Clinician of the Future 2023 Education Edition

Elevating global voices in healthcare

Clinician of the Future 2023: Education Edition

Contents

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Foreword

As healthcare continues to evolve, the changing global environment is impacting not only practicing clinicians but also the next generation of healthcare professionals. Medical and nursing education must prepare students for a work environment influenced by unprecedented developments in medical technology, growing patient expectations and an increasing use of data to enhance care and prevention. The volume of data and information is growing exponentially, and medical and nursing education must support students navigating these changes as they transition from their studies to clinical practice.

In an ongoing effort to elevate the voices of those on the frontlines of patient care, we proudly introduce this new report from Elsevier Health, the *Clinician of the Future 2023: Education Edition*, which features the insights of more than 2,000 medical and nursing students from around the world on the opportunities and challenges they face in preparation for a professional career in healthcare.

This is the latest report in our Clinician of the Future series, building on our previous research to understand clinicians' views on what the future of healthcare might look like. Now we're turning the spotlight on students and educators to understand how they view the decade ahead, and how best we can support students throughout their educational and professional journey.

The pressures facing current clinicians have not gone unnoticed by today's students, who voice their concerns about the expectations of them once they enter clinical practice. Our report also identifies key insights into both the excitement and caution towards technology and generative AI in healthcare education. The findings give all of us working in healthcare much to consider as we strive to set up today's students with the best chance of succeeding in their medical careers.

Here at Elsevier Health, we partner with educators and institutions to support the ongoing innovation and the adoption of new technologies, to ensure that students learn from a curriculum that is trusted, evidence-based and developed responsibly.

We remain committed to listening to the needs of students and educators to ensure that our solutions will help institutions build a practice-ready workforce that can keep pace with the advancements in clinical care.

I hope you will enjoy reading this report and if you're interested in learning more about other Clinician of the Future reports and future events, please sign up to be a part of the Clinician of the Future community.

Sincerely,

Jan Herzhoff, Phd

President, Elsevier Health

Clinician of the Future 2023: Education Edition

Summary

Today's medical and nursing students are driven by the impact they will be able to make in patients' lives, are largely committed to their studies and rate their education highly. But they are concerned about their mental health, they are feeling the pressure — both financial and academic — and they worry about the looming clinician shortages. Taken together, these factors mean an alarming number are reconsidering their futures.

Technology may offer support, and students are already embracing the latest developments, including generative artificial intelligence (GenAI) to help them navigate the digital world in which they are learning and their future roles as clinicians.

By listening to students' voices, we gain an understanding of their experiences today and expectations of tomorrow. Their views, set alongside those of practicing clinicians, give an indication of trends in healthcare and highlight potential problems to address.

This report presents the results of a survey of 2,212 students from 91 countries and two roundtable sessions with key opinion leaders and faculty in the USA and UK. The aim is to gain a deep understanding of students' experiences today and their expectations of the future in healthcare, as well as the perspectives of those instructing them.

Students seeking broader horizons

For details, see Chapter 1 on page 8

Students are committed to and positive about their education, but with concerns about mental health, study–life balance and the volume of information they need to absorb, combined with external worries such as the rise of misinformation and looming clinician shortages, some are considering quitting their course altogether. Many others are thinking about non-patient-facing roles once qualified.

➤ 25% of medical students in the USA and 21% in the UK are considering quitting their studies

Most notably, an alarming proportion (16%) of students are rethinking their career on the frontline of healthcare. Nursing students (21%) are more likely than medical students (12%) to be considering dropping out. Indian nursing students also show higher desire to leave their current studies (29% versus 21% global).

➤ 58% see their current studies as a stepping-stone towards a broader career in healthcare

While a minority of students plan to quit their studies, the majority report that they plan to move into roles in which they do not intend to treat patients directly. Globally, 58% of students (54% medical students, 62% nursing students) see their current studies as a stepping-stone towards a broader career in healthcare that will not involve directly treating patients. The main career paths students are interested in are public health management, research, and business consultancy.

➤ 60% are worried about their current mental health

Students, like their counterparts in practice, are under a lot of pressure. Most students globally (60%) are worried about their mental health. According to their responses, some of the underlying factors might include study–life balance, financial pressure and the cost of studying, academic pressure, knowledge and misinformation, and the worry of future shortages and burnout.

➤ 89% are devoted to improving patients' lives

Despite pressures, worries and many considering quitting, students are devoted to making a positive difference in patients' lives, including in broader non-patient-facing roles like research and development, management consulting and public health.

Harnessing the power of GenAI

For details, see Chapter 2 on page 22

Technology – particularly generative AI (GenAI) – is an enabler to learning, students welcome it, and over half use it today. The upward trend in support and use in healthcare that we predicted in previous Clinician of the Future reports will continue in the next generation of clinicians, most students believe GenAI will be used in clinical care, despite some concerns.

➤ **62% feel excited about the use of AI for their education**

The majority of medical and nursing students globally are enthusiastic about the use of GenAI in their education. About three-fifths (62%) of respondents to the Clinician of the Future: Education Edition survey agree they are excited about the use of GenAI (tools like ChatGPT and Bard) for their medical or nursing education.

➤ **51% of students are using GenAI to support their learning**

Half of students globally have used tools like ChatGPT and Bard for their medical or nursing education. The top three uses among respondents are for coursework, exam preparation and to get updates on their field of study.

➤ **43% of students say instructors are welcoming of AI**

Four in 10 students say their instructors welcome their use of GenAI for education purposes, with nursing students significantly more likely to agree (49%) compared to medical students (38%). In the roundtables, while noting the potential limitations of the technology, instructors were also welcoming of students' use of GenAI.

➤ **70% think GenAI will aid diagnoses, treatments and patient outcomes in the future**

Seven in 10 students believe AI advancements will aid in diagnoses, treatments and patient outcomes, and over half (56%) predict that in 10 years' time clinical decisions will be made with the assistance of GenAI.

➤ **56% fear the negative effects of GenAI on the healthcare community**

Echoing the sentiments of today's practicing clinicians, as shared in the *Clinician of the Future 2023* report, over half of students are concerned about the negative effects GenAI may have on the healthcare community.

Students predict their futures

For details, see Chapter 3 on page 32

Looking at students' expectations of the future compared to the expectations of today's practicing clinicians can highlight potential trends. Students, like clinicians, do see the patient of the future being more empowered, and similarly they expect more personalized treatment. They expect preventive care will be the standard approach and digital healthcare to be the norm, though many acknowledge the potential for this to introduce inequalities in access to care and put additional pressure on clinicians. They envisage a more diverse, more digitally powered future, with AI playing a role in the healthcare team.

