed up as

non-invasive: clean catch urine (CCU), bag sampling, pad sampling, and invasive: in-out catheterization and suprapubic sampling (SPA). CCU involves directly collecting urine into a sterile container without skin contact. Bag sampling consists of attaching a sterile adhesive-lined bag on the perineum to collect urine, dependent on drop by drop. While this was convenient, there are still fears about the pain during the removal of the bags and the contamination issue. Pad sampling involves placing an absorbent material in a child's nappy or incontinence pants to absorb voided urine. Though less disruptive, this method poses a higher chance of contamination as it entails prolonged contact with the perineum. (Diviney & Jaswon, 2020.)

However, one of the possible challenges a nurse could face with a pediatric patient while taking the sample through one of these non-invasive methods is encouraging them to void spontaneously. As simple as it sounds, it might sometimes be challenging for continent patients. A study showed that the stimulation of voiding is a fast manner that helps to get the sample and decrease its chance of contamination, while another study has introduced a technique called the "Quick Wee", which involves applying saline-soaked, frozen gauze (2.8°) to the suprapubic region. (Diviney & Jaswon, 2020.)

In-and-out catheterization is a procedure where a urinary catheter is temporarily inserted to collect a urine sample and then removed. This method offers theoretical advantages, such as being less challenging than suprapubic aspiration and reducing the risk of contamination from bacteria in the distal urethra, which is a common issue with voided samples. For suprapubic sampling, a 22-gauge needle is used to aspirate urine directly from the bladder. This procedure is performed under ultrasound guidance, where the needle is inserted through the anterior abdominal wall and into the bladder to collect the sample. Because a suprapubic sample avoids bacteria that colonize the distal urethra as natural flora and has a theoretically minimum chance of contamination, it is frequently referred to as the gold standard for urine collection. However, parents and professionals agree that SPA is the most intrusive and unpleasant procedure. (Diviney & Jaswon, 2020.)

One of the effective ways to support the learning of nursing students, particularly in pediatric nursing, is by educational videos. Educational videos are valuable tools for enhancing student learning in nursing education. Based on a study on nurse-patient communication, using videos as an additional teaching-learning technique could be promising for developing knowledge, including professional training. Another study found that after watching a validated educational video on peripheral venipuncture, students approved that they had received greater knowledge of the procedure. Moreover, employing educational videos during student training can help in correcting technical skills, facilitating better preparation, and boosting confidence when carrying out processes. (Pereira et al., 2023.) Students have reported their satisfaction with this audio-visual method that helps them memorize and understand more easily the new information regarding both theory and clinical learning. A Korean study on nursing students has also shown that student competencies and skills have increased while using educational videos compared to traditional ways of teaching. (Natarajan et al., 2022.)

3 PURPOSE AND OBJECTIVES OF THE PROJECT

The purpose of the project-based thesis was to produce an educational video for nursing students on collecting an uncontaminated urine sample from pediatric patients using bag sampling, a non-invasive method.

The objectives of the project-based thesis were to provide a step-by-step demonstration of the bag sampling technique for toddlers aged 1.5 to 2.5 years old, strengthen the students' evidence-based knowledge of pediatric nursing, promote patient safety by emphasizing the importance of sample quality for the diagnosis, and improve the quality of care and patient satisfaction by demonstrating family-centered care.

4 PROJECT PLAN AND IMPLEMENTATION

The project-based thesis started with an initiation phase, during which a topic was chosen after a discussion with the supervising teacher. In the beginning, a broader topic concerning pediatric procedures was proposed. After the discussion and some research regarding different procedures. The authors decided to narrow down the procedure and the age group of the pediatric patients to ensure concise research and maximize benefit to the target group. The topic was chosen due to the lack of material in both English and Finnish in the last five years. During this phase, the methodology of the work was chosen, the purpose/objectives and key concepts were set, the target group was determined, the choice of the project format (video) was made, and the risks and opportunities of the project were assessed.

