
THE PAEDIATRIC PATIENT – A CHALLENGE FOR THE PROFESSIONAL IN THE CLINICAL LABORATORY

Mariya Proshenska

Medical University - Plovdiv, Medical College, Speciality of Medical Laboratory Assistant
Republic of Bulgaria, Mariya.Proshenska@mu-plovdiv.bg

Penka Argilashka

Medical University - Plovdiv, Medical College, Speciality of Medical Laboratory Assistant
Republic of Bulgaria, Penka.Argilashka@mu-plovdiv.bg

Mariya Kukularova

Medical University - Plovdiv, Medical College, Speciality of Medical Laboratory Assistant
Republic of Bulgaria, Mariya.Kukularova@mu-plovdiv.bg

Mariya Saykova

Medical University - Plovdiv, Medical College, Speciality of Medical Laboratory Assistant
Republic of Bulgaria, Mariya.Saykova@mu-plovdiv.bg

Abstract: In their professional activity medical laboratory assistants conduct a full array of lab tests by following established protocols for preparing the patient for tests and phlebotomy which do not account for the patient's age. However children are not just small adults. They have their specific characteristics which require special attention by the medical care professional. And if for those working in primary and hospital pediatric care, this specificity is well known and practiced, for specialists outside this practice, it still remains a real challenge. This current study is trying to establish: to what extent is the medical laboratory professional knows the specifics of working with child patients; are there difficulties and what is their essence; are new competencies necessary or is it sufficient to expand those laid down in the training program? For this purpose a cross-sectional research amongst 67 subjects was carried out, out of which 27 were students training to be medical laboratory assistants and 40 were qualified medical laboratory assistants currently employed in the healthcare system. Data was gathered using sociologic methods (interview, survey) and statistic analysis (corelational and graphic analysis) for processing and presenting the results of this study. The following variables were monitored – *years of professional experience in working with paediatric patients and types of difficulties encountered* – *work specifics* (phlebotomy, acquiring informed consent), *working with special needs children* (hyperactive, aggressive, children with mental or general health problems, disabled children), *absence of awareness and participation by the parent/legal guardian*. The data showed weak corelation between the years of experience in working with children and the difficulties encountered by the medical lab professional when working with paediatric patients. Statistically significant factors that influence this relation are: working with special needs children (46.3%) and phlebotomy (38.8%) as a part of the specifics of work. *The absence of awareness and participation by the parent/guardian* to provide supporting environment in the work with paediatric patients does not have a significant effect on the difficulties experienced by the medical laboratory assistants regardless of their professional experience. This study is most relevant to the medical laboratory assistants directly engaged in work with children and also to the Medical colleges as the educating party. The professional experience is important but not sufficient. The correct approach to minimize the challenges is to expand the competencies for working with child patients through training in an academic environment, which (competencies) through future professional practice will be refined and reinforced.

Keywords: Professional activity, medical laboratory assistant, children, specificity, difficulties.

1. INTRODUCTION

Worldwide, Laboratory Medicine is the largest medical activity in healthcare, as the clinical laboratories have a central role in providing care for the patients through ensuring and securing quality of the medical laboratory tests. (Olver P., Bohn M. K., Adeli Kh. 2023) More than 60-70% of the medical decisions for prevention, diagnostics, treatment and monitoring of the diseases are based on laboratory tests results. (Hallworth, MJ. 2011) This circumstance applies for paediatric healthcare too. The laboratory tests in paediatrics vary from screening tests for determination of metabolic, hematologic and genetic disorders, to genetic tests. (Consolini, D., 2023)

In their professional activity the medical laboratory professionals perform a complete range of laboratory tests, using approved protocols for preparation of the patient for examination and phlebotomy, as the age groups of persons whose tests are being processed in clinical laboratory vary from newborns to elderly persons. (Medical Standard for Clinical Laboratory, 2014). The paediatric patient population varies widely – from premature newborns to children

in all development stages, incl. adolescents. However, children are not just little adults. Unlike the adult patients, they have specificities which require attention by the medical professionals. For example, the diseases in paediatric practice differ significantly from the ones in adults. Children are more vulnerable which requires tests to be performed in short terms. The adolescents, even when looking healthy, are subjects of lots of social diseases – alcohol and drug abuse, sexually transmitted diseases, smoking, mental disorders, and others, all of them having an impact on their condition. (Hicks, J., 2002)