➤ **The Future Clinician as a Partner for Health:** 67% agree the relationship of clinicians and patients will be a partnership

➤ **The Future "Total Health" Clinician:** 80% students consider managing public health a top priority

➤ **The Future Tech-Savvy Clinician:** 71% agree digital health technologies will enable positive transformation of healthcare

➤ **The Future Balanced Clinician:** 60% agree use of digital health technologies will be a challenging burden on clinicians' responsibilities – lower than clinicians today

➤ **The Future Accessible Clinician:** 58% agree the use of digital health technologies will exacerbate health inequalities

https://tinyurl.com/CotF2023e

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Introduction

Since we launched the Clinician of the Future study in 2022, we have published two reports: the inaugural *Clinician of the Future Report 2022* and *Clinician of the Future 2023*, in which we followed up on many of the themes from the first report and uncovered some new ones. This report is the third, and in it, we share insights from today's medical and nursing students, most of whom will be the clinicians of the future.

By listening to the voices of students and the faculty who guide them to succeed in their careers, we gain an understanding of their experiences today and expectations of tomorrow. Their views, set alongside those of practicing clinicians, give an indication of trends in healthcare and highlight potential problems to address.

Students themselves are drivers of change, and their experiences now will be significantly influential in determining what the future role of the clinician looks like. Since our aim with this study is to envision the clinician of the future, student voices provide an important part of the picture.

Student: In this report, we share insights from medical students and nursing students; unless specified, we are referring to a mix of both.

Clinician: In this report, when we talk about 'clinicians' we are referring to physicians and nurses in primary and secondary care.

The Clinician of the Future

Looking at the clinician of the future from five angles highlights how multifaceted their work is, today and in the future. It also shows the multiple challenges clinicians face, and the range of solutions they will need access to in order to navigate the world of healthcare tomorrow. You can explore these personas in the *Clinician of the Future Report 2022.*

In chapter 3 of this report, we revisit the five scenarios, building on them with students' input.

Clinician of the Future 2023: Education Edition

This report presents the results of a global survey of students and two roundtable sessions with key opinion leaders in faculty from the USA and UK. The aim is to gain an understanding of students' experiences today and their expectations of the future in healthcare, as well as insights from the point of view of those instructing them.

The student survey, carried out in June and July 2023, focused on attitudes and perceptions among students, in order to uncover the paradigm shifts expected to have maximum impact on the way healthcare is delivered in the future.

Respondents are a sample of students (medical and nursing) from a variety of sources, and from a panel provider. See the Methodology (page 47) and Appendix (page 49) for a more detailed breakdown.

Student survey

10-15-minute online survey

n=2,212 students from 91 countries

April and May 2023

We conducted two online roundtable events – one with key opinion leaders in the UK and one in the USA – in which experts shared their reactions to the survey results and offered their own insights from the clinician and instructor angle.

Today's students, tomorrow's clinicians

In the inaugural *Clinician of the Future* report, we shared that more than two-thirds of survey respondents agreed the clinician's role has changed considerably.[1] We also highlighted the serious concern clinicians have about future shortages of doctors and nurses.[2]

These drivers of change continue to have an impact today, and while much hope has been placed on students to make up the shortfall in the future, our survey results suggest this might not be realistic. The next generation of clinicians, although appropriately trained and keen, may not be in sufficient number to fill the gaps we have identified through the Clinician of the Future 2023 study.

While most clinicians today perceive their role as being involved in direct patient care, it seems today's shortages may be exacerbated due to changing attitudes and goals. The majority of students see their education as a stepping-stone to a non-patient-facing role, and some are planning to quit their studies. This finding is supported by recent research in the UK, which suggests a "concerning proportion" of medical students are planning to leave the NHS imminently, and either leave healthcare altogether or move abroad for a career.[3]

This report is a step towards understanding not only the attitudes and experiences of today's students, but also their career intentions and concerns about their future in healthcare.

Explore this report

Throughout this report, we share global insights from over 2,000 students. We also put a spotlight on three markets: India, the UK and the USA. Each country and region has its own context, and this has an influence on students' responses. While we have tried to interpret responses within context, we are taking an objective view of the survey data. We share the results in the text and highlight some in visuals; you can explore the full results at https://tinyurl.com/CotF2023e.

In chapter 1, we explore the experiences and attitudes of students, including their mental health, career intentions and expectations.

In chapter 2, we dive deeper into one of the most fast-developing drivers of change, artificial intelligence, and share insights from students and key opinion leaders.

In chapter 3, we revisit the Clinician of the Future from the five angles we envisioned in the inaugural report, adding students' insights to the pictures.

As ever, healthcare and the role of the clinician are changing fast. We want to keep listening to clinicians, including those on their way to qualification. We will continue to build on this research as part of the Clinician of the Future study.

Join the discussion

This report and the study behind it are part of an ongoing discussion about the future of healthcare and what actions we all can take to ensure clinicians thrive in it. We welcome the opportunity to partner with you – stay in touch and join the conversation.

https://tinyurl.com/CotF2023e

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1   Elsevier. Clinician of the Future Report 2022. Chapter 4, pages 82-83. https://www.elsevier.com/connect/clinician-of-the-future

2   Elsevier. Clinician of the Future Report 2022. Chapter 4, page 86. https://www.elsevier.com/connect/clinician-of-the-future

3   Ferreira T, et al. Career intentions of medical students in the UK: a national, cross-sectional study (AIMS study). BMJ Open. 2023;13:e075598. 12 September 2023. https://doi.org/10.1136/bmjopen-2023-075598

