

Action Plan for the Future - the Situation for Biomedical Laboratory Scientists (BLS) in Denmark, Finland, Norway, and Sweden

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Objective: The aim of this study was to investigate if there is a lack of professionals in the Nordic countries as well as the prognosis for the future in relation to educational output. In addition, the study aimed to investigate the Nordic professional's point of view on how to make the profession attractive, what career opportunities that are needed and what role the BLS should have in the future healthcare setting.

Materials and methods: Data for each country were provided from reports. Professionals present at the NML congress 2023 were invited to discuss questions related to the lack of BLS. Answers were collected, summarized, and grouped in themes.

Results: Three of four Nordic countries report current and future challenges in BLS workforce and a substantial amount of BLS in the Nordic countries are 50 years or older. Despite efforts where admissions to the universities have increased, the amount of examinates has not increased proportionally. Professionals identifies a need for making the profession more attractive highlighting career opportunities, professional visibility, salary increase, and task-shifting.

Discussion: We have identified several threats to the sustention of BLS in healthcare today and in the future in the Nordic countries. This includes high retirement numbers, drift towards working in the private sector, as well as low salaries and lack of career opportunities. In this study, the profession has provided useful insights on how to make the profession more attractive including increased visibility, provide career paths, and distinguish what the BLS competence is and

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can be in the future.

Conclusion: We have identified several future arenas for the profession that can attract students to educations, keep professionals in healthcare, and secure high quality in diagnostics. To succeed, we need stronger linkage between the profession itself, educational institutions, healthcare employers, and professional organizations.

Abbreviations:

Biomedical laboratory scientist (BLS)

Nordisk Medisinsk Laboratoriegruppe (NML)

Keywords/MeSH terms:

Scandinavian and Nordic Countries, Medical Laboratory Personnel.

Introduction

A total of almost 28 million people reside in the Nordic Region (Sweden, Norway, Finland, Denmark, and Iceland). In the last 20 years or so, there has been an increase in the population by 13%. As in many other European countries, the populations are growing older and older. In 2022, 20% of the population was 65 years of age and above. This number is expected to rise to 25% in 2040. Hence, there are more citizens requiring healthcare and individuals are living longer.¹ A consequence of this is higher demands on healthcare and subsequently on laboratory testing and clinical physiological examinations.

In the Nordic countries, biomedical laboratory scientists (BLS) work in laboratory medicine as well as in clinical physiology. Qualifications after education are provided through a license to practice. This guarantees patient safety and qualifications to provide high quality diagnostic testing/examinations and reporting.² Biomedical laboratory medicine is a field that is developing rapidly due to improvements in medicine, methodology, and technology. Adaption to new scenarios, techniques and circumstances have shown to be crucial for the profession, especially in the context of the COVID-19 pandemic where BLS all over the world provided life-saving diagnostic testing. New methods and instrumentation were implemented rapidly, demanding skills in technology, validation, and adaptation.³

Educated within laboratory medicine or clinical physiology, Nordic BLS work in both

specialized healthcare as well as community health centers and in single clinics. Professionals in laboratory medicine have competencies in different areas such as transfusion medicine, clinical chemistry, microbiology, immunology, pathology, genetics, and phlebotomy. Clinical physiology also includes knowledge and skills in ultrasound, neurophysiology, and nuclear medicine. Specialization requires further studies and experience but is defined different depending on the country.

A challenge and opportunity for the profession in healthcare is the concept of task shifting. This can include letting go of some tasks and including more specialized ones. Task shifting may be a natural consequence of a profession as it changes and develops throughout the years. However, recent task shifting for the BLS profession has been a necessity due to shortage of personnel at many laboratories. Other professions may then come into the laboratory because there are problems in recruiting BLS but also because of separating specific tasks to other healthcare staff.

To keep professionals in healthcare, there is a need for clear pathways that should result in career development and salary increases.⁴ Industry and private actors may recruit from well-educated and experienced professionals as well as from the younger generation that are eager for change and opportunities. Work life conditions also play a crucial role, where the reason for working part time has shifted from family reasons to stress and exhaustion.

As described, the Nordic countries have challenges ahead when it comes to diagnostic services, keeping professionals in the public healthcare as well as ensuring good work life conditions. In this study we aim to summarize the Nordic situation for BLS and discuss potential solutions.