The professionals working in primary and inpatient paediatric healthcare know this specificity very well and have the knowledge to deal with it. Yet, this is a real challenge for the professionals who are not in paediatric practice. The challenges for the specialists in clinical laboratory working with children, vary from collecting biological samples to the differences in the reference ranges and the critical values. The anthropometric characteristics of the newborns require collecting of minimal quantity of blood for laboratory tests which determines necessity of appropriate laboratory instruments. (Bishop M., Fody Ed., Van Siclen C., March Mistler J., Moy M., 2023) The concentration of some clinical chemical components is changing dramatically during the process of physiological development of the child, and thus the normal values in paediatrics are being considered pathological in adults. (Hicks, J., 2002) There is also a specificity in the types of tests, prescribed as a routine in the paediatric practice and having a special significance in young populations. Tests such as prostate-specific antigen, which is very common in adults practice, are rarely used in paediatrics. (Pyle-Eilola, A., Thornton, D., 2017) Other tests are used in children and in adults, but the indications differ. For example, AFP (alpha-fetoprotein) is used as a tumor marker for hepatocellular carcinoma in paediatrics, while in adults it is used mainly for prenatal screening of the mother. (Jones, P., 2014)

Despite the precisely followed standard protocols, the work with paediatric patients in clinical laboratory remains a challenge for the medical laboratory professional. The goal of this study is to find an answer of the following questions: to what degree the medical laboratory professional knows the specificity of working with paediatric patients; are there any difficulties and what is their nature; is there a necessity of new competencies, or extending the ones existing in the educational program would be enough?

2. MATERIAL AND METHODS

For this purpose, a cross-sectional study was carried out (March 2023) among 67 persons, of whom 27 students (15 in their second year, and 12 in their third year, all studying in the Medical laboratory professional program), and 40 qualified medical laboratory professionals, working in Clinical Laboratory Departments of University clinics, Multidisciplinary Hospitals, Medical Centres and private healthcare facilities at the territory of the city of Plovdiv. Methods of sociology (an interview, a survey) were used for gathering the main information, as IBM SPSS Statistics 23 was used to analyse the data from the study.

Two survey cards were created – for students and for working medical laboratory professionals, containing questions for the length of their professional experience and the approaches used when working with children; presence of difficulties and their nature; their opinion on necessity of new or additional training hours for working with children.

The monitored variables were: *years of professional experience in working with paediatric patients and kinds of difficulties met – specificity of work* (phlebotomy, obtaining informed consent), *working with children with behaviour problems* (hyperactive, aggressive, having mental or general health issues, children with disabilities), *absence of awareness and participation by the parent/guardian*. In order to study the relation between the years of professional experience in working with children and the kinds of difficulties, the monitored persons were divided into 4 groups according to the *professional experience in working with paediatric patients* – persons with experience obtained during their university studies; persons with experience in working with paediatric patients and length of service up to 5 years; persons with experience in working with paediatric patients and length of service 5 – 10 years; and persons with experience in working with paediatric patients and length of service exceeding 10 years.

3. RESULTS

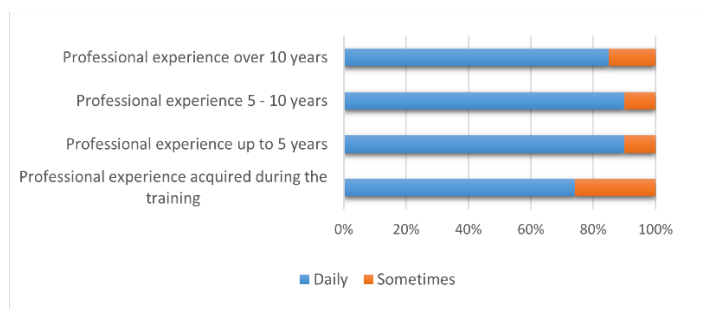
The study data shows that 40% of the people surveyed are persons with *professional experience in working with paediatric patients* obtained during their university studies, 15% are persons with experience in working with paediatric patients and length of service up to 5 years, 15% are persons with experience in working with paediatric patients and length of service 5 – 10 years, and 30% are persons with experience in working with paediatric patients and length of service exceeding 10 years. (Fig.1)