Students seeking broader horizons

Chapter 1

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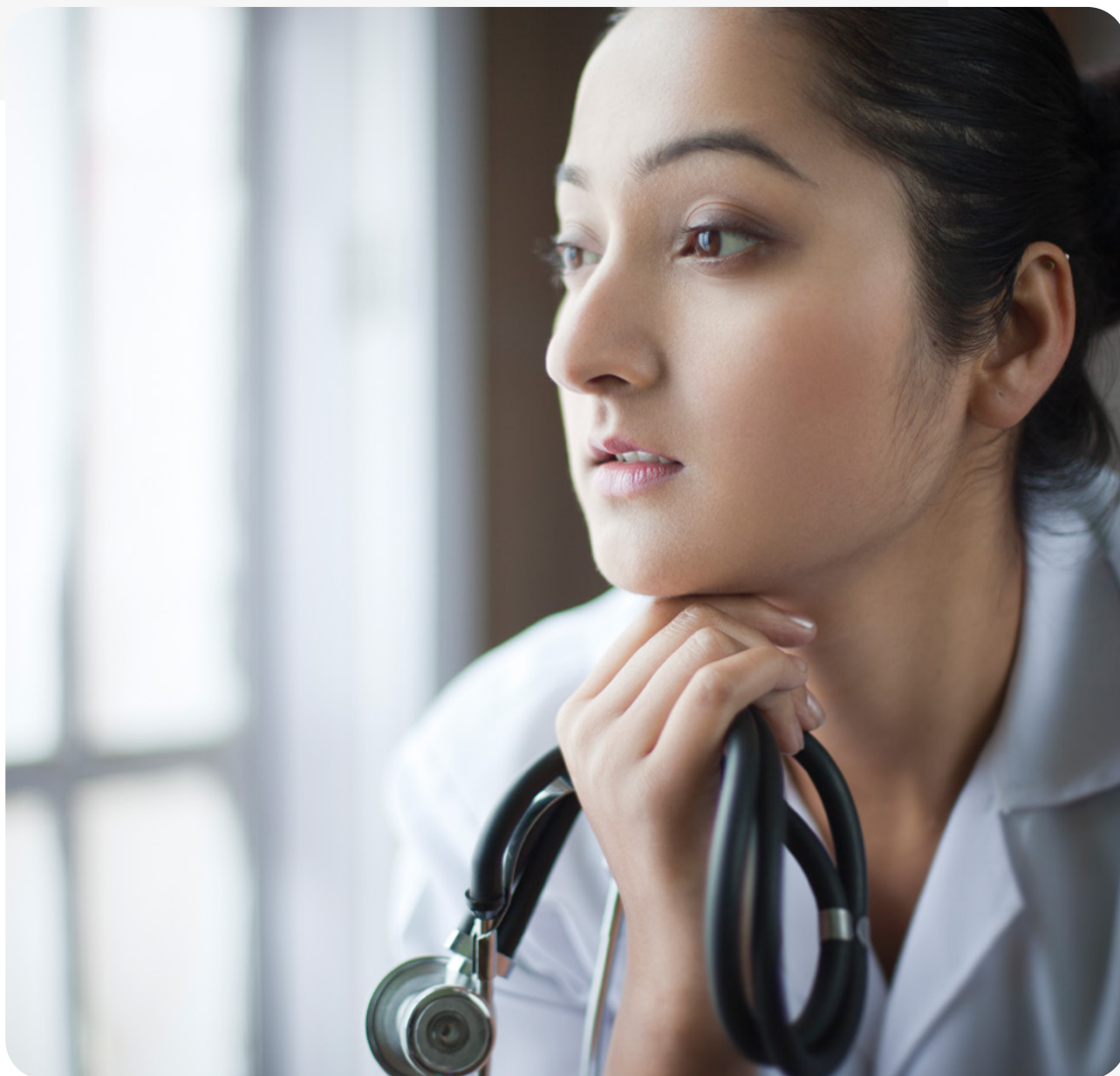
Students seeking broader horizons

Students are committed to healthcare and positive about their education, but with concerns about mental health, study–life balance and the volume of information they need to absorb, combined with external worries such as the rise of misinformation and looming clinician shortages, many are already considering leaving patient-facing roles or leaving healthcare altogether.

Are we training clinicians for a future outside patient care? And how can we adjust education to future-proof the healthcare workforce?

➤ 25% of medical students in the USA and 21% in the UK are considering quitting their studies

➤ 58% see their current studies as a stepping-stone towards a broader career in healthcare that will not involve directly treating patients

➤ 60% are worried about their current mental health

➤ 89% are devoted to improving patients' lives

Some students are considering quitting and leaving healthcare

A portion of students are rethinking their career on the frontline of healthcare. Globally, 16% of students who responded to the Clinician of the Future Education survey say they are considering quitting their medicine or nursing studies. Nursing students (21%) are more likely than medical students (12%) to consider dropping out.

While only 5% of students in LATAM are considering quitting their studies, a concerning 24% are considering it in NOAM, comprising 25% of medical students and 22% of nursing students. The USA and UK show the highest levels of medical students considering quitting their studies (25% and 21%) compared to the rest of the world (12%).

In our focus countries, there is a relatively consistent proportion of one in five students considering quitting — 23% in the USA, 20% in the UK and 20% in India. While the breakdown of medical and nursing students considering leaving their programs is fairly even in the USA and UK, in India significantly more nursing students (29%) than medical students (11%) are considering quitting.

Statement: I am considering quitting my medicine / nursing studies.

Region and Country	Base Sizes	% Students Agree (n=2148)		% Medical Agree (n=1346)		% Nursing Agree (n=802)	
TOTAL	2148	16		12		21	ME
NOAM	463	24 ●	LA, AP	25 ●	LA, EM, AP	22	LA
LATAM	204	5 ●		2 ●		9 ●	
EMEA	646	19	LA	16 ●	LA, AP	21	LA
APAC	835	15	LA	8 ●	LA	23	LA
USA	446	23 ●		25 ●	IN	21	
UK	315	20		21 ●	IN	18	
INDIA	433	20		11		29 ●	

● ● Significantly higher or lower than total

Significantly higher than Role/ Region/ Country (indicated by first two letters e.g. AP = Asia Pacific)

Asia Pacific = AP North America = NO India = IN Medical Students = ME
Europe, Mid. East & Africa = EM Latin America = LA UK = UK Nursing Students = NS
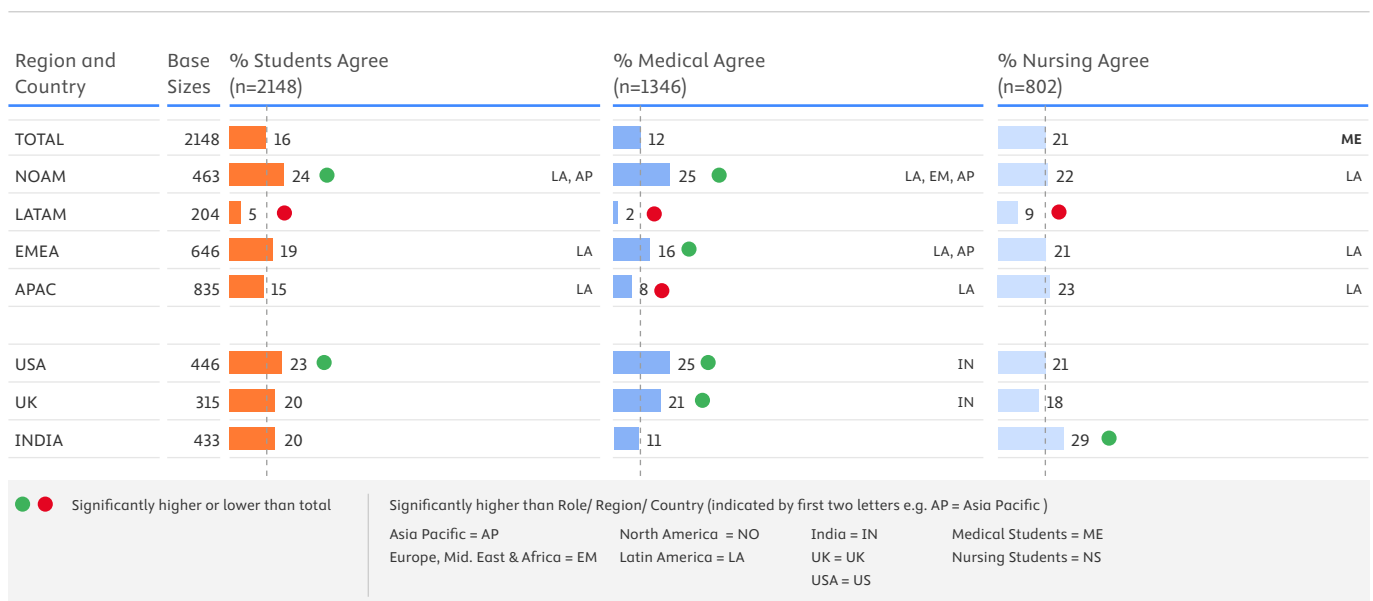USA = US

Fig 1. Question: To what extent do you agree or disagree with each of the following statements?