Aim

The aim of this study was to investigate if there is a lack of professionals in the Nordic countries as well as the prognosis of professionals in the future in relation to educational output.

In addition, the study aimed to investigate the Nordic professional's point of view on how we can make the profession attractive, what career opportunities that are needed and what role the BLS should have in the future healthcare setting.

Material and methods

Data on professional workforce, education numbers and prognostic data for each country were provided from reports collected from each Nordic country (Denmark, Finland, Norway, and Sweden).

Professionals were invited to participate in a lecture and workshop at the Nordisk Medisinsk Laboratorieggruppe (NML) congress 2023 in Oslo Norway. The activities were hosted by the Swedish institute of biomedical laboratory science (IBL) and Vårdförbundet - the Swedish association of health professionals. As part of the program, participants were asked to answer the following mentimeter questions using www.menti.com:

- is there a shortage of BLS in your country?
- are BLS replaced by other professions?
- do you have good career possibilities for BLS in your country?

Following the lecture, round table discussions were held to discuss the following questions:

- what can we do to make the profession attractive?
- what should the BLS role be when other professions come into the laboratory?
- what career opportunities do we need in the profession?

Answers from the round table discussions were collected, summarized, and grouped according to themes.

Participation was voluntary and data collection anonymous. Initial mentimeter questioning was performed with no information on who participated. Round table discussions were performed in person, but the collected answers were not connected to table, participant, or country.

Results

Professionals in the Nordic countries

In total, there are almost 30,000 (29,687) educated BLS in Denmark, Finland, Norway, and Sweden. Among those, approx. 75% (22,176) work in healthcare (Table 1). In Denmark, 16% of BLS-positions have other professionals assigned and in Finland some regions have reported a shortage of BLS.^{5,6} In Norway, the increase of BLS positions is less than the increased need of BLS and there is a shortage of BLS in all regions.⁷ In Sweden, all regions (21 of 21) reported a lack of BLS in 2022.⁸

Table 1: Numbers of biomedical laboratory scientists in four Nordic countries

	Denmark ⁵	Finland [*]	Norway ¹²	Sweden ¹³
Total workforce BLS	6700	5300	7482	10 205
BLS in healthcare	4975 (74%)	3900 (74%)	5423 (73%)	7878 (77%)

* Data collected from KEVA [Internet, cited 2023 nov 24] Available at <https://www.keva.fi/en/>

Future perspectives and retirements

Three of four Nordic countries report future challenges in BLS workforce. According to the Finnish report from KEVA, in 2023 the shortage of BLS was 778 BLS and in 2032 there will be a shortage of about 20%.⁶ Predictions from Norway show that the shortage in 2040 will be between 800 and 1200 BLS.⁹ Numbers from the Swedish higher education authority project a shortage of 20% by 2035.¹⁰

In Denmark, 32% of the BLS are over 50 years of age and in Finland 26.5% are 55 years or older.^{5,11} In Norway, 22% are 55 years or older and Swedish data show that 36% of the professionals are 55 or older.^{12,13}

Professionals in Denmark are increasingly recruited to the private sector (industry) with an increase of 61% from 2005 to 2021.⁵ In Finland, 38% of BLS work in private sector 2021.¹¹ In Norway, around 7% of BLS working in healthcare, are employed in private laboratories.⁹ In Sweden, the trend for working in private healthcare has been relatively constant during 2007-2021. For working in the private sector in other areas there has been a sharp increase of over 200%.¹³

The number of professionals in health care who have part time positions is reported to be 20% in Denmark, 17% in Norway and 25% in Sweden.^{5,12,14}

Education

There are six professional BLS bachelor educations in Denmark. Students study 3.5 years and during the last 13 years there has been an increase in applications and in accepted students (from 400 accepted students in 2013 to 500 students in 2023). More students graduate but not relatively compared to the increased numbers of acceptance. In 2022, 294 BLS graduated from the Danish educational programs.¹⁵

In Finland, BLS are trained in six universities of applied sciences, for 3.5 years. In 2022, 342 new students were accepted and 222 graduated. Statistics show that 60% of accepted students will graduate in 3.5 years, 68% in 4.5 years, and the examination rate is 73% after five years.¹⁶ In Finland, admission numbers have increased recently, but the students have not yet graduated.

