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Medical student attrition in Poland: a four-year retrospective administrative study of formal discontinuation at a large medical university

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Medical student attrition in Poland: a four-year retrospective administrative study of formal discontinuation at a large medical university

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Abstract

Background. Failure to complete medical studies matters for students, universities, and health workforce planning, yet the comparability of published rates is limited by differing definitions and observation periods. The aim of this study was to describe the frequency and distribution of formal removals from the student register in a medical degree programme across consecutive academic years and stages of study, the characteristics of the affected cases, the grounds for these decisions recorded in the Dean's Office documentation, and the recorded use of social support and selected university resources.

Methods. A single-centre, retrospective, descriptive study of anonymised administrative data from the 2020/2021–2023/2024 academic years was conducted. Of 470 source records, 165 cases of non-commencement of studies and 13 transfers to other medical universities were excluded. The analysis included 292 cases of formal removal from the register, involving 291 students. Percentages were calculated against annual student denominators for each year of study; the combined denominator comprised 15,059 annual observations, not unique individuals.

Results. The overall rate of formal removal was 1.9% of annual observations, ranging from 1.3% to 2.4% across academic years. The highest rate was recorded in Year 1 (235/2,760; 8.5%); Year 1 cases accounted for 80.5% of all removals. The most common administratively recorded ground was failure to pass required courses (73.6%), while in 24.0% of cases no ground for removal was recorded. Women accounted for 60.6% of cases, and Polish citizens for 91.4%.

Conclusions. Formal removals from the register were concentrated in Year 1, where the rules in force did not provide for the usual possibility of repeating the year or for conditional progression after failing an examination or course. The findings support early, multidimensional support and the standardisation of how the grounds and circumstances

of discontinuation are recorded. Full-cohort studies tracking students from admission to completion are needed to estimate the cumulative probability of non-completion.

Keywords: medical student attrition; formal removal from the register; academic failure; student retention; medical education.

Background

Failure to complete medical studies represents an important problem for students, universities and health care systems. In an international comparison, Enabulele and Enabulele [1] reported non-completion rates ranging from 1.4% in the United States to 16.0% in Pakistan; mean values for Australia and New Zealand were 3.1% and 6.7%, respectively, and 11.7% for the analysed population of students from Nigeria. The importance of monitoring completion of education is reinforced by the World Health Organization's [2] projection of a global shortage of 11.1 million health workers by 2030. In a ten-year study conducted at an Irish medical school, Maher et al. [3] analysed six complete student cohorts. After excluding students who transferred to other medical programmes, 5.7% of participants did not complete their studies. The lack of consistent systems for collecting and reporting data on completion and discontinuation further complicates assessment of the scale of the problem and cross-country comparisons [1].

In a systematic review, Ahmady et al. [4] showed that academic difficulties at the preclinical stage are associated with individual, instructional, and environmental factors, and that early identification of underperforming students may enable appropriate support to be implemented. In a study by Hefny et al. [5], students who discontinued their education early most often linked poor performance to psychological problems, social

factors, and difficulties with self-organisation; anatomy was most frequently identified as the most difficult first-year subject.

The importance of analysing medical student non-completion in Poland is heightened by the scale of workforce needs and public investment in education. According to Statistics Poland, in 2024, 141,193 physicians worked directly with patients, while 166.5 thousand physicians residing in Poland held a licence to practise [6]. In response to health-system needs, undergraduate training capacity has been expanded: the admission limit for medical degree programmes increased from 6,188 places in the 2015/2016 academic year to 10,065 in 2024/2025 [7]. At public universities, full-time programmes taught in Polish are publicly funded [8]; discontinuation therefore has not only individual consequences but may also mean that places and resources allocated to training future doctors are not fully utilised.

In Poland, available studies focus, among other things, on systemic changes and the expansion of medical education (Kupis et al. [9]) and on students' motivation, satisfaction, stress, and values at different stages of study (Sarnowska et al. [10]). However, national, register-based analyses of formal removals spanning consecutive academic years and stages of the programme are lacking. The aim of this study was to describe the frequency and distribution of formal removals from the student register in a medical degree programme across consecutive academic years and stages of study, the characteristics of the affected cases, the grounds for these decisions recorded in the Dean's Office documentation, and the recorded use of social support and selected university resources.

