Original Article

The need for early clinical exposure in medical education

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ABSTRACT

INTRODUCTION. Anxiety among medical students is highly prevalent and may negatively impact students' future practice. Transitioning from the pre-clinical to the clinical phase often presents considerable challenges. Early clinical exposure has been identified as beneficial in easing this transition. Most medical schools in Scandinavia already include a few weeks of exposure. Even so, student distress remains high. The study aimed to assess the need for more clinical exposure during the Bachelor of Science (BSc) programme in medicine based on students' subjective needs.

METHODS. This cross-sectional study employed a non-probability sampling method to include medical students enrolled in the Master of Science (MSc) programme at the University of Southern Denmark. A self-administered questionnaire was designed to explore medical students' self-reported needs and attitudes towards the BSc programme. Descriptive and inferential statistics were used to summarise and assess the data.

RESULTS. Among the 120 students included, 90% perceived the clinical exposure during the BSc programme as insufficient. Furthermore, 68% felt inadequate in their understanding of a physician's clinical role, and 87% felt inadequacy in their understanding of the work-life balance within the profession upon completing the BSc degree. The estimated response rate was 13%.

CONCLUSIONS. The findings suggest a subjective need for more clinical exposure in the BSc programme. However, the impact of additional clinical exposure on student distress remains unclear.

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A needs assessment is a critical step in ensuring that the needs of a specific population are adequately addressed and that resources are allocated as effectively and efficiently as possible [1]. Anxiety among medical students is highly prevalent worldwide, with an estimated prevalence of 33.8% in 2019, substantially higher than in the general population [2]. Anxiety seems to remain a prevalent issue among young doctors [3], with mental health issues such as anxiety and stress negatively impacting their ability to practice medicine, potentially leading to loss of empathy and malpractice [4, 5]. The causes may be a multitude of factors related to academic pressure and settings [6]. Furthermore, several studies indicate that transitioning from the pre-clinical to the clinical phase can be challenging and one of the most stressful periods for medical students. This may be related to the socialisation process [7, 8]. Early clinical experience may potentially help ease this transition by reducing the shock of practice and preparing students for clinical work [9]. Early experience also seems to help students

acclimatise to a clinical environment, interact with patients more confidently, develop a professional identity and contribute to students' satisfaction with medical education [10, 11]. All medical schools in Denmark offer some clinical exposure during the Bachelor of Science (BSc) programme. However, the duration is typically limited to a few weeks [12-14]. The question remains: are a few weeks of clinical exposure sufficient to prepare medical students adequately before transitioning into the Master of Science (MSc) programme, and does this short exposure address their perceived needs? This cross-sectional study aimed to assess the students' perceived need for more clinical exposure in the BSc programme in medicine.

Methods

Design and inclusion criteria

This cross-sectional survey study utilised self-reported survey data collected from medical students enrolled in the MSc programme in medicine at the University of Southern Denmark (SDU) in 2022. To meet our inclusion criteria, the students had to be enrolled in the MSc programme in medicine at the SDU, have completed the BSc degree at the SDU and have completed our survey. Respondents who did not consent to the collection and use of data or could not be validated by student mail were excluded.

Endpoints

The primary endpoint was to assess the students' attitudes towards the scope of clinical exposure to which they were exposed during their BSc programme. The secondary endpoints were to assess self-reported evaluation of the BSc programme regarding the clarity of study choice, acquisition of an understanding of the work-life balance and the clinical role of the physician.

Survey design

No internationally validated questionnaire was suitable for our purposes. Therefore, the authors developed a self-administered questionnaire designed to explore medical students' self-reported needs and attitudes towards their BSc programme, particularly emphasising professional and clinical aspects. The questionnaire covered seven main themes, including 1) Background information, 2) Study relations and environment, 3) Related networks, 4) Clarity of study choice and profession, 5) Attachment to the university and university hospital, 6) Assessment of needs and 7) Post degree plans (see supplementary material). The questionnaire was reviewed by a panel of experts within medical training to ensure its content validity and was subsequently pilot tested in a group of medical students before being distributed. The respondents were required to answer all of the questions. No alternative answer options were provided. Student e-mails were requested to ensure respondent validity.