Figure 1. Professional experience in working with pediatric patients



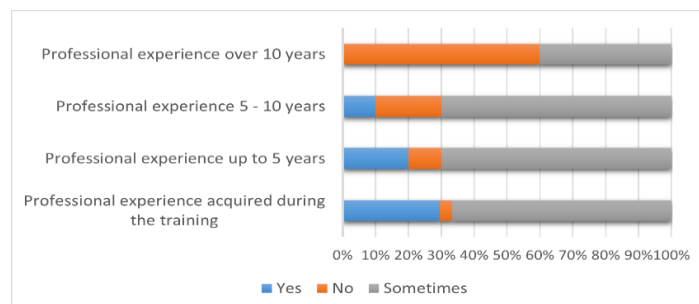
82% of the people surveyed work with paediatric patients on a daily basis, as the other 18% also have paediatric patients, but rarely, i. e. each student and medical laboratory professional in the studied cohort has been working with paediatric patients. (Fig.2)

Figure 2. Working with pediatric patients



The greatest percentage (60%) of participants who have difficulties in working with paediatric patients are the persons with experience obtained during their university studies. Most confident in their work are the professionals having more than 10 years length of service. (Fig.3)

Figure 3. Do you experience difficulties working with children?



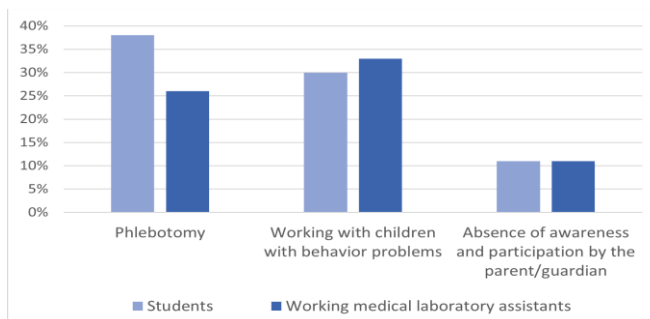
The Pearson coefficient confirms presence of a statistically significant relation between the years of experience in working with children and the difficulties which the medical laboratory professional meets in the professional work with them. Yet, the Cramer Coefficient shows that this relation is weak which focuses the attention to other factors having impact on this interdependence. The kinds of difficulties in working with paediatric patients, defined as *specificity of work*, *working with children with behaviour problems* and *absence of awareness and participation by the parent/guardian*, may vary depending on the acquired experience. For 100% of the students the main difficulty is phlebotomy as a part of the work specificity, followed by working with children with behaviour problems (for 62%). It is the other way around for the working medical laboratory professionals. (Fig.4)

For 46,3% of all monitored persons the main difficulty is working with children with behaviour problems, followed by phlebotomy (for 38,8% of them) and the absence of awareness and participation by the parent/guardian (for 15%).

The ANOVA analysis shows that statistically significant factors, having impact on the relation between the professional experience and the presence of difficulties, are working with children with behaviour problems ($p < 0,000$) and phlebotomy ($p < 0,034$) as a part of the work specificity.

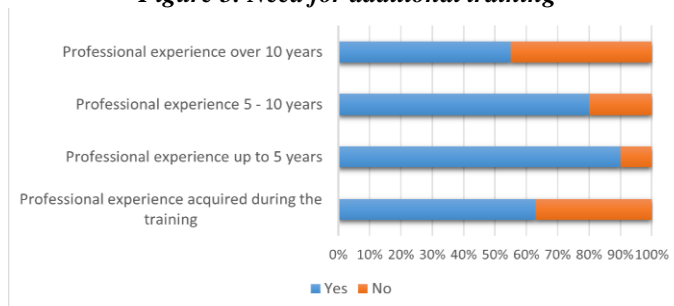
The absence of awareness and participation by the parent/guardian as a supporting environment in working with paediatric patients does not have a significant impact on the difficulties which the medical laboratory professionals have, even the less-experienced ones.

Figure 4. Leading difficulties for students and working medical laboratory assistants



The question: Do you consider necessary introducing of additional training hours dedicated to future working with children?, receives an affirmative answer by 67% of all monitored persons. Even 55% of the medical laboratory professionals with more than 10 years of professional experience answer affirmatively, even though they make no statement of having difficulties in working with children. (Fig.5)

Figure 5. Need for additional training



4. DISCUSSION

According to the Paediatric Regulation, the term “paediatric population” concerns children in the age range from birth to 18 years at most. Depending on the development stage, this population includes the following age groups: Newborns and infants (from birth to 2 years of age); Children in preschool age (2-5 years of age); Pupils (6-9 years of age); and Adolescents (10-18 years of age). The most recent amendment is related to the WHO definition for adolescence, starting from 10 years of age, which aims to underline the necessity of earnest attitude to these children.