Methods

A single-centre, retrospective, descriptive observational study was conducted, based on analysis of anonymised data from the records of the Dean's Office of the Faculty of

Medicine, Medical University of Warsaw. The study included 292 cases of formal removal from the student register, involving 291 medical degree students who had commenced their studies and were subsequently removed from the register during one of the six years of study, across four consecutive academic years: 2020/2021, 2021/2022, 2022/2023 and 2023/2024. A removal case was defined as any formal removal from the student register that occurred after the individual had actually commenced their studies. Where the same individual was readmitted and subsequently removed again, each event was treated as a separate removal case.

Individuals admitted to the programme who did not commence their studies, i.e., did not begin participating in classes (n = 165), and individuals who transferred to a medical degree programme at another medical university (n = 13), were excluded from the analysis.

Annual denominators were determined using aggregate data from the Dean's Office records on the number of students commencing each of the six years of study in a given academic year. For each academic year, the denominator was the sum of students commencing Years 1–VI, and the numerator was the number of formal removal cases meeting the inclusion criteria. The annual formal removal rate was calculated as the numerator divided by the denominator, multiplied by 100. Analogous rates were calculated by year of study.

In the combined analysis, the denominator was 15,059 annual student observations. Because the denominator comprised annual observations, the same student could be included in more than one academic year.

Before the analysis began, an audit of data completeness and consistency was performed. This assessed repetition of student identification numbers, consistency of demographic data, the chronology of commencement and completion of studies,

completeness of information on year of study, and the number and type of recorded bases for removal. In one case, the same student ID number appeared in two consecutive academic years and corresponded to two separate removal cases following readmission. Both cases were retained in the analysis. For this reason, the 292 analysed removal cases involved 291 unique students.

For each removal case, the available information considered included: the academic year in which the removal occurred, year of study at the time of removal, sex, age, citizenship, place of residence, full-time or part-time mode of study, the administratively recorded basis for removal, use of a means-tested social scholarship, application for a means-tested social scholarship, use of a place in student housing, use of online reading-room resources, borrowing books from the library, and type of secondary school completed. Place of residence was classified as a rural area, a town of fewer than 100,000 inhabitants, or a city of at least 100,000 inhabitants.

Bases for removal were established from information recorded in the Dean's Office documentation and analysed according to the categories used in that documentation. These comprised: failure to pass courses required by the study programme, choice of another profession, deterioration of financial circumstances, death of the student, health reasons, and absence of information on the basis for removal.

Data on social support and use of university resources included information on use of a means-tested social scholarship, application for such a scholarship, use of a place in student housing, use of the online reading room, and borrowing books from the library. For student housing, the online reading room, and the library, the absence of recorded activity was coded as “no use recorded”; this is not equivalent to confirmed non-use.

Type of secondary school completed was analysed in two categories: technical secondary school and general secondary school or an equivalent school. The “equivalent

school" category included foreign secondary schools corresponding in level to the Polish general secondary school and entitling the holder to apply for admission to higher education. Where neither category was marked, the value was classified as missing data.

Percentages describing the characteristics of removal cases, the administratively recorded bases for removal, and use of support and university resources were calculated relative to the number of removal cases in a given academic year or in the whole analysed group. Missing data were presented as a separate category, and no imputation was performed. Formal removal rates based on population denominators were calculated separately by academic year and by year of study. Age was described using the mean and standard deviation and the median and interquartile range. Given the descriptive aim of the study, no inferential analyses or multivariable models were performed.

Data analysis was performed in Python version 3.12.13 (Python Software Foundation), using pandas version 2.2.3. The study received approval from the Bioethics Committee of the Medical University of Warsaw. ChatGPT (OpenAI; GPT-6/Codex) assisted with table preparation, checks of consistency between the reported results and tables, reference verification and translation into English. The authors reviewed the AI-assisted text, checked the references and numerical results against source materials, and take full responsibility for the final content.