Sampling methods and data collection

We used a non-probability voluntary sampling method to recruit participants. An invitation was distributed containing a public link to a web-based survey platform. The invitation was shared once through a joint announcement at the online learning management platform (Itslearning) of the university and the Facebook group for each student semester. The survey responses were collected using REDCap (Research Electronic Data Capture) provided by OPEN (Open Patient Data Exploratory Network). Data collection occurred from 27 July to 12 October 2022.

Variable of interest

Our primary variables of interest were the students' assessment of the scope of clinical exposure received during the BSc programme and the variables of Theme 4 (Clarity of study choice and profession). Other variables of

interest included a descriptive analysis of participant demographics, focusing on examining a potential link between the related network and the variables of Theme 4, and examining potential differences between first- and final-semester students in their assessment of the scope of clinical exposure received during the BSc programme.

Statistical analysis

Data were exported from REDcap in a pseudo-anonymous form, and statistical analyses were performed using Stata Statistical Software B.17. Descriptive statistics, including frequency, proportions, means, standard error and 95% confidence intervals, were used to summarise the data. The level of significance was set at 0.05 for all hypothesis testing. A chi-squared goodness-of-fit test was performed to assess whether our sample was representative of the population concerning sex proportions. To compare different subgroups, we used a 2×2 contingency table with a two-tailed Pearson's χ^2 test or Fisher's exact test.

Trial registration: not relevant.

Results

A total of 942 medical students were enrolled in the MSc program in medicine at the SDU at the time of data collection. Our inclusion criteria required that participants had obtained their BSc from the SDU. However, we could not determine the exact number of students meeting this criterion. This study has an estimated minimum response rate of 13%. However, the true response rate may have been higher. The inclusion process is illustrated in **Figure 1**.