Until 2021, there were seven universities providing a three-year bachelor's and professional degrees in Norway. In 2021, yet another university started offering the program. From 2016 to 2020 there was a slight increase in the number of accepted students (8% increase from 380 to 410). The increase in accepted students did not provide a higher number of

graduates. The graduation rate after three years of study was 68% in 2019, whereas in 2023, it was 63%. The drop-out rates were 20% and 26%, respectively. From 2021, there was an additional increase in the number of accepted students due to the newly offered program, and the number increased to 435. In 2023, there were a total of 480 new students accepted (an increase of 26% from 2016 to 2023).¹⁷

Swedish universities (n=11) provide a 3-year bachelor and professional degree and have increased the numbers of accepted students, from 370 students in 2006 to 580 students in 2020. The number of examined professionals has not followed this increase. Of students who started their studies in 2006, 70% of the women and 54% of the men were examined while of those starting 2016, 58% of the women and 50% of the men followed through until graduation.¹⁸

In all four countries there are options for further university education. A master's degree can be BLS topic-specific (Denmark, Sweden, Norway) or related to medicine, public health or other. PhD education is also possible but requires part of the master's level education according to the Bologna model of higher education.

The professionals' point of view

The following results are based on data from the lecture and workshop at the NML congress 2023 in Oslo Norway. First, participants were asked to answer three questions related to shortage of the profession using a mentimeter analysis tool.

All participants (n=52) stated that there was a lack of BLS in their country. Six out of 58 (10%) reported that BLS are replaced by other professionals. Approximately half of the participants (52%: 32/61) reported that there are career possibilities for the professions.

These findings inspired follow up questions that were discussed at a round table format. We encouraged participants to think outside of the box and discuss a desirable professional future. A total of 73 different suggestions in relation to the questions asked at the round table discussions were collected. The most

popular topic to be discussed was how can we make the profession attractive?

Increased visibility of the profession was mentioned in several groups, mainly towards the community in general. The profession itself needs to tell others about who they are and why the profession is great. A positive storytelling was mentioned and there were also interesting ideas such as rebranding of the profession and creating TV-shows. It was also mentioned that it would be interesting to show what will happen in the healthcare system without BLS, particularly in relation to the recent pandemic. Additional examples to enhance the visibility included to do more research projects, publish, and to introduce students to research early on.

Another noted theme among the responses was career opportunities such as introduction programs and clear career pathways. Retention of staff was mentioned by several groups and that it must be worthwhile to stay at the workplace. Salary increase should be coupled to competence and there should be differentiation between tasks and responsibility providing career development.

The expectations of students and younger colleagues was also discussed. There is a need to better understand the new generation and the demands on the workplace. Mentorship was also mentioned as a way of educating new colleagues and students.

Another interesting output from the discussions was a suggestion of a separate shorter technical education to complement BLS in the laboratories and that BLS could aim for a master's degree.

The second discussion topic related to, what should the BLS role be when other professions come into the laboratory? There was a consensus that tasks related to sample registration, sample transportation, ordering supplies and repacking could be performed by other professionals. Also, phlebotomy was an example of a task that could be vacated. It was clear from the discussions that quality control of laboratory procedures and testing was to remain a responsibility of the BLS. Diagnostic

partnership was discussed as a potential new role for the BLS.

The third discussion topic was, what career opportunities do we need in the profession? Besides the concept of career pathways, the groups discussed positions such as lead scientist, manager, and combined positions between laboratory and academia. Continuous professional development (CPD) was considered important as well as trainee opportunities.

Discussion

This study aimed to investigate if there is a lack of professionals in the Nordic countries and to investigate the Nordic professional's point of view on the current and future situation of BLS.

The data indicates that there is a confirmed shortage of BLS today and in the future in Finland, Norway, and Sweden. There is no national data from Denmark supporting a shortage of BLS, but reports show that 16% of BLS-positions have other professionals assigned, indicating either a lack of professionals or a drift of workforce to other areas.⁵ Working in the private sector is an option for the BLS, both in industry and in healthcare, and in Sweden there has been a sharp increase of over 200% (2007-2021) for working in the private sector (healthcare excluded).¹³

A substantial amount of BLS in the Nordic countries are 50 years or older, especially in Sweden where 36% of the professionals are 55 or older.¹³ Hence, the growth and maintaining sufficient practicing BLS is strongly dependent on educating new professionals. Despite efforts in Denmark, Norway, and Sweden, where admissions to the universities have increased, the amount of examinees has not increased proportionally. A considerable amount of BLS work part time, between 17-25%.