4.1 Methodology

The project-based thesis employed a hybrid approach that combines both the agile method's flexibility and the waterfall method's well-structured process. The waterfall methodology follows a step-by-step protocol. There's also a strong emphasis on requirements. Before moving on with the project, you must comprehensively understand its requirements. Once the project is in progress, there is no way to make changes. The Agile methodology is considered the opposite of the Waterfall method. This technique promotes a quick and adaptable approach, as the name suggests. (Workamagig, 2023.)

The hybrid method allows the division of the project's goal into more manageable parts. These elements are then executed and assessed by an ongoing supervisor feedback mechanism. The approach encourages open discussion and teamwork among the participants. (Sue, 2017.) The combination of the two approaches gives us the best of both. The Hybrid methodology nods to the Waterfall method by first concentrating on obtaining and assessing requirements. From then on, it adopts the Agile approach flexibility while focusing on quick iterations. (Workamagig, 2023.)

4.2 Target Group

The focus of this thesis is nursing students at Satakunta University of Applied Sciences (SAMK). SAMK is a multidisciplinary and internationally recognized institution on Finland's west coast. It provides a wide range of educational and research opportunities in fields such as health care, social services, business administration, and technology (Satakunta University of Applied Sciences, 2024). SAMK offers a Bachelor of Health Care degree in nursing that lasts 3,5 years. A key feature of the program is its focus on evidence-based practices, encouraging students to use research and critical thinking to enhance care quality. The program also emphasizes effective communication and holistic, patient-centered care, which is crucial when working with children. (Satakunta University of Applied Sciences, 2025.)

The nursing program covers a wide range of topics, including anatomy, physiology, pharmacology, nursing ethics, patient care, health promotion, and public health. Students gain hands-on experience through clinical practice, where they develop the ability to care for patients of all ages, including children. Students complete their bachelor program with a thesis project on any topic that interests them in the final year of studies. (Satakunta University of Applied Sciences, 2025.) The program includes a pediatric course called Nursing Care for Children and Adolescents. The course's objectives are to offer students the evidence-based knowledge needed to understand the basic needs of children of different ages, promote the development of children's and adolescents' mental health, identify common pediatric disorders, and attend to the basic requirements of children and adolescents. It also seeks to build competencies in the areas of assessment, planning, implementation, and evaluation of individualized care of children. In addition to recognizing risk factors for abuse and making sure medical treatments are administered safely. (Satakunta University of Applied Sciences, n.d.)

4.3 Risk Management

SWOT analysis was used in the project planning phase as a tool to determine and manage our project's possible risks, limitations, and opportunities. Strengths, Weaknesses, Opportunities, and Threats are acronyms for SWOT analysis (Bridges, 2022). Four paragraphs were set for each part of the SWOT analysis.

Table 1: Swot analysis demonstration in the thesis

Swot analysis	**Details**
Strengths	- The video format helps the audience, students, understand the procedure better. - Using child-friendly techniques, including communication and tips to distract the child. - Following the medical and ethical guidelines that respect the Finnish regulations.
Weaknesses	- We are not able to involve a real patient in our video. A mannequin only can be used for ethical matters. - We would need the help of others to record our video or to make the voice of the toddler. - Demonstrating urine sample collection from a mannequin could be challenging.
Opportunities	- We have access to the SAMK simulation rooms by booking a time. - There is a toddler mannequin that can be used for the child role.

	- We have taken paediatric patients' courses + modest experience in the pediatric field including research done during the thesis preparation. - The project will serve other healthcare professionals both with urine sample collection techniques and ways of encountering a pediatric patient and their families.