> "… in terms of health workforce issues in the United States, 5% is still one out of 20 nurses or one out of 20 physicians not completing their studies. That's really disastrous, because as we all know, what comes into an entering class is what you've got for that year. Especially for the US, the figure is quite high."

Dr. Lois Margaret Nora, who attended the US roundtable for the Clinician of the Future Education study

In a study focused on nursing students, dropout rates vary greatly around the world, and are as high as 50% in Australia.[1] And according to a 2019 report, in Spain, 4.5% of medicine students and 4.9% of nursing students drop out.[2] Reasons for quitting are just as variable. In a study involving nursing students who had quit their courses, some of the main reasons shared were realizing they were not suited to nursing, lacking the resources (psychological, physical and practical) to cope, unmet expectations of the profession and lack of supervisory support in difficult experiences.

Are we training clinicians for a career outside healthcare?

In a follow-up question, we asked respondents who are considering leaving what they are most likely to do next. Globally, 5% of students are considering leaving healthcare altogether, with agreement varying between 11% in NOAM to 7% in EMEA down to 2% in APAC and under 1% in LATAM.

Of particular concern is that one in eight nursing students in the USA (12%) are considering leaving healthcare. Indian nursing students also show higher desire to leave their current studies (29% versus 21% global), though the majority plan to remain in healthcare (2%).

Statement: I am considering quitting my medicine / nursing studies. Follow-up: If this does happen, what are you most likely to do next? Plan to leave healthcare

Region and Country	Base Sizes	Plan/Consider leaving	% Students Considering/planning to leave (n=2148)	
TOTAL	2148	% Considering leaving studies	16	84
		% Plan to leave a healthcare career	5	11
NOAM	463	% Considering leaving studies ●	24	76 / LA, AP
		% Plan to leave a healthcare career ●	10	13 / LA, EM, AP
LATAM	204	% Considering leaving studies ●	5	95
		% Plan to leave a healthcare career ●	5	
EMEA	646	% Considering leaving studies	19	81 / LA
		% Plan to leave a healthcare career ●	7	12 / LA, AP
APAC	835	% Considering leaving studies	15	85 / LA
		% Plan to leave a healthcare career ●	2	13
USA	446	% Considering leaving studies ●	23	77
		% Plan to leave a healthcare career ●	11	12 / IN
UK	315	% Considering leaving studies	20	80
		% Plan to leave a healthcare career ●	8	12 / IN
INDIA	433	% Considering leaving studies	20	80
		% Plan to leave a healthcare career ●	2	18

● ● Significantly higher or lower than total

■ Considering leaving healthcare

■ Plan to leave healthcare = % enrol in another degree not related to healthcare plus % find a job outside healthcare

Significantly higher than Role/ Region/ Country (indicated by first two letters e.g. AP = Asia Pacific)

Asia Pacific = AP
Europe, Mid. East & Africa = EM

North America = NO
Latin America = LA

India = IN
UK = UK
USA = US
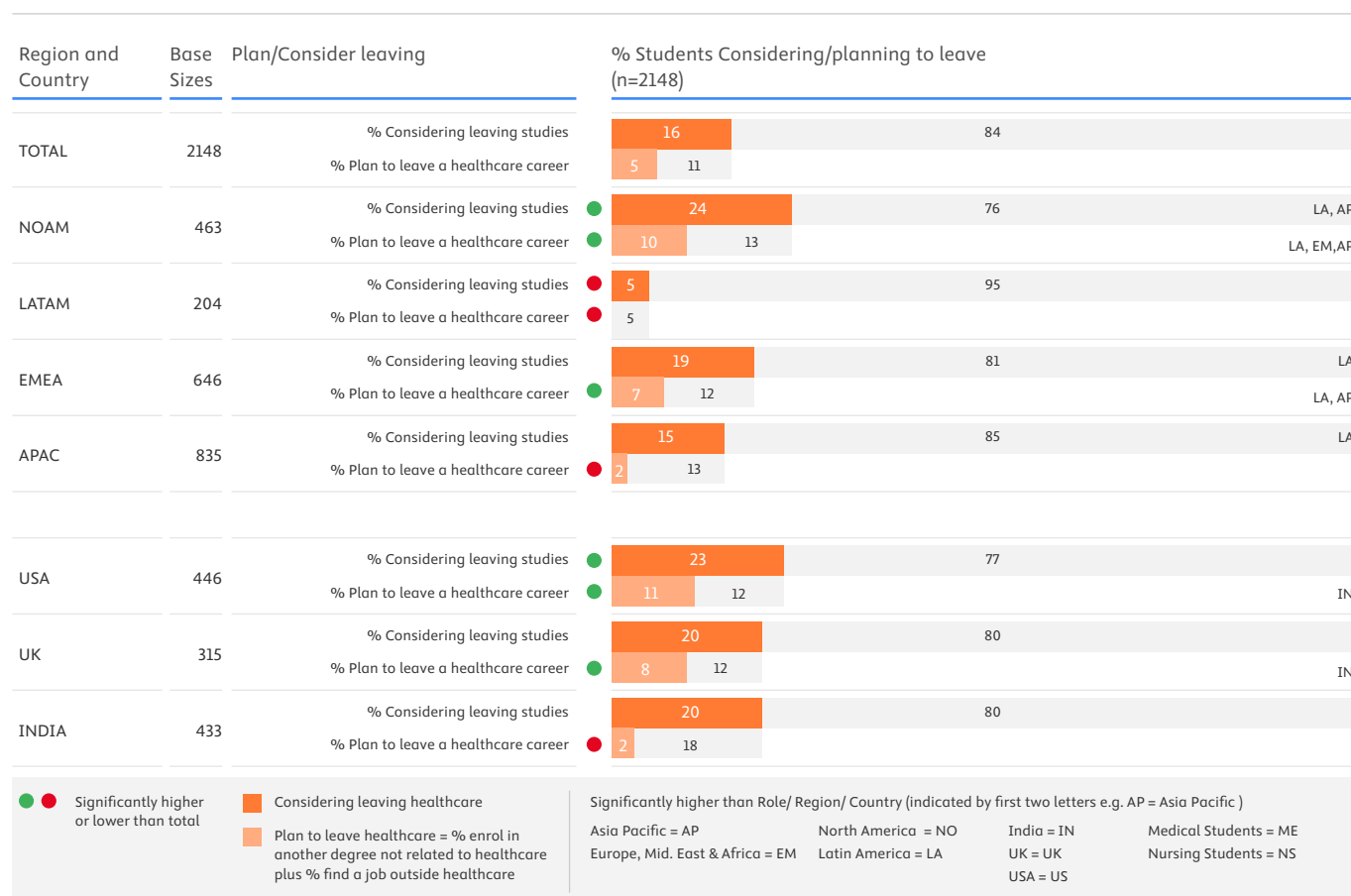
Medical Students = ME
Nursing Students = NS

Fig 2. Question: You mention that you are considering quitting your studies. If this does happen, what are you most likely to do next?