FIGURE 1 Inclusion process.
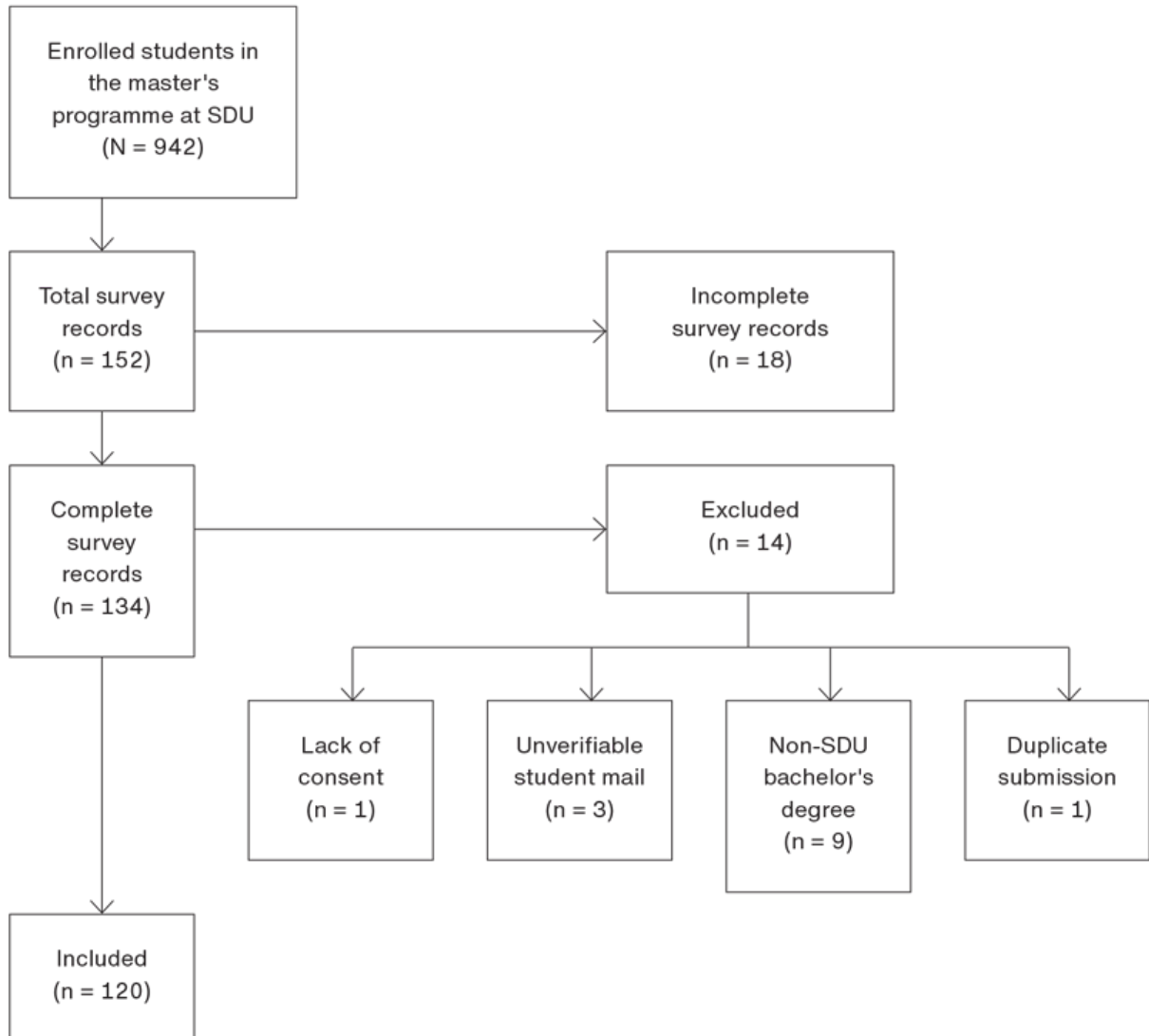
SDU = University of Southern Denmark.

Demographics, study environment and related network

Table 1 summarises the demographic characteristics of the sample population and expected percentages of sex distribution based on the data available for the target population (n = 942). A χ^2 goodness-of-fit test was performed, comparing the observed and expected frequencies of sex, resulting in a non-significant p value of 0.18. Most students reported physical lectures (63%) as their primary study environment during the BSc programme, and 38% had at least one physician among their friends or family.

TABLE 1 Demographic characteristics and expected sex distribution percentages.
N = 120; mean age (range) [standard deviation]: 25.5 (22-35) [± 2.25] years.

	n (%)	Expected, %[a]
Sex		
Female	84 (70)	64
Male	36 (30)	36
Total	120 (100)	100
Study environment		
Primarily attended physical lectures	76 (63)	-
Primarily self-studied	16 (13)	-
Had a study group	88 (73)	-
Had good study relations	106 (88)	-
Related network		
Had a physician in the family	26 (22)	-
Had a physician among friends	33 (28)	-
Had a physician among friends & family	13 (11)	-
Total with a physician in their network	46 (38)	-

MSc = Master of Science; SDU = University of Southern Denmark.
a) Enlisted students at the MSc in medicine at the SDU in 2022 and sex distribution: total 942 (100%), women 603 (64%), men 339 (36%). Data shared from the SDU Faculty of Health Sciences.

Primary variables of interest

Upon completion of the bachelor's programme, 81% of the students reported feeling satisfied that medicine was the right choice of study. Furthermore, 32% felt they had acquired an adequate understanding of a physician's clinical role, and 13% felt they had acquired an adequate understanding of the work-life balance within the medical profession. In addition, 90% assessed the scope of clinical exposure received during the programme as insufficient. The results are summarised in **Table 2**.