4.4 Literature retrieval and previous studies

During the planning phase, the key concepts were used to start building the theoretical background needed to make the project. Artificial intelligence, such as Google Bard and ChatGPT, was used to brainstorm ideas about keywords and relevant search terms for literature retrieval. The Thesaurus was used to find precise synonyms for the thesis. Grammarly is used to check spelling mistakes, and DeepL is used for Finnish-English translation. The databases used for the literature retrieval are SAMK FINNA, PubMed, and Google Scholar. The PICO model allowed us to combine specific words in the databases above to get relevant literature related to our thesis (Howard, 2022). The criteria for the literature retrieval are materials written in English and Finnish, articles or journals where the full free text and abstract are available, published within the last five years, and relevant articles to the thesis. All searches that didn't meet the criteria were excluded. This is to ensure that up-to-date information is provided in the thesis. Finnish materials are included to ensure that Finnish guidelines are followed in the thesis. In addition, a manual search was performed, and Käypä Hoito was used to find recommendations based on the Finnish healthcare system. The literature retrieval and summary of previous studies have been added as Appendix 1 and 2 respectfully to the thesis.

After approximately 6 months of work, the thesis plan and video manuscript used for recording the video were ready and approved. Then, the thesis agreement was signed by all the involved parties.

4.5 Video Implementation

The execution part was the last phase of the project. The video was developed as the main component of our project-based thesis, aiming to demonstrate the bag sampling technique of urine collection from a two-year-old girl, implementing a family-centred care during the whole procedure. The video's manuscript helped organize the work during the recording and editing phases. It outlined the steps of the procedure, several concepts, and techniques to be explained in the slides, included between the different sections of the video, and demonstrated an effective way of communicating with the pediatric patient and her mother. The video manuscript can be found in Appendix 3 of the thesis.

The video was recorded using a phone in a simulation room at Satakunta University of Applied Sciences, Pori Campus. The toddler-aged doll in the simulation room was used to record the video to represent a realistic situation. Unfortunately, the doll had closed eyes, which was slightly compromising the realistic effect. Authors agreed to rehearse the lines in the manuscript before the recording day. The supervising teacher provided the bag sample used in the video. The video was repeated several times to improve the quality to the best of the ability of both authors. It was recorded on December 13, 2024, and took over two and a half hours to guarantee precision, clarity, and smooth step transitions. The scenes were watched immediately after video recording to ensure that the voices were clear, and all the scenes were recorded. A second short segment of the video was shot separately on January 20, 2025. Help and feedback were sought from the supervising teacher when needed to make sure that the technique was demonstrated correctly.

The editing software applications used were CapCut and Canva. CapCut is a free and open-access video editing software accessible online (CapCut Video Editor, n.d). CapCut helped to assemble the different segments of the video

and edit them. The editing part took approximately 10 hours, making sure that the video flowed seamlessly. Canva was used to add slides that explained the theoretical parts of the video. Canva is a free online platform that allows creating different designs for presentations, social media posts, logos, and other designs (Canva, 2024). The process of editing the videos, such as trimming, adding slides, and combining clips, required more than 10 hours of work using Canvas tools. The video was shown to the supervising teacher, and several discussions and meetings with her were held to help improve and ensure the video's accuracy, relevance, and usefulness. The video is copyrighted but available as open-source material.

5 DISCUSSION

5.1 Evaluation

The evaluation part of the project has been done by the authors in the first place, then by the supervisor teacher, who has a pediatric nursing background, and finally by a children's and adolescents' nursing teacher for external feedback. The teacher answered a form that was sent to her by the authors and gave positive feedback, pointing out the clarity and effectiveness of the video, which compiled theory and demonstration of the procedure. In a nutshell, the educational video is a sum of several key strengths. First, the authors successfully translated the concepts and evidence-based guidelines into a real-life scenario through the video, in which they were able to follow aseptic techniques, show the right steps of the procedure, and apply family-centered care and ethics. Secondly, the video successfully and indirectly transmitted the whole image of family-centered care, helping the students better understand the meaning of the concepts mentioned earlier in the theory part. Thirdly, the incorporated slides that had evidence-based information became reliable material for nursing students that will provide them with clear guidance on the bag sampling method, following aseptic techniques. The recorded video follows the

evidence-based theory and, therefore, will serve as a coherent product combining theoretical and practical knowledge, serving as an educational tool for nursing students, helping them improve their technical and pediatric nursing skills with both patients and their families.