While a minority of students plan to quit their studies, the majority report that they do not intend to treat patients directly. Globally, 58% of students (54% medical students, 62% nursing students) see their current studies as a stepping-stone towards a broader career in healthcare that will not involve directly treating patients.

In responses in the survey, many students shared their plans for the future, which included research, development of new treatments and devices, improvement of patient care, consulting and arts programs to support patient care. These responses help explain the findings that most students are devoted to improving patients' lives, despite planning a career outside of direct patient care.

> "Going into research activities in rural India. Also trying to understand the different community problems that lead to bigger healthcare problems over time."
>
> Student (India), Clinician of the Future Education survey

> "Instead of treating patients, I would like to create awareness, and focus on more health education, prevention and disease control"
>
> Student (Nigeria), Clinician of the Future Education survey

> "The possibilities are endless, be it in the research field, or with physicians that work with athletes or companies that don't directly treat patients, but rather prevent illnesses or enhance their working environment in order to achieve the best functional status."
>
> Student (Portugal), Clinician of the Future Education survey

Responses are relatively consistent around the world, with 61% of students in the USA and UK and 64% in India agreeing they see their current studies as a stepping-stone to a broader career. Opinion is split in LATAM, where agreement is low among medical students (37%) and high among nursing students (67%).

Statement: I see my current studies as a stepping-stone towards a broader career in healthcare that will not involve directly treating patients

Region and Country	Base Sizes	% Students Agree (n=2129)	% Medical Agree (n=1332)	% Nursing Agree (n=797)
TOTAL	2129	58	54	62 ME
NOAM	453	60 LA	62 🟢 LA	59
LATAM	205	51	37 🔴	67
EMEA	639	58	54 LA	63
APAC	832	58	56 LA	60
USA	436	61	63 🟢	60
UK	313	61	57	64
INDIA	432	64 🟢	63 🟢	65

🟢 🔴 Significantly higher or lower than total

Significantly higher than Role/ Region/ Country (indicated by first two letters e.g. AP = Asia Pacific)

Asia Pacific = AP
Europe, Mid. East & Africa = EM

North America = NO
Latin America = LA

India = IN
UK = UK
USA = US

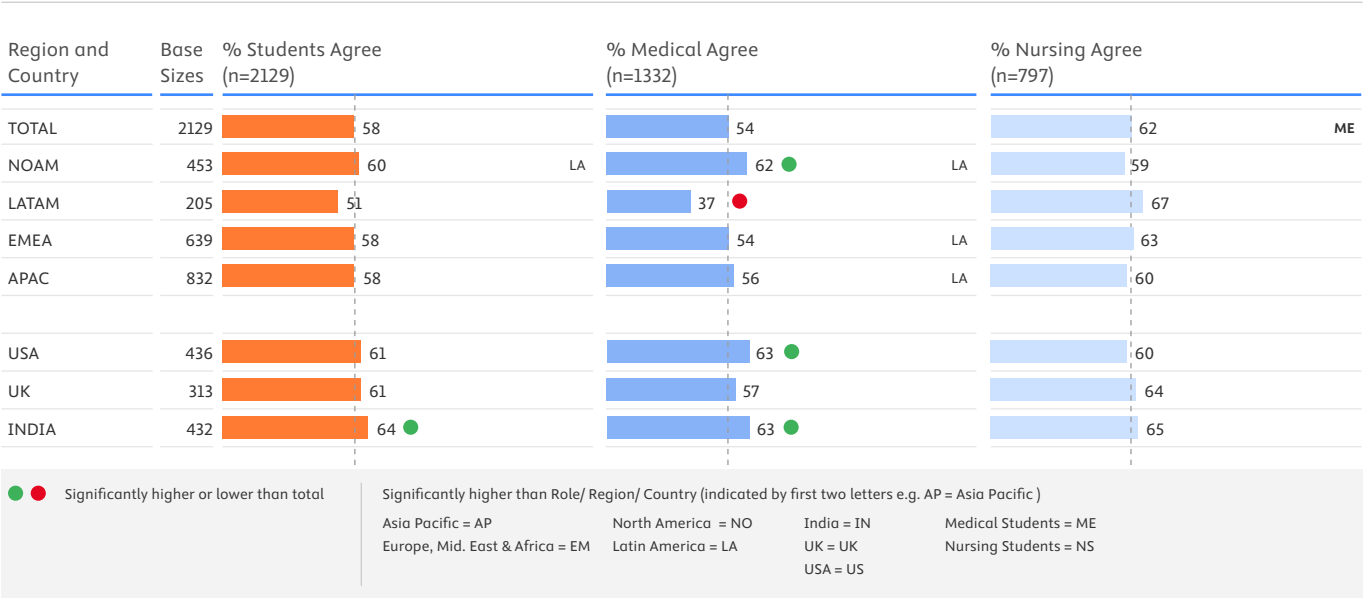Medical Students = ME
Nursing Students = NS

Fig 3. **Question:** What are your expectations after graduating as a clinician? Please rate the extent to which you agree with each of the following statements

> "I know this might evolve as they go through their education, but 6 out of 10 in school, when we hope that they're most excited about that career, are looking at it with skepticism. That is surprising to me."
>
> Dr. Sanjay Desai, who attended the US roundtable for the Clinician of the Future Education study

Participants in the US roundtable were surprised by the response. In nursing, for example, they mentioned it being much more likely for students to want to jump in to direct patient care than consider a non-patient-facing career. Despite this, there were echoes of concern.

In the UK roundtable, key opinion leaders discussed these findings, highlighting that students may be thinking about the broadening of their roles.

> "Any doctor wears many hats. You're a teacher, you're a leader, you are everything in between, not just the patient facing clinician. You're everything."

Dr. Philip Xiu, who attended the UK roundtable for the Clinician of the Future Education study

Whatever their reasons, this is a major concern for clinicians, as a lack of patient-facing colleagues is among their biggest priorities. In the 2023 Clinician of the Future study, the shortage of nurses ranks #1 (54% selected it as a top priority) on the list of priorities for the next 2-3 years and the shortage of doctors ranks #5 (45%).[3] This was of even higher importance in the UK and USA, with 78% and 70% of all clinicians ranking it #1 respectively.[4] Given the decline in nursing student applications in the UK[5] and USA,[6] this is a problem that needs to be addressed urgently.

Students are positive about their education and career path

Clinicians undergo years of challenging and rigorous higher education in order to practice. Having overcome these high barriers to entry, medical and nursing students then face years of training, during which they must learn an ever-increasing volume of information. In this sense, clinical education is continuously evolving: in 1950, the doubling time of medical knowledge was an estimated 50 years; this plummeted to seven years in 1980, 3.5 years in 2010 and as little as two or three months today.[7]

Perhaps unsurprisingly, those pursuing nursing and medical careers often refer to having a calling. For example, in a survey of primary care physicians (PCPs) and psychiatrists in the US, 42% agreed strongly that their practice of medicine is a calling.[8]

This is reflected in the results of the Clinician of the Future Education survey: almost all students who responded — 89% — said they feel devoted to becoming a clinician and to improving patients' lives. This was highest among medical students in Latin America (97%).