Results

During the study period, 470 source records were identified. After excluding 165 individuals who did not commence their studies and 13 individuals who transferred to a medical degree programme at another medical university, 292 formal removal cases involving 291 students were included in the analysis (Figure 1).

The sum of students commencing Years I–VI was 3,795 in the 2020/2021 academic year, 3,767 in 2021/2022, 3,757 in 2022/2023, and 3,740 in 2023/2024. The formal removal rate relative to these annual denominators was 1.8%, 2.2%, 2.4%, and 1.3%, respectively. Overall, the 292 cases represented 1.9% of 15,059 annual student observations. Taking into account the number of students commencing each year of study, the highest removal rate was recorded in Year 1 (235/2,760; 8.5%), followed by Year 2 (29/2,460; 1.2%). In Year 3 it was 0.5% (12/2,425), while in Years 4–6 it was 0.2% in each case (4/2,462, 6/2,463, and 6/2,489, respectively) (Table 1).

Among the 292 analysed cases, 177 (60.6%) concerned women, and 267 (91.4%) concerned individuals holding Polish citizenship. The mean age at the time of removal was 21.9 ± 3.8 years, and the median was 20.0 years (interquartile range [IQR]: 20.0–22.0). The largest proportion of cases concerned individuals residing in cities of at least 100,000 inhabitants (n = 136; 46.6%), followed by towns of fewer than 100,000 inhabitants (n = 90; 30.8%) and rural areas (n = 64; 21.9%). In 195 (66.8%) cases, the individuals removed were studying full-time. Completion of a general secondary school or an equivalent school was recorded in 288 (98.6%) cases ([Additional file 1]).

The most common basis for removal recorded in the Dean's Office documentation was failure to pass required courses, occurring in 215 (73.6%) cases (Table 2). Across consecutive academic years, the proportion of cases associated with this basis was 70.1%, 71.1%, 76.1%, and 78.0%, respectively. In 70 (24.0%) cases, no information on the basis for removal was recorded; this proportion ranged from 20.0% to 27.7% across years. Of these, in 66 (22.6%) cases the documentation formally marked the “no information” category, while in 4 (1.4%) cases no basis for removal was marked at all. The remaining categories occurred sporadically and included choice of another profession (n = 3; 1.0%),

death of the student (n = 2; 0.7%), deterioration of financial circumstances (n = 1; 0.3%), and health reasons (n = 1; 0.3%).

Across all analysed academic years, the majority of removals recorded in a given year concerned first-year students. Overall, Year 1 cases accounted for 235 (80.5%) of all 292 removals ([Additional file 2]).

Use of a means-tested social scholarship was recorded in 8 (2.7%) analysed removal cases, while an application for such a scholarship was recorded in 9 (3.1%) cases. For both variables, data were missing in 28 (9.6%) cases; all missing data concerned the 2020/2021 academic year. Use of a place in student housing was recorded in 18 (6.2%) cases. Use of the online reading room was recorded in 142 (48.6%) cases, and the proportion with recorded use decreased across consecutive academic years, from 65.7% in 2020/2021 to 28.0% in 2023/2024. Borrowing books from the library was recorded in 111 (38.0%) cases ([Additional file 3]).

Discussion

In this study, formal removals from the medical degree student register accounted for 1.9% of all annual student observations during the study period. This proportion was calculated on the basis of the number of students commencing each year of study. It therefore does not represent the proportion of individuals who did not complete the entire six-year programme, and should not be directly compared with rates calculated for cohorts followed from admission to completion.

For context, previous studies reported attrition estimates ranging from 1.4% to 16.0% in the review by Enabulele and Enabulele [1], 2.8% over five years in the American cohort studied by Nguyen et al. [11], and 3.5% of individuals not completing their studies in the analysis by Kamran et al. [12]. Differences between these estimates and our result may

reflect variation in endpoint definitions, follow-up duration, denominator construction, and the organisation of medical education.

The most striking finding was the pronounced concentration of formal removals in Year 1, whereas removals occurred far less often at later stages of the programme. This distribution highlights the need to interpret academic difficulties in the context of the transition into medical school and the applicable progression rules.