The specificity of work of the medical laboratory professional with patients in clinical laboratory is related to obtaining informed consent for performing working procedures and interventions, which require specific communication approaches, considering the type and quantity of the biological sample for laboratory analysis, competent use of consumables, knowledge of the reference ranges, preparation of the patient in the pre-analytical stage of the respective tests, and performing phlebotomy.

The evidence of this study shows that the persons in the monitored group have the required competencies which they apply skilfully in their work with children. It turns out that even experienced professionals have difficulties in working with paediatric patients, as the following issues are determined:

- Venipuncture (phlebotomy) in the youngest patients – up to 3 years of age

- Obtaining informed consent for children at 3-6 years of age
- Absence of parents' awareness about the forthcoming intervention and absence of parents' participation
- Children with behaviour problems – bad parenting, presence of disabilities, aggression

Blood drawing is a great challenge in paediatrics. Phlebotomy in children is performed by a paediatric specialist in specialized outpatient medical care, or by a physician working in Paediatric Ward (Clinic) in an inpatient healthcare facility. (Medical Standard in Paediatrics, 2016) In clinical laboratory phlebotomy is performed by the medical laboratory professional. The main methods for blood sample collecting in children are venipuncture or capillary puncture, as the last one is a preferred method for newborns, infants and little children. Venipuncture is a preferred method for older children. (Hicks, J. 2002) The phlebotomy process itself is a complex intervention which requires attention to detail, fine motor skills, and necessary competencies in the field of anatomy by the professional. (Bokholdt, M. 2020) And last but not least – professional experience. It is no accident that the surveyed medical laboratory professionals with more than 10 years of professional experience do not consider this intervention as a difficulty. In most cases venipuncture is considered a routine procedure. Anyway, it could be a painful and stressful experience for a child. The calm approach and the professional technique of the medical laboratory professional may lower the anxiety, pain and stress for the child during the venipuncture. The surveyed persons – students and working professionals, share about various approaches that they use to distract the attention of the children, such as conversations about subjects which are interesting for them (for example, kids' movies and cartoons heroes, friends in kindergarten/school, and so on), positioning, music and participation of the family, all of which significantly reduce the anxiety. 92% of the students in Medical Laboratory Professionals Program have acquired these skills during their clinical training in actual working environment, while the other 8% have acquired them during their studies in Medical Psychology.

As a party in the treatment, the children should be included in the process of informed consent, although by definition they are not capable of giving consent (in the legal meaning). (Health Act, 2018) Children have the amazing ability to form an opinion by 3-4 years of age. Due to this, there is a potential for reaching an agreement when obtaining informed consent in preschool children. Researches on the cognitive abilities show that children from this age group have a significant ability to ensure agreement and to express fundamental resistance and protest at the same time, other than the usual signs of discomfort during or after unpleasant procedures. That is why a part of the monitored persons in this study determine the work with children from this age group as a difficulty.

Absence of parents' awareness about the forthcoming intervention and absence of parents' participation as a supporting environment have no significant impact on the work of well-experienced medical laboratory professionals, but these factors could facilitate the phlebotomy by reducing the child's anxiety. It is important for the children to feel parents' support during the medical tests. Partnership is achieved by all three participants – parent, medical laboratory professional and child, as each of them participates with certain suggestions and experience – in paediatrics “it takes three to tango”. (Gabe, J., Olumide, G., Bury, M., 2004) The specialists advice the parents to build in their children confidence in the medical specialist and responsibility for their own health, using simple and understandable words depending on the kids' age. (Patterson, C. 2021)

It is a fact that working with children with behaviour problems remains a challenge even after years of experience in working with patients and proven communication approaches. Children with behaviour problems (hyperactive, aggressive, having mental or general health issues, children with disabilities) require more regarding the obtaining of informed consent, regarding their participation in the intervention, and regarding the usual patience and attention by the medical laboratory professional. The aggressive patients, children or adults, require certain skills by the medical specialist for dealing with and managing conflicts. The relationships between the medical staff and the patients may worsen because of disagreement or simply misunderstanding. Yves Peiffer, who is a psychologist and director of Clinical Practice and Development at the Crisis Prevention Institute, Paris, France, gives the following advice: “The only thing we have control of is our own behaviour – and we can use it to calm down the person in front of us.” The aggressiveness has consequences not just for the working professional him/herself, but for the whole organization, either through absences or through poor quality of care for the patients” (Gattuso, Ch., 2023)

We offer the following advices for solving these issues:

- Revision of the study programs with a view to extending knowledge, communication skills and approaches in working with children, communication in problematic situations, approaches for dealing with aggression;
- The requirement for having at least 3-year experience in performing phlebotomy in adults for performing phlebotomy in children should be entered into the Medical Standard for Clinical Laboratory.