% Students Agree

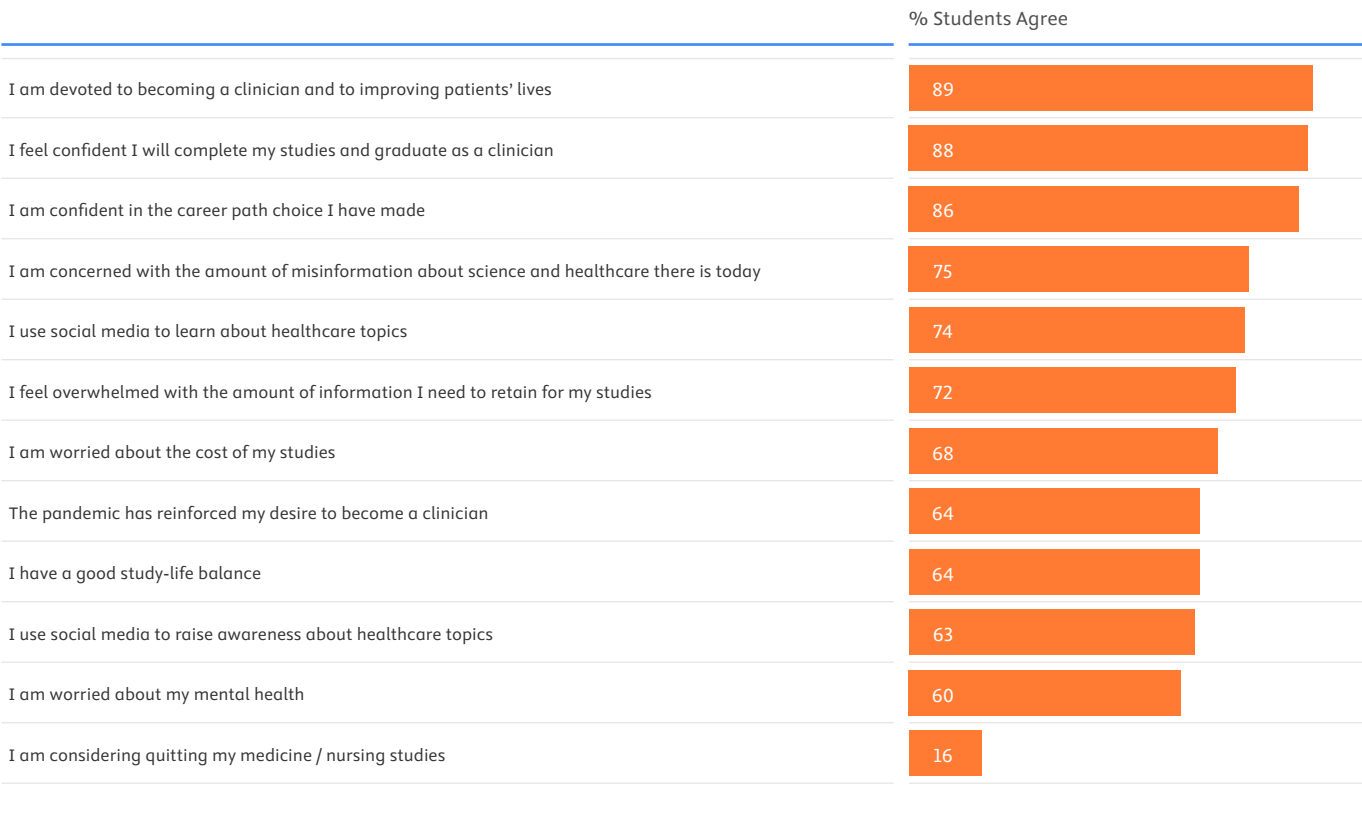| Statement	%
I am devoted to becoming a clinician and to improving patients' lives	89
I feel confident I will complete my studies and graduate as a clinician	88
I am confident in the career path choice I have made	86
I am concerned with the amount of misinformation about science and healthcare there is today	75
I use social media to learn about healthcare topics	74
I feel overwhelmed with the amount of information I need to retain for my studies	72
I am worried about the cost of my studies	68
The pandemic has reinforced my desire to become a clinician	64
I have a good study-life balance	64
I use social media to raise awareness about healthcare topics	63
I am worried about my mental health	60
I am considering quitting my medicine / nursing studies	16

Fig 4. Question: To what extent do you agree or disagree with each of the following statements. Base=All students 2,212. Exact numbers vary by statement.

> "I'm encouraged by the positivity of the respondents, and I think that is really reflective of the nursing population as well. They come in very optimistic, you know, 'I'm gonna change the world, one patient at a time.' And that's what we want."
>
> Dr. Diane Evans-Prior, who attended the US roundtable for the Clinician of the Future Education study

Research conducted in Switzerland in 2022 showed that experiencing calling is a motivational factor for study choice and that it has a positive influence on the consistency of students' choices.[9]

This effect is reflected in the Clinician of the Future Education survey: 86% of respondents globally report being confident in the career path choice they have made, in line with 89% reporting a devotion to becoming a clinician. Confidence is highest in LATAM (91%) and lowest in EMEA (82%). Notably, 90% of medical students in APAC but only 76% of those in the UK are confident in their choices.

Similarly, 88% of respondents globally are confident that they will complete their studies and graduate as a clinician, with the highest confidence in LATAM (97%).

Students rate the curriculum and their training highly

Part of respondents' positivity about their career choice, graduation and work prospects could be due to their positive experience of their training and the curricula they are following, as can be seen in figure 5. Overall, medical and nursing students who responded to the Clinician of the Future Education survey feel their schools are providing them with the right skills and experience they need to become a clinician.

Globally, 70% of respondents report getting the necessary support, mentoring and career planning from their instructors, though agreement is higher among nursing students (74%) than medical students (67%). Those most likely to report receiving support are in NOAM (77%) and least likely in LATAM and EMEA (61%). Agreement is relatively high in all three focus countries: 74% in the USA and 76% in the UK and India.