Considering the data there are clearly identifiable challenges ahead. It is of utmost importance that BLS's are retained in healthcare, that students are recruited to education and the profession be attractive enough for a stable career choice. Also, from the round table discussions, the professional voice emphasizes the need for making the profession

more attractive highlighting career opportunity and subsequently salary and responsibility increase.

Education and Career Development

Despite increased admissions to BLS programs, the numbers of examinees do not follow. Hence, only increasing the number of admissions seems not to be the way to solve the problem. A substantial number of students do not finish their studies and some need longer periods to do so. Language barriers and lack of study techniques have been discussed as contributing factors to this issue, unfortunately also leading to a lot of instructor or faculty effort being directed towards activities other than teaching of the biomedical laboratory sciences. It is also worth mentioning that if there is a desire to increase admissions there needs also to be clinical internships available. However, if there is a lack of BLS there is also a lack of internship supervisors. Teaching staff, laboratory facilities and finances also influence the possibility of more admissions.

There are options for further university education in all four countries. The absence of regulated specialist education in Sweden, despite positive attitudes from professionals and students, highlights a significant gap in career development opportunities for BLS.⁴ In Norway and Denmark, BLS can do a master's program and there are a few programs especially suitable for BLS. In Finland, there are masters available but not yet specifically for the BLS profession. These educational opportunities are crucial for attracting more students to the BLS profession and retaining professionals in healthcare by offering clear pathways for career advancement. However, the lack of national regulation or recognition of these qualifications across regions can limit mobility and career progression for BLS, undermining the attractiveness of the profession.

Among the professionals that participated in answering questions on Mentimeter, 52% estimated career paths to be present for the profession. While this may encompass various

forms of development beyond university education and specialist training, discussions underscored the importance of linking career paths with salary increases. The conditions for BLS, including low salaries and the absence of defined career paths and professional development opportunities, have led many professionals to leave the field for other careers. In a survey performed by IBL in 2022, professionals in private sector underscored that salary and career development is a significant reason for leaving the public sector.¹⁹ In Sweden, BLS have lower salaries compared to other similar healthcare professionals as well as negative lifetime earnings, underscoring the urgency of addressing these disparities.²⁰ Such conditions not only devalue the profession, but also jeopardize the sustainability of healthcare services that rely on the critical functions performed by BLS. Salary is likely to be a significant factor, especially in retaining qualified BLS in the field.

In the study discussions, career development in terms of new roles as lead scientist, manager and combined positions between clinic and academia were discussed as possibilities that could attract and keep professionals in healthcare. It was also discussed that the younger professionals have different expectations on a future workplace. Young people may consider salary as the basis for their choice of study and the younger generation also values the opportunity to influence their own working hours (flexibility). While work still plays an important role, the younger generation expects a better work life balance. They are perhaps more direct on their expectations on a future workplace and may also be more open to changing careers and employers. If the laboratory profession is to attract the younger professionals, the profession needs to meet and include the younger generations in the shaping of the future healthcare.

Task Shifting

The need and the current practice of task shifting was discussed in relation to the BLS role when other professions come into the

laboratory. The concept of task shifting is not new but something that has been evident for several years, and in many disciplines. In pathology for example, task shifting has ensured patient treatment in small hospitals in Norway. In especially the northern part, there are long distances between hospitals and few BLS, therefore nurses or other trained health care professions do frozen sectioning and staining, followed by evaluation through telepathology/digital pathology.

Task shifting includes letting go of some tasks and well as taking on new ones. Sample registration, sample transportation, ordering supplies, and repacking were identified as tasks that could easily be performed by other professionals. Blood sample collection was also discussed as something that could be provided by other healthcare professionals and is already delegated to nurses and practical nurses in Norway and Finland. Additionally, and another example of task shifting is that porters in Norway are trained and tested in blood sampling. In Sweden, there are local initiatives where assistant nurses are provided with education and training to specialize in laboratory medicine. However, the pre-analytical knowledge is considered an important BLS competence. Other disciplines where task shifting, or interdisciplinary work is implemented are in medical genetics, nuclear medicine, and blood banking. The new roles can be seen as a result of technological and diagnostic progress. New explorative areas for the future BLS include working in municipality settings, diagnostic partnership, research work, and working with artificial intelligence (AI).