TABLE 2 Survey results: Clarity of study choice and profession (Theme 4) and Assessment of need (Theme 6).

Question	n (%) (N = 120)	Standard error	Logistic probability: 95% CI	Margin of error, %
Were you satisfactorily assured that medicine was the right study choice after completing your bachelor's program?				
Yes	97 (81)	0.036	0.74-0.88	± 7
No	23 (19)	0.036	0.12-0.26	± 7
Did you feel you had acquired an adequate understanding of a physician's clinical role upon completing the bachelor's programme?				
Yes	38 (32)	0.042	0.24-0.40	± 8
No	82 (68)	0.042	0.60-0.76	± 8
Did you feel you had acquired an adequate understanding of the work-life balance of a physician upon completing the bachelor's programme?				
Yes	15 (13)	0.030	0.07-0.19	± 6
No	105 (87)	0.030	0.81-0.93	± 6
How would you assess the scope of the clinical exposure you received during your bachelor's programme?				
Excessive	1 (1)	0.008	0.00-0.02	± 1
Appropriate	11 (9)	0.026	0.04-0.14	± 5
Insufficient	108 (90)	0.027	0.85-0.95	± 5

CI = confidence interval.

Secondary variables of interest

For first-semester students, 95% rated the clinical exposure received as insufficient. A total of 94% of students in the final semester shared this assessment. We found no potential correlation between the related network and the three variables of Theme 4. Test results are presented in **Table 3.**

TABLE 3 Association tests.

Question	Physician among friends or family?[a]			Semester status (MSc programme)[b]		
	no	yes	total	7th semester (1st semester)	12th semester (final semester)	total
Were you satisfactorily assured that medicine was the right study choice after completing your bachelor's programme?						
No, n	11	12	23			
Yes, n	63	34	97			
Total, N	74	46	120			
Pearson's χ2 test			2.3058			
p value			0.129			
Did you feel you had acquired an adequate understanding of a physician's clinical role upon completing the bachelor's programme?						
No, n	51	31	82			
Yes, n	23	15	38			
Total, N	74	46	120			
Pearson's χ^2 test			0.0306			
p value			0.861			
Did you feel you had acquired an adequate understanding of the work-life balance of a physician upon completing the bachelor's programme?						
No, n	66	39	105			
Yes, n	8	7	15			
Total, N	74	46	120			
Pearson's χ^2 test			0.5036			
p value			0.478			
How would you assess the scope of the clinical exposure you received during your bachelor's programme?						
Appropriate, n				1	1	2
Insufficient, n				19	17	36
Total, N				20	18	38
Fisher's exact test						1.000

MSc = Master of Science.
a) The potential correlation between related network and the 3 variables of Theme 4 presented in this study was evaluated using a 2 × 2 contingency table and 2-tailed Pearson's χ^2 tests.
b) Fisher's exact test was conducted to evaluate potential differences in students' perception of the scope of clinical exposure received during their bachelor's programme based on their current semester status in the master's programme (first versus final).

Discussion

Summary

Most students responded that the clinical exposure received was insufficient (90%). This attitude was consistent irrespective of the students' progression in their studies. A notable percentage of students (19%) felt uncertain about their study choice after having completed three years of studies. This uncertainty appears to extend into the understanding of their future profession, as 68% reported a feeling of inadequacy in their understanding of the clinical role of a physician, and 87% reported a feeling of inadequacy in their understanding of the work-life balance within the profession. We found no relation between the related network and the above variables.