% Students Agree

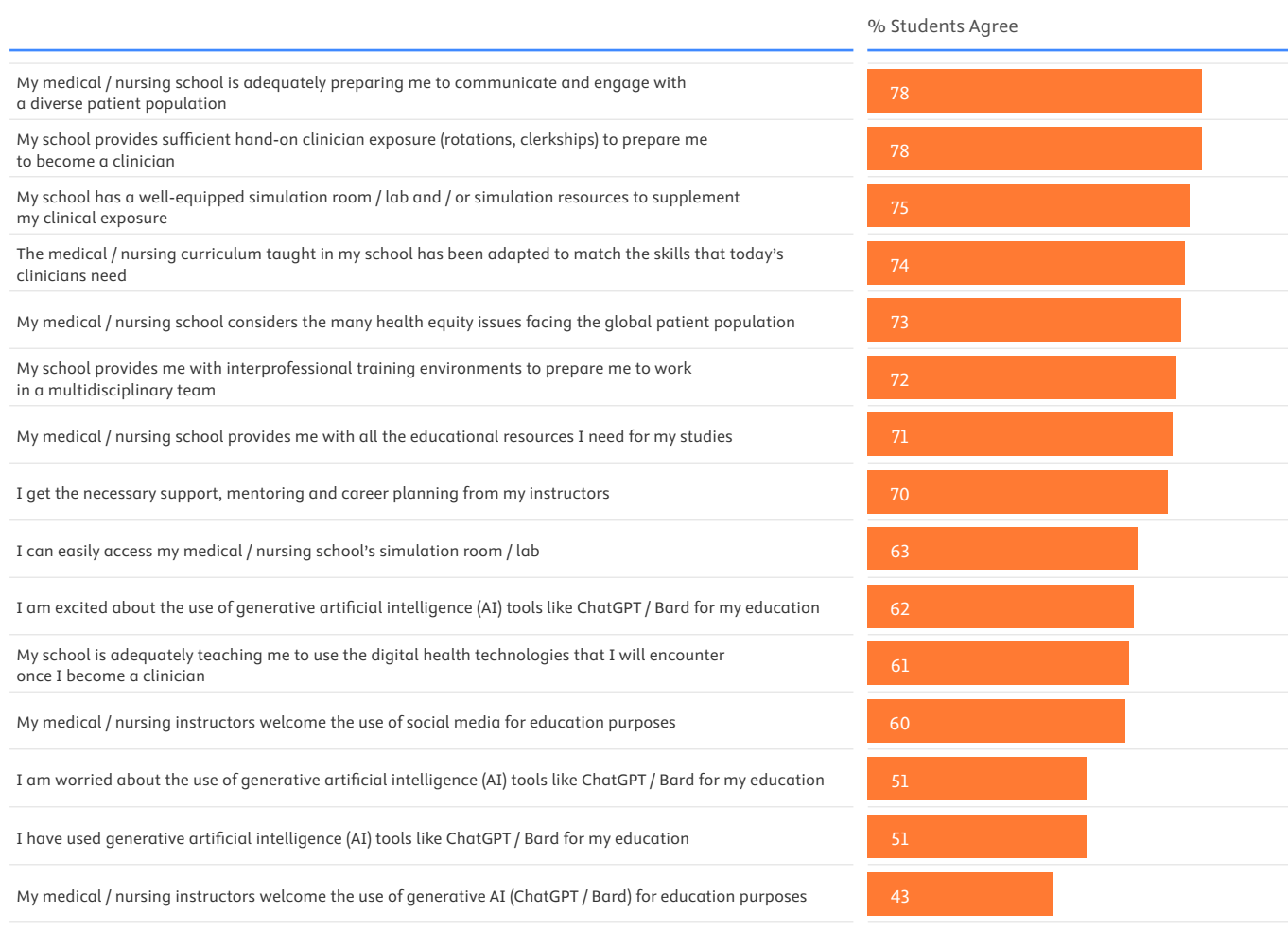| Statement	%
My medical / nursing school is adequately preparing me to communicate and engage with a diverse patient population	78
My school provides sufficient hand-on clinician exposure (rotations, clerkships) to prepare me to become a clinician	78
My school has a well-equipped simulation room / lab and / or simulation resources to supplement my clinical exposure	75
The medical / nursing curriculum taught in my school has been adapted to match the skills that today's clinicians need	74
My medical / nursing school considers the many health equity issues facing the global patient population	73
My school provides me with interprofessional training environments to prepare me to work in a multidisciplinary team	72
My medical / nursing school provides me with all the educational resources I need for my studies	71
I get the necessary support, mentoring and career planning from my instructors	70
I can easily access my medical / nursing school's simulation room / lab	63
I am excited about the use of generative artificial intelligence (AI) tools like ChatGPT / Bard for my education	62
My school is adequately teaching me to use the digital health technologies that I will encounter once I become a clinician	61
My medical / nursing instructors welcome the use of social media for education purposes	60
I am worried about the use of generative artificial intelligence (AI) tools like ChatGPT / Bard for my education	51
I have used generative artificial intelligence (AI) tools like ChatGPT / Bard for my education	51
My medical / nursing instructors welcome the use of generative AI (ChatGPT / Bard) for education purposes	43

Fig 5. Question: Now we would like to discuss topics related to your medical / nursing school and the curriculum imparted. To what extent do you agree or disagree with each of the following statements? Base=All students 2,212. Exact numbers vary by statement.

Students are also mostly positive about access to resources: over two-thirds of medical students (71% globally) feel their school provides them with all the educational resources they need, ranging from 56% among LATAM medical students to 84% among UK nursing students.

The majority of students – 87% – believe their studies and the training will enable them to positively impact patient outcomes in the clinical setting. Agreement is high in every region, ranging from 80% in NOAM to 96% in LATAM.

Similarly, about three-quarters (76%) of respondents globally say they are confident that their institution is preparing them to succeed as a clinician. Agreement is relatively consistent by region, but lower in EMEA (71%).

As a result, the majority of medical students (72%) are confident they will get a residency role in their preferred specialty, with agreement highest in India (79%). UK students are significantly less confident, with 64% agreeing.

This positive sentiment can also be seen in data from the Association of American Medical Colleges (AAMC): in 2022, 83% of medical students in the USA were satisfied with the quality of their medical education.[10]

Gaps to close in the curriculum

However, key opinion leaders who took part in the roundtable for the Clinician of the Future Education study highlighted that when it comes to the curriculum, students can only know what they know.

> "I think if you ask students who are just starting university about their curriculum, they will think of that entirely as knowledge as opposed to all the other things that go into medical skill. They don't think of all the soft skills, of communication and all those aspects. We've all worked with loads of junior doctors who may not have the best knowledge, but they're practically excellent, and these students are always the ones who are the best doctors."

Dr. Euan Sandilands, who attended the UK roundtable for the Clinician of the Future Education study

Indeed, as we shared in the *Clinician of the Future Report 2022*, 83% of clinicians agreed today's training needs to be overhauled to keep pace with advances, including the introduction of new technologies. And evolving medical education was an important aspect of all three of clinicians' top priorities for the next decade: 38% of clinicians ranked healthcare training and education to stay up to date in their top three priorities. Optimizing medical training and continuous education could help increase the integration of new scientific knowledge into clinical work and keep up with developments in digital health technologies.[11]

Research supports this need for change in education, suggesting that graduates are "under-equipped," partly due to traditional curricula, assurance and accreditation.[12] There is also a risk of deficits in graduates' understanding of biomedical science and the pathologic basis of disease, according to one study.[13] And research also suggests that soft skills such as communication are lacking in traditional clinical education, which could have a detrimental effect on the clinician–patient relationship.[14, 15]

As we reported in 2022, there is a need for traditional medical education to continue to evolve in order for tomorrow's clinicians to have the skills and competencies they will need to practice – not only clinical knowledge, but also data and technology skills, 'soft' skills and business and leadership skills.[16] The American Medical Association (AMA) encourages universities to integrate Health Systems Science (HSS), incorporating collaboration, high-value care, leadership, population health, systems thinking and teamwork into their programs, though this has yet to be fully realized.[17]

Most respondents to the Clinician of the Future Education survey perceive that their curricula have been adapted to match the skills that today's clinicians need, with 74% of students agreeing globally, rising to 78% in NOAM. Agreement is lower among medical students (71%) compared to nursing (78%). See figure 5 for details.