While this project has achieved its primary objectives, several challenges and constraints have been encountered. Time and resources were the main limitations. For instance, no feedback was collected from students to evaluate the outcomes of the project from students' perspectives. Besides, due to the lack of language proficiency, the video did not provide any subtitle options for non-English speakers, which might limit the audience. Moreover, only one urine sample collection technique was demonstrated; the rest were briefly mentioned. There were also some technical problems related to a shortage of resources, such as using a static doll instead of an interactive one, a low-quality camera, and the editing software that was restricted to free applications only.

5.2 Ethics and Reliability

There are general recommendations for writing a bachelor thesis, for example, to read relevant literature to prevent scientific dishonesty, increase the quality of the thesis, and ensure responsible conduct of research. During the write-up process, the authors followed the checklist provided by the student at every thesis stage. During the thesis analysis as required based on the required national ethics, the authors grew acquainted with the topic of the thesis, the guidelines of research ethics principles related to the treatment of individuals, and data protection. (Finnish National Board on Research Integrity, 2024.)

Following the checklist, it was understood that the thesis would be publicly available and checked for plagiarism using Turnitin, the checker used by SAMK. Plagiarism is considered a violation of the copyright law. Therefore, SAMK's guidelines were followed regarding citations and references, making sure to paraphrase and reformulate the ideas taken from the different sources before incorporating them into the thesis document. Also, according to the copyright act, any third-party content used must be cited. Therefore, every

necessary permission was obtained for the use of pictures or materials required to make the video. (Rectors' Conference of Finnish Universities of Applied Sciences Arene, 2020.)

The thesis utilized Artificial Intelligence (AI) in research, requiring compliance with copyright and data protection laws. The acts and regulations governing copyright, data protection, and privacy protection were followed while using AI, and copyrighted content was not put into any AI application (Satakunta University of Applied Sciences, 2025). The project focused on a vulnerable category of patients: children. Therefore, real patients were avoided in the educational video, and a mannequin provided by the school was used instead to demonstrate the procedure. In that way, respect for the patient's privacy and safety was ensured.

5.3 Reflections on Personal Growth

During the execution of this project, the authors had the opportunity to develop their project management skills. Time, resources, risks, and work organization were all factors considered. This helped improve their communication and teamwork skills, as well as adaptability and many other interpersonal skills. Besides, professional skills were also developed throughout the process. The research and video execution phases enhanced the authors' evidence-based knowledge of the project's key concepts and video production. The project increased both the authors' knowledge on collecting uncontaminated urine samples using the bag sampling method in toddlers, focusing on family-centred care.

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APPENDIX 1: SEARCH RESULTS FROM DATABASES

Database	Search query	Results	Accepted
SAMK FINNA	“urine collection” AND (child* OR infant* OR toddler*) AND (method* OR technique* OR procedure*) Time Frame: 2019 -2024. Full Text. Peer reviewed.	2,858	3
SAMK FINNA	child AND developmental stage AND nursing procedure	1986	1

PubMed	"Infant"[Mesh] OR "Child"[Mesh] OR "Child, Preschool"[Mesh]Child*[tiab] OR Infant*[tiab] OR toddler[tiab] AND "Urine Specimen Collection"[Mesh] OR *Urine collection*[tiab] AND Prepar*[tiab]	8	0
	("Child Development" [Mesh] OR "Social Behavior" [Mesh] OR "Emotions" [Mesh]) AND ("Developmental Stages [Mesh] " OR “Psychosocial Development” [Mesh])	85	1