An important methodological contribution of this study is its explicit separation of formal removal after studies had begun from non-commencement and inter-university transfer. These events describe different outcomes: non-commencement occurs before education starts, whereas transfer changes institution without ending medical education. Defining the endpoint this way, and specifying the denominator as annual student observations, clarifies what the reported 1.9% represents and helps prevent comparisons between non-equivalent measures. This distinction is relevant to international interpretation because attrition studies vary in outcome definitions, observation periods, denominator construction, and data-collection methods [1].

Under each version of the Medical University of Warsaw Study Regulations in force during the analysed period, § 30 generally excluded first-year students from repeating the year and from conditional progression after failing one examination or one course [13–16]. The exception to the repeat-year restriction differed: the 2020 regulations referred to health-related circumstances, whereas the 2021–2023 versions also specified leave granted by the Dean. Students in later years therefore had access to administrative solutions unavailable in Year 1. For comparison, the University of Glasgow's Bachelor of Medicine and Bachelor of Surgery (MBChB) programme regulations for 2023/2024 provided that a student not meeting progression requirements after the first year was generally permitted to repeat that year once [17]. This example illustrates variation in

progression rules between institutions but does not constitute a comparison of their effectiveness. Our data do not demonstrate that the regulations caused the observed distribution of removals, nor that first-year students more often experienced underlying difficulties. However, these rules may have increased the likelihood that failure to pass required examinations in Year 1 resulted in formal removal rather than repetition of the year or conditional continuation.

The transferable contribution is a framework for interpreting administrative attrition data alongside local progression regulations. At each institution, these rules help determine whether academic difficulty leads to repetition, conditional progression, or formal removal. Comparisons across institutions should therefore align endpoint definitions and denominators and describe the applicable progression rules. The present single-centre descriptive data do not establish the effect of any specific rule; testing that question requires cohort-based analyses or studies of policy changes.

The demographic profile of students formally removed describes the study group but does not identify risk factors. Without corresponding denominators for the entire student population, it is not possible to determine whether sex, citizenship, place of residence, or mode of study was associated with the probability of removal. In an analysis of four Hungarian universities, sex and citizenship showed moderate associations with non-completion, whereas indicators of academic progression and mode of financing were more influential [18]. Large US studies, in turn, found a higher probability of attrition among students from low-income backgrounds and resource-deprived areas [11], as well as among low-income and first-generation students [12]. These findings justify further investigation of social inequalities but cannot be directly transferred to the Polish context because of systemic differences.

Failure to pass required courses was the dominant formal basis for removal. This observation is consistent with the analysis by Pusztai et al. [18], in which slower accumulation of course credits was among the strongest indicators of non-completion. However, the formal basis for a Dean's Office decision should not be equated with the underlying cause of a student's difficulties. The scoping review by Kirtchuk et al. [19] indicates that academic difficulties may be associated with threats to student identity, stigma, mistrust of institutions, and maladaptive coping strategies. In the qualitative study by Picton et al. [20], the experiences of students struggling in Year 1 were usually multifactorial and included mental health problems, acute crises, overload, learning difficulties, and an inappropriate choice of programme. Academic failure may therefore represent a common final pathway through which psychological, social, health-related, and organisational factors operate.

The importance of mental health is supported by the study by Medisauskaite et al. [21], conducted at nine UK medical schools. Greater emotional exhaustion and higher severity of anxiety and depressive symptoms, insomnia, and somatisation were associated with a stronger intention to leave medical school. An intention to leave is not equivalent to formal removal and these findings therefore do not demonstrate an association with the endpoint used in the present study. They do, however, indicate that the infrequent recording of health-related or personal reasons in administrative documentation need not imply that these factors have little underlying importance. Interpretation is further limited by the frequent absence of information on the formal basis for removal.