The concept of diagnostic partnership leverages BLS's specialized knowledge in laboratory analyses, sampling, handling, and storage of biological samples to ensure reliable diagnostic processes. Their expertise in quality assurance further guarantees that laboratory equipment and analytical results meet the applicable standards. As diagnostic partners, BLS can significantly contribute to healthcare teams by enhancing the quality of sampling, handling of biological samples, and ultimately improving patient care. This expanded role

requires a reevaluation of the current task distribution within healthcare settings, advocating for BLS to undertake more specialized tasks that align with their expertise. It emphasizes the necessity for BLS education and training programs to incorporate modules on interprofessional collaboration, diagnostic decision-making, and communication skills.

The integration of AI and digitalization in healthcare presents unique opportunities and challenges for the BLS profession. AI applications in laboratory medicine can streamline workflows, enhance diagnostic accuracy, and predict patient outcomes more efficiently. However, this technological advancement also necessitates a shift in the skill set required from the BLS. To remain relevant and maximize the potential of AI and digital tools, BLS must acquire proficiency in digital literacy, data analysis, and the ethical considerations of AI use in healthcare. Educational programs for BLS might need to adapt to these changes by incorporating courses on information technology, data management, and AI applications in healthcare. This will prepare future BLS for a healthcare environment where digital tools are integral to laboratory operations and diagnostics. Additionally, continuous professional development opportunities in these areas should be available for current BLS to ensure the workforce is equipped to navigate the digital transformation in healthcare. Furthermore, the role of BLS in the development, validation, and implementation of AI-driven diagnostic tools highlights their potential as innovators in the field. By engaging BLS in interdisciplinary research teams focused on AI and digital health solutions, their expertise can inform the development of technologies that are both clinically relevant and aligned with laboratory practices.

Visibility

Increased visibility of the profession was thoroughly discussed from different aspects and in relation to making the profession more attractive. There were plenty of interesting suggestions and it was clear that this is not the sole responsibility of others but also of the

profession itself. If BLS cannot express their own value, how can one expect others to see it? Practicing BLS need to communicate the impact and value of having BLS in healthcare besides describing the risks associated with the absence of the profession. If the profession can show the diversity and highlight the many interesting disciplines within the profession, as well as allowing for research and advancement into leadership, this might be a way to promote and inspire. Actions such as media campaigns, TV-shows and rebranding might be difficult on an individual level, where instead leaders, professional organizations and unions need to be the voices advocating for the profession.

Conclusion

This study has identified several threats to the sustention of BLS in healthcare today and in the future in the Nordic countries. This includes educating too few students in combination with high retirement numbers, drift towards working in the private sector, as well as low salaries and lack of career opportunities. In this study, the professionals have provided useful insights on how to make the profession more attractive including the increase of visibility, provision of career paths, and clarification of the current and potential competencies of BLS for the future. Several future options for the profession have been identified that can attract students to the educational programs, retain professionals in healthcare, and ensure high-quality diagnostics. Strategies for attraction to the profession and retention in health care include:

- Establishing career development pathways within and across Nordic countries to enhance professional growth and mobility.
- Addressing salary disparities and ensuring competitive compensation that reflects the critical role of BLS in healthcare.
- Reevaluating task distribution within healthcare settings to ensure optimal use of BLS specialized skills, while also considering workload and job satisfaction.
- Implementing flexible working conditions that cater to the evolving expectations of the workforce, particularly the younger generation's desire for work-life balance.

To succeed, there needs to be a stronger linkage between the profession, educational institutions, healthcare employers, and professional organizations that can foster a more cohesive approach to addressing the challenges. By advocating for the profession, highlighting the critical contributions to healthcare, and ensuring BLS are equipped to thrive in their roles, stakeholders can enhance the profession's attractiveness and sustainability. Through strategic interventions focused on education, career development, compensation, and work-life balance, the Nordic countries can ensure a robust, satisfied, and future-ready BLS workforce.

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