5. CONCLUSIONS

The laboratory tests are an important feature of paediatric healthcare. Knowing the specificities of the paediatric laboratory medicine by the medical laboratory professionals, working with paediatric patients, is mandatory for making right clinical decisions and ensuring optimal medical care. The advantage of the discussed issue is directed to medical laboratory professionals who are directly engaged with paediatric patients in their work, as well as to the Medical Colleges being a training party. Professional experience is important, but it is not enough. The proper approach for minimizing the challenges is extension of competencies for working with paediatric patients through training in academic environment, as these competencies shall be improved and consolidated during the future professional practice.

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REFERENCES

- Закон за здравето (2022): чл. 87. (2) Права на пациента. Министерство на здравеопазването на Р България. <https://www.mh.government.bg/bg/normativni-aktove/zakoni/zakon-za-zdraveto/>
- Медицински стандарт по клинична лаборатория (НАРЕДБА №1 от 31.01.2014 г. обн. ДВ, бр.13 от 14.02.2014 г., изм. и доп., бр.37 от 17.05.2016 г.). Министерство на здравеопазването на Р България. <https://www.mh.government.bg/bg/normativni-aktove/meditsinski-standarti/>
- Медицински стандарт по педиатрия (НАРЕДБА №7 от 3.11.2016 г., обн. ДВ, бр.90 от 15.11.2016 г.) Министерство на здравеопазването на Р България. <https://www.mh.government.bg/bg/normativni-aktove/meditsinski-standarti/>
- Baker, D., Rohde, R. (2023) Public Health and Medical Laboratory Professional Identity. AMERICAN SOCIETY FOR MICROBIOLOGY. <https://asm.org/Articles/2023/April/Public-Health-and-Medical-Laboratory-Professional>
- Bishop M., Fody Ed., Van Siclen C., Mistler J. M., Moy M. (2023) Clinical Chemistry: Principles, Techniques, and Correlations, CHAPTER 30 Newborn and pediatric clinical chemistry, p.734-757, 9-th edition, Jones & Barlett Learning
- Bokholdt, M. (2020) Blood Specimen Collection: Venipuncture (Pediatric) – CE. Elsevier Clinical skills, 1-10
- Consolini, D. (2023) Screening Tests for Infants, Children and Adolescents. *Journal of MSD Manual for the Profesional.* <https://www.msmanuals.com/professional/pediatrics/health-supervision-of-the-well-child/screening-tests-for-infants,-children,-and-adolescents>
- Patti, J. (2014) Pediatric Labs are Different. *Lablogatory.* <https://labmedicineblog.com/2014/11/25/pediatric-labs-are-different/>
- Gabe, J., Olumide, G., Bury, M. (2004) ‘It takes three to tango’: a framework for understanding patient partnership in paediatric clinics. *Social Science & Medicine.* Volume 59, Issue 5, 1071-1079 <https://doi.org/10.1016/j.socscimed.2003.09.035>
- Gattuso, Ch. (2023) Defusing Conflicts with Aggressive Patients. *MedScape.* <https://www.medscape.com/viewarticle/993618>
- Hallworth, MJ. (2011) The ‘70% claim:’ what is the evidence base? *Ann Clin Biochem;* 48:4878. <https://doi.org/10.1258/acb.2011.011177>.
- Hicks, J. (2002) Key elements in a successful pediatric laboratory. <https://acutecaretesting.org/en/articles/key-elements-in-a-successful-pediatric-laboratory>
- Olver P., Bohn M. K., Adeli Kh. (2023) Central role of laboratory medicine in public health and patient care. *Clinical Chemistry and Laboratory Medicine (CCLM);* 61(4): 666–673 <https://doi.org/10.1515/cclm-2022-1075>
- Patterson, Ch. (2021) Making Fingersticks and Insulin Shots Easier for Kids With Diabetes. *Nemours KidsHealth,* <https://kidshealth.org/en/parents/injections-tests.html>
- Pyle-Eilola, A., Thornton, D. (2017) Pediatric Laboratory Medicine. CHAPTER 2: Common tests and considerations important in pediatric medicine <https://accesspediatrics.mhmedical.com/content.aspx?bookid=2219§ionid=171095487>