The concentration of removals in Year 1 is consistent with descriptions of this period as a critical transition between secondary school and a demanding academic and professional environment. Picton et al. [20] indicated that a student must simultaneously adapt to independent functioning at university, the specific demands of learning medicine,

and the formation of a future physician's professional identity. Hefny et al. [5] likewise described the overlapping of psychological, social, and organisational difficulties in the early period of education. Kirtchuk et al. [19] emphasised the need for individualised remediation, building trust, and reducing fear of seeking help. Our findings argue for implementing support before failure becomes entrenched: monitoring of early results, readily accessible academic advising, help with organising study, and confidential psychological consultation. However, an observational study cannot establish that such measures would reduce the number of removals; their effectiveness requires prospective evaluation.

In the analysed group, students who were formally removed rarely received or applied for a means-tested social scholarship. This, however, is not evidence that financial difficulties were uncommon. A scholarship is an administrative indicator dependent on income criteria, application submission, and documentation completeness; it does not capture everyone experiencing financial strain. In the study by Nguyen et al. [11], low income and origin from a resource-deprived area were independently associated with a higher probability of attrition, while Kamran et al. [12] found a higher probability of non-completion among low-income and first-generation students. Because of differences in funding systems, these findings provide context rather than a direct explanation of our observations. The lack of comparative data for students continuing their studies precludes assessment of the association between scholarship support or student housing and formal removal.

In the documentation, use of the online reading room was recorded more often than borrowing books from the library, but these data only confirm that a particular activity was recorded and do not describe its frequency, intensity, or quality. They also do not include students' own textbooks, open digital resources, or materials made available

outside university systems. Recorded use of the online reading room declined markedly across consecutive academic years, which may be related to changes in educational delivery during and after the pandemic; Alrumi [22] described the rapid shift to online teaching during the pandemic and discussed blended learning as a possible future model for medical education. The present data cannot distinguish this mechanism from organisational or technical changes, the availability of other resources, or changes in activity recording. Without a comparison group, use of library resources should not be interpreted as a marker of engagement or as a factor protecting against removal.

Study limitations

Limitations include the retrospective, single-centre nature of the analysis, the absence of individual tracking of complete cohorts from admission to graduation, the absence of complete comparative data for students who continued their studies, and the use of the sum of annual observations as the denominator. Consequently, the cumulative probability of non-completion and independent associations between demographic or social characteristics and formal removal cannot be estimated. The documentation contained only the formal bases for decisions, and this information was not recorded in almost one-quarter of cases. This also has a system-level implication: university registers should require consistent documentation of the formal basis for each decision and, where possible, of the broader context of discontinuation using standardised categories. The study period additionally covered education during and after the COVID-19 pandemic. The study design does not allow causal inference or evaluation of the effectiveness of progression rules or support interventions.

Conclusions

Formal removals were concentrated in Year 1, and the dominant recorded basis was failure to pass required courses. The Year 1 finding should not be compared with cohort-based rates of non-completion of the entire programme. When interpreting the concentration of removals at the beginning of medical school, local progression rules should be taken into account, because regulations governing year repetition and conditional progression help shape how academic failure translates into formal discontinuation. This conclusion is also relevant to other institutions: comparable monitoring of discontinuation requires distinguishing non-commencement, transfer, and departure after studies have begun; using clearly defined denominators; and completely documenting the bases for decisions. The findings support an early, multidimensional support system that combines monitoring of academic progress with psychological, social, and organisational assistance. Future studies should follow complete cohorts, use standardised definitions, systematically record the circumstances of attrition, and prospectively evaluate support interventions across multiple centres.

List of abbreviations

IQR, interquartile range; WUM, Medical University of Warsaw.

Declarations

Ethics approval and consent to participate

The study was approved by the Bioethics Committee of the Medical University of Warsaw.

Consent for publication

Not applicable. No individually identifiable data are reported in this article.

Availability of data and materials

The data analysed in this study are not publicly available because they are administrative student records held by the Dean's Office of the Faculty of Medicine, Medical University of Warsaw, and are subject to institutional and data-protection restrictions.

Competing interests

The authors declare that they have no competing interests.