	("Education, Nursing" [Mesh] OR "Nursing Students" [Mesh] OR "Educational Technology" [Mesh]) AND "Educational Video" [Mesh]	18	2
	("Patient-Centered Care" [Mesh] OR "Family- Centered Care" [Mesh] OR "Child Care") AND ("Children" [Mesh] OR "Pediatric" [Mesh])	2215	2
	("Urine Collection"[MeSH] OR "Urinalysis"[MeSH] OR "Dipstick Test"[MeSH]) AND ("Non-Toilet-Trained Children"OR "Infants"[MeSH] OR "Pediatric"[MeSH])	185	2
	("Urine Collection"[MeSH] OR "Urinalysis"[MeSH] OR "Precontinent Children" AND ("Parent-Child Relations"[MeSH] OR "Parenting") Time Frame: 2019 -2024. Full Text. Peer reviewed.	4	2

Google Scholar	urinary system AND child* AND disease* Time Frame: 2019 -2024. Full Text. Peer reviewed	17 000	2
Google Scholar	"aseptic technique" AND "urine collection" Time Frame: 2019 -2024. Full Text. Peer reviewed	233	1
Manual Search	Käypä Hoito		
SAMK FINNA	laps* AND hoit* Time Frame: 2019 -2024 Book Material	145	1

APPENDIX 2: SUMMARY OF PREVIOUS STUDIES

Author(s), title, year, country	Purpose of the study	Target group/participants (N=?)	Indicators used / data collection	Key results
Alteneiji, M. (2021) The best clean catch method for collecting uncontaminated samples in non-toileted children.	Exploration of the best technique for urine collection by clean catch method (CCU) from non-toilet trained infants and children without contamination.	Non-toilet trained infants.	Randomised controlled trials, Cohort studies and Cross-sectional studies.	Bladder stimulation through various techniques effectively collects urine samples from children via the clean catch method.
Armengol et al., 2024) Clinician and parent views on urine collection in precontinent children.	Experiences and perceptions of healthcare professionals (HCPs) and parents regarding urine collection methods for precontinent children, identify barriers to successful sampling, and suggest improvements to the	Precontinent children.	Semi-structured interviews.	The study highlights significant challenges with current urine collection methods for precontinent children, emphasizing the need for improved techniques, better information for parents, and enhanced collaboration between parents and healthcare

	urine collection process.			professionals to reduce discomfort and anxiety during the process.
Diviney, J., & Jaswon, M. S. (2020). Urine collection methods and dipstick testing in non-toilet-trained children.	Review of the best technique that can be used to collect uncontaminated urine sample from non-toilet trained children.	Non-toilet trained children.	Systematic review.	Pediatrics-based clinicians should consider the risk of sample contamination, patient age, and sample acceptability when determining their collection method.
Urinary tract infections in children: an overview of diagnosis and management. Kaufman,J., Temple-Smith, M., & Sanci, L. (2019).	Overview of UTI diagnosis and treatment in children.	Continent and Precontinent children.	Research Article	International guidelines have conflicting recommendations regarding sample collection methods, antibiotic duration and imaging indications. Targeted research is required to inform knowledge gaps and inform cost-effective care for paediatric UTI.

Pain experienced by infants and toddlers at urine collection bag removal. Lamy et.al 2019.	Determine whether the use of an oleo-calcareous liniment to aid bag removal reduced the acute pain expressed by young children.	Infants and toddlers.	Randomised controlled clinical trials.	Results of the current study demonstrated that use of an OCL did not attenuate the pain caused by urine collection bag removal in pre-continent children.
(Seniwati et al., 2023.) Patient and family centered care.	Explain the concept of family-centred care for children.	Children and family.	Systematic review.	Partnership, Communication, Respect, and Compassion were identified as the four attributes of family centred care for children.
(Malik & Marwaha, 2022.) The Developmental stages of Social Emotional Development in Children	To describe the social-emotional stages of children at different ages.	Children.	Research article/ Systematic review.	This classification helped us choose the category of age we wanted to focus on and better understand their developmental stage to choose the right interaction and nursing methods.
N. Matsumori (2024) "Recognition of Ethical Nursing	Clarify the recognition of ethical nursing practices, which	Paediatric nurses/Children	Questionnaire	The result showed that more than half of children needed