The need for more clinical exposure

As the transition from the pre-clinical to the clinical phase can be one of the most stressful periods for medical students and keeping in mind that early clinical exposure may potentially help ease this transition by reducing the shock of practice [7, 9], our findings imply that a few weeks of clinical exposure during the BSc programme may not be sufficient to adequately prepare students for the transition into the clinical phase. The high prevalence of anxiety among medical students relative to the general population may be attributed to factors within the clinical and academic environment. However, a meta-analysis of the prevalence of anxiety among medical students found no significant difference in the prevalence of anxiety between medical and non-medical students [2]. However, some local studies have reported significantly higher anxiety levels among non-medical students than among their medical counterparts [15]. This suggests that the stressors may extend beyond the realm of medical education. Regardless of the extent of clinical exposure received before the clinical phase, students may still perceive uncertainties about their academic study or a lack of understanding of their future profession. However, similar results have been found in other research that supports our findings and hypotheses. Thus, Tayade et al. noted that early clinical exposure (ECE) was part of medical education reform in India, highlighting its role as a valuable intervention. In their study, 820 students were divided into two groups: one exposed to ECE and the other to traditional teaching. The ECE group received six modules in both hospital and community settings. The results showed that 93% of students strongly agreed that ECE enhanced their interest in learning, 90% felt it provided an improved clinical context and 87% reported a high level of satisfaction [10]. Similarly, a study by Eyal, L and Cohen, R (2006) surveyed 371 medical students and graduates regarding the effectiveness of their curriculum in preparing them for clinical practice. Only 15% of students felt ready for internships, 40% reported inadequate training in clinical skills and 96% felt that insufficient time was allocated to case-based learning [16]. At the national level, the Danish Medical Students' Association conducted a survey across the four medical universities in Denmark. Among the 1,825 respondents, 41-44% believed that their programme lacked adequate clinical exposure. However, this survey included both bachelor's and master's students and highlighted inconsistencies in the clinical exposure provided during the master's programmes across universities [17].

Early clinical exposure and other possible ways of preparing medical students

A study by Ewnte & Yiqzaw found that ECE effectively facilitated student learning and provided insight into their future careers. However, several factors such as heavy workload, poor relationships between academic and health institutions, and lack of initiative regarding the implementation process were perceived as barriers to implementing effective ECE [18]. Future interventions incorporating ECE should consider critical factors that could obstruct its successful implementation, using available research as guidance. Other potential interventions and approaches could be incorporating simulation training in practical procedures and clinical examinations. A study examining stress levels during physicians' first lumbar punctures revealed high stress levels among novice physicians before and during the procedure. The stress was linked to reduced patient confidence in the operator

and an increased risk of post-dural puncture headache. In contrast, stress levels were lower among intermediate operators and experts [19]. This suggests that early integration of simulation training in the BSc programme may help reduce student distress and improve preparedness before their transition to the clinical phase. A national follow-up experimental study considering both the quantity of ECE and the quality of clinical placements would be essential to assess the impact of ECE on student distress and preparedness for the transition into the clinical phase.

Strengths and limitations

The inclusion criteria ensured a common baseline in curriculum-based medical knowledge and clinical experience, which strengthens the validity of our results. By stratifying the respondents based on MSc semester status at the time of their response, we reduced the risk of baseline bias on the need assessment. The verification of respondents also ensured the authenticity and credibility of our findings. This study also has some limitations that need to be considered. The sampling method used may be prone to selection bias, as the students who chose to respond might hold stronger opinions or attitudes than the overall population. Additionally, the ability of the study to draw generalisable conclusions is limited by its single institution design, a sample size only constituting slightly more than every eighth student and an estimated 13% response rate. The selection bias and estimated response rate could theoretically have led to an underestimation or overestimation of the attitudes observed in this study. Supplementary dropout analysis would have been relevant but posed challenges due to survey settings and voluntary response sampling, among others. Our study analysed completed and validated responses, with the noted limitations in assessing attrition and non-response.

Conclusions

Our findings revealed a strong subjective need for more clinical exposure during the BSc programme in medicine, along with a perceived uncertainty before transitioning to the MSc programme among the respondents. Few weeks of clinical exposure do not seem to meet the students' needs. However, the impact of additional clinical exposure on student distress remains unclear.

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