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AD-R conceived and designed the study, coordinated the project, contributed to data curation and analysis, interpreted the findings, and drafted the manuscript. JK-B contributed to the study design, data acquisition and analysis, interpretation of the findings, and critical revision of the manuscript. ER-W contributed to data acquisition, interpretation of the findings, and critical revision of the manuscript. PT contributed to the methodology and data analysis and interpretation of the findings. PW contributed to the interpretation of the findings and critical revision of the manuscript. AN-O contributed to the study conception, interpretation of the findings, and critical revision of the manuscript. All authors read and approved the final manuscript.

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Figure legends

Figure 1. Flow diagram of study group selection and derivation of annual denominators

Note. The combined denominator is the sum of annual student observations and does not represent 15,059 unique individuals.

Tables

Table 1. Number of annual student observations and formal removal rates

A. By academic year			
Academic year	**Sum of students commencing Years I–VI, N**	**Formal removals, n**	**Annual removal rate, %**
2020/2021	3795	67	1.8
2021/2022	3767	83	2.2
2022/2023	3757	92	2.4
2023/2024	3740	50	1.3
Total	15059	**292**	**1.9**
B. By year of study — combined data from the four academic years			
Year of study	**Annual student observations, N**	**Formal removals, n**	**Removal rate, %**
Year I	2760	235	8.5
Year II	2460	29	1.2
Year III	2425	12	0.5
Year IV	2462	4	0.2
Year V	2463	6	0.2
Year VI	2489	6	0.2
Total	15059	**292**	**1.9**

Note. The combined denominator comprises annual student observations, not unique individuals; percentages are not cumulative rates of non-completion of the entire programme.

Table 2. Administratively recorded bases for removal by academic year

Basis for removal	**2020/2021 N = 67**	**2021/2022 N = 83**	**2022/2023 N = 92**	**2023/2024 N = 50**	**Total N = 292**
Failure to pass required courses	47 (70.1%)	59 (71.1%)	70 (76.1%)	39 (78.0%)	215 (73.6%)
Choice of another profession	1 (1.5%)	1 (1.2%)	1 (1.1%)	0 (0.0%)	3 (1.0%)
Death of the student	1 (1.5%)	0 (0.0%)	1 (1.1%)	0 (0.0%)	2 (0.7%)
Deterioration of financial circumstances	0 (0.0%)	0 (0.0%)	1 (1.1%)	0 (0.0%)	1 (0.3%)
Health reasons	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (2.0%)	1 (0.3%)
No information on basis (formally marked)	18 (26.9%)	20 (24.1%)	18 (19.6%)	10 (20.0%)	66 (22.6%)
No basis marked at all	0 (0.0%)	3 (3.6%)	1 (1.1%)	0 (0.0%)	4 (1.4%)
Total	**67 (100%)**	**83 (100%)**	**92 (100%)**	**50 (100%)**	**292 (100%)**

Additional files

Additional file 1.xlsx (Characteristics of formal removal cases): Table S1, including demographic and educational characteristics of the analysed cases.

Additional file 2.xlsx (Year of study at removal): Table S2, distribution of formal removal cases by year of study and academic year.

Additional file 3.xlsx (Social support and university resources): Table S3, recorded use of social support and selected university resources.

Figure 1. Flow diagram of study group selection and derivation of annual denominators

Population denominators	Selection of formal removal cases
Students commencing Years I–VI in the 2020/2021–2023/2024 academic years N = 15,059 annual observations	Source records concerning removal from the student register n = 470
↓	↓
Annual denominators: 2020/2021: N = 3,795 2021/2022: N = 3,767 2022/2023: N = 3,757 2023/2024: N = 3,740	Excluded: • non-commencement of studies (n = 165) • transfer to another medical university (n = 13)
	↓
	Included in the analysis: 292 formal removal cases involving 291 unique students
Annual formal removal rates: 2020/2021: 1.8% 2021/2022: 2.2% 2022/2023: 2.4% 2023/2024: 1.3% Overall: 292/15,059 (1.9%)	The unit of analysis was a formal removal case. One student contributed two cases following readmission.

Note. The combined denominator is the sum of annual student observations and does not represent 15,059 unique individuals.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Additionalfile3.xlsx
- Additionalfile2.xlsx
- Additionalfile1.xlsx