Practices and Psychological Preparation in Pediatric Nursing. A Survey of Nurses in Japan.	included the psychological preparation of nurses practicing pediatric nursing in various settings, and to identify issues for future training.			psychological preparation for a procedure.
Antibiotic Resistance and Bacteria in Urinary Tract Infections in Pediatric Patients by (Cag et al, 2021).	to discover the bacteria that is mostly causing UTIs in pediatric patients and to assess the bacterial resistance patterns to the common antibiotics used for the treatment	Pediatric patients under 17 years old who were diagnosed with UTIs	Research article	One of the findings was that E. coli strains exhibited high resistance to ampicillin, which explains the importance of a good diagnosis to determine the bacteria causing the infection so as to provide the right antibiotic treatment.
Nurse-Patient Communication Strategies: A Proposal of an Educational Video for Nursing Students	The aim was to produce an educational video that The aim was to teach students nurse-patient	Undergraduate nursing students enrolled in a public higher education institution in Rio de Janeiro, Brazil.	Research article	The nursing students showed a high level of understanding, with an understanding rate of approximately 96% for

(Pereira et al, 2023)	communication strategies to help improve their communication skills in clinical settings.			the content presented in the video.

APPENDIX 3: VIDEO MANUSCRIPT

Video Manuscript: urine sample collection from a 2-year-old girl (Family-centered approach).

Setting: In a pediatric ward exam room

Cast:

- ★ Experienced pediatric nurse (friendly &calm)
- ★ A worried mother concerned about her child's condition
- ★ Child (mannequin of a 2-year-old toddler): nervous

In the scenario, we highlight three major points that we want to show through our project

- ✓ Ways of making the child feel comfortable and involved in the process
- ✓ Reassuring the parent that the procedure is simple and non-invasive
- ✓ Offering evidence-based knowledge regarding the procedure, the importance of a good sample and the UTIs

Slide 1: INTRO: a brief explanation of UTIs and urine sample collection
Slide 2: Factors affecting the choice of the collection method and possible complications of UTIs
Slide 3: Key components of family-centred care

Pediatric ward, just outside the exam room. The nurse and the mother are speaking quietly while the child, Elli, is playing with a toy in the room.

Nurse: (with a reassuring smile) "Mrs. Laine, before we go in, I just wanted to explain how we'll be collecting Elli's urine sample today. It's a quick and simple procedure, and it won't cause her any discomfort."
Mother: (looking a bit worried) "I was wondering about that. Elli can get pretty anxious with anything medical.

Nurse: (nodding understandingly) “That’s completely understandable. Many children feel the same way. Today, we’ll be using a non-invasive method. Instead of using a catheter, we’ll be applying a small, soft adhesive bag over her genital area. It’s designed to catch her urine when she needs to go.”

Slide 4+5: Invasive vs non-invasive method+ pictures of the bags used for both genders

Mother: (relieved) “Oh, that sounds much better. I was worried it might be more invasive.”

Nurse: “Not at all. It’s very gentle and won’t hurt her. The key is to make sure Elli feels comfortable and in control. I’ll explain everything to her in a fun and simple way, so she understands that it’s just part of her visit and there’s nothing to be afraid of.”

Mother: (nodding) “That sounds like a good approach, that could help her relax”.

Nurse: and “One more thing I have to mention. If this method doesn’t go as smooth as we’re planning, we’d need then the intervention of the doctor to proceed through an invasive technique for the optimal diagnosis. We’ll see first how it goes with our little Elli, hopefully we don’t need to try a different technique. Our aim is to get a good diagnosis out of the sample.

Mother: I understand your point, I am afraid of the pain it might cause to her but as you said rather get a good diagnosis and save time.

Slide 6: The use of a doll instead of a real child for ethical reasons

Nurse: (smiling warmly) “Hi there! What’s your name?”

Child: (shyly) “My name is Elli.”

Nurse: “That’s a beautiful name, Elli! I am nurse.... Today, we’re going to do something really easy, and your mommy is going to help us.

Mother: (reassuring) “Elli, the nurse just needs a little sample from you, like when you go to the bathroom.”

Child: (frowning) “But it is going to hurt”

Nurse: (gently) “Oh, don’t worry, Elli. This causes no pain, I promise! We’re just going to use this special bag to catch some of your pee. It’s like a magic trick!”

Slide 7: Encountering a pediatric patient

Child: (curious) “A magic trick?”

Nurse: (nodding) “That’s right! You know how you pee in the potty at home? We’re going to help you do that here, but in a way that lets us check to make sure you’re super healthy. And mommy is here with us! Look! (showing a little teddy bear) This is Mr. Teddy; he’ll also be with us! Would you like maybe to play with him when we’re done?

Slide 8+9: Step-by-step guide of the bag sampling procedure

The nurse, following aseptic techniques, disinfects his hands and puts factory-clean gloves on.

Nurse: (pulling out a small, soft adhesive bag) “See this little bag? We’ll put it right here.” (Gently points to where it will be placed on Elli “It’s soft and won’t hurt at all. After you go pee, we’ll take it off, and you’re all done!”

Mother: (smiling) “It’s really easy, Elli. Remember how we talked about being brave like your favourite superhero? You can do this, and then we can go get a special treat afterward.”

Child: (brightening up) “Like ice cream?”

Nurse: (laughing softly) “Ice cream sounds perfect! And guess what? Mr. Teddy will be so proud of you for being so brave and you can play with him as soon as we’re done!”

Child: (nodding) “I’ll do it then.”

Slide 10: Picture of the required supplies for bag sampling.

The nurse is first washing the genital area with water and then drying it with clean pads. After that placing the bag gently from the bottom to the top of child’s genital area making sure it sticks properly, not allowing any urine leak-age.

Nurse: (gently placing the adhesive bag) “You’re doing great, Elli. Now we just have to wait for you to pee, and we’ll be all set. Would you like to sit with Mommy for a bit, or we can look at a book while we wait?”

Child: “I’ll sit with Mommy.”

Mother: (hugging Elli) “You’re doing so well, sweetie. Just like we talked about. It’ll be over before you know it.”

Nurse: (checking the adhesive bag) “Alright, Lily, you’re all set! Now, when-ever you feel like going pee, it’ll go right into this little bag.”

Child: (frowning) “But... I don’t feel like peeing.”

Mother: (gently) “That’s okay, sweetie. Sometimes it takes a little while.”

Nurse: (smiling warmly) “That’s no problem at all, Elli. We have a fun little trick that might help. It’s called the ‘Quick-Wee’ method! Would you like to try it?”

Child: (curious but hesitant) “What’s that?”

Slide 11: a brief explanation of the Quick-Wee method.

Nurse: (excitedly) “It’s like magic! We’ll use a little bit of cool water and gently tap on your tummy—just like how raindrops feel. This can help you feel like you need to pee. And Mr. Teddy can watch to see how fast it works! Alright, here we go! I’ll put a little cool water on this cotton pad, and then I’ll tap, tap, tap on your lower tummy.”

Nurse: (checking the bag) “Look, Elli, you did it! All done, just like that! You were such a big helper.”

Child: (smiling) “It didn’t hurt at all!”

Nurse: “See, I told you it was like magic! Now we’ll take this to the lab to make sure you’re as healthy as Mr. Teddy.”

Mother: (standing up) “I’m so proud of you Elli, you were amazing!”

Child: (proudly) “Can we get ice cream now?”

Nurse: (laughing) “I think you’ve definitely earned it! Great job! And here is a candy from me”

Slide 12/13/14: Outcomes of family centred care and some ethics-related explanations+ references

End of the video

This scenario used adapted vocabulary to match the understanding of both the mother and the child. The slides will explain in professional terms the theoretical points, ethical concerns, and the family-centred approach using evidence-based sources.