In the UK roundtable held as part of the current study, key opinion leaders discussed the curriculum and the students' perceptions of their education, noting that is not just about knowledge acquisition. Rather, 'soft' skills like communication and empathy, which are harder to teach and assess, have a big influence on success as a clinician.

> "Knowledge is knowledge. Curriculum is the curriculum. The only thing we can do for these students is to foster lifelong learning. We need to get them to become independent learners. The curriculum changes, the healthcare system adapts, and it changes all the time. They need to be able to be independent learners for the rest of their lives."
>
> Dr. Philip Xiu, who attended the UK roundtable for the Clinician of the Future Education study

In the Clinician of the Future 2022 and 2023 studies, we explored some of the aspects of education that are important to building a future-proof healthcare workforce.

➤ 'Soft skills' – 82% of clinicians agreed 'soft skills' such as listening, being empathetic and communicating are increasingly important.[18]

➤ Practical skills – 67% of clinicians say their newly trained colleagues lack hands-on training due to COVID-19.[19]

➤ Digital health technologies – 83% of clinicians agreed their training needs to be overhauled to keep pace with the introduction of new technologies.[20]

➤ Clinical knowledge – in interviews and discussions, clinicians acknowledged the need to stay up-to-date with the latest developments.[21]

➤ Business and leadership – 83% of clinicians agreed they need to understand more about the economics of healthcare.[22]

Here's what the students say about some of these aspects today.

Soft skills

Most students who responded in the current survey (72%) say their medical or nursing school provides them with interprofessional training environments to prepare them to work in a multidisciplinary team. This is especially the case for nursing students (77%) compared to medical students (67%). See figure 5 for details.

Similarly, 78% of respondents globally agree that their medical or nursing school is adequately preparing them to communicate and engage with a diverse patient population. Agreement ranges from 71% among EMEA medical students to 83% among APAC medical students.

Practical skills

According to students who responded to the Clinician of the Future Education survey, most of their medical or nursing schools are providing sufficient hands-on clinical exposure, such as rotations and clerkships, to prepare them to become clinicians. Globally, 78% of respondents agree, with significantly less agreement in LATAM (65%) and highest agreement among medical students in APAC (83%).

Digital technologies

The survey also reveals potential to make better use of digital technologies, particularly simulation resources. While three-quarters of respondents agree their school offers them the simulation resources to supplement their clinical exposure, only 63% can access those resources easily.

There are some regional differences in availability and accessibility, but access is consistently lower. In NOAM, 80% of students agree their school offers simulation resources, while 73% can access them easily. In LATAM, 63% say their school has simulation resources, while only 50% can easily access them.

There are also differences between courses, with resources more accessible to nursing students globally (68%) than to medical students (58%). Notably, 76% of nursing students in India have easy access to simulation resources at their schools.

While access to simulation rooms is more limited, digital technologies could help bridge the gap by providing digital simulation resources that students can access at home.

> "It doesn't surprise me that so many believe that the school has a well-equipped simulation lab and resources. But I would say, with a number of schools where I wind up interviewing students, spectacular resources but limited access is something I hear as an issue. Here, the access gap is closer than I would have expected, so it struck me very optimistically."
>
> Dr. Lois Margaret Nora, who attended the US roundtable for the Clinician of the Future Education study

The transition to work

In both roundtables held as part of the Clinician of the Future Education study, key opinion leaders discussed the difficulty of transitioning from education to the workplace. They acknowledged that graduates are not yet ready to practice, that they need support in their transition and that employers have a role to play in onboarding them effectively.

> "The healthcare industry, whether it's in the US or UK, there needs to be a support system to support these new graduates in their transition to a workplace."
>
> Dr. Philip Xiu, who attended the UK roundtable for the Clinician of the Future Education study

> "For nursing, our hospital partners are more than happy to do a transition to practice program or residency for nursing education. That works for about 49% of our population, but 51% of our nurses are not in hospitals, and the orientation on boarding process there is just appalling, it's killing our profession. For those students who aren't able to get that mentoring, their longevity is significantly shortened."
>
> Dr. Diane Evans-Prior, who attended the US roundtable for the Clinician of the Future Education study

Despite their vocational drive, many students are struggling

Students, like their counterparts in practice, are under a lot of pressure. In the Clinician of the Future Education survey, most students globally (60%) are worried about their mental health. While students are less worried about their mental health in APAC (51%) and NOAM (53%), concern is much higher in LATAM (91%), particularly among nursing students there (94%). See figure 4 for details.

These findings are reflected in the General Medical Council's (GMC) National training survey 2023, in which two-thirds of UK medical students are at high or moderate risk of burnout.[23] The GMC notes the severity of the rise in burnout risk rates, as stressful environments have a negative impact on patient care and safety and undermine an already vulnerable workforce. Similarly, in India, research involving almost 600 medical students revealed over 80% were experiencing burnout.[24]

> "I see this as an opportunity, because if our students are concerned about their mental health, as educators our way to respond to that is to imbue our programs with opportunities to thread self-care and really to utilize effective debriefing techniques in moments of crisis for our students."
>
> Dr. Diane Evans-Prior, who attended the US roundtable for the Clinician of the Future Education study

It's important to consider the mental health and wellbeing of medical and nursing students, as there is evidence that burnout in practicing clinicians often originates in their time as students.[25] Indeed, medical students agree it is critically important to measure their wellbeing,[26] and the UK's General Medical Council recommends that medical schools include student wellbeing as a performance metric and work collaboratively with students to measure it.[27] Wellness questionnaires could be an option here, and there are several that may help schools assess student wellbeing beyond depression and anxiety.[28]

Research has revealed many factors that could contribute to a decline in students' mental health, including academic pressure and workload, financial worries, and exposure to the death and suffering of patients.[29]

This was highlighted in a qualitative study looking at why nursing students drop out of their education, which noted that participating students lacked support to deal with the emotional response to witnessing serious illness and death. As a result, they reported feeling overwhelmed by their vulnerability.[30]

A lack of support can be catastrophic. A recent news report highlighted the "heightened sense of responsibility" that surgeons have for the lives of their patients, noting that suicide rates are higher among this group. Overall, suicide rates among doctors are already elevated compared to the general population, at approximately 300 to 400 people per year in the US alone – the equivalent to a medical school class.[31]

> "Some of the things that uniquely happen in medical education and in nursing education are the first patient death, the mistake with medication. I think too often there's not safety and transparency about that. And so someone will feel horrible about something that happened in the clinical environment, but not necessarily have a place to go and process that."
>
> Dr. Lois Margaret Nora, who attended the US roundtable for the Clinician of the Future Education study

To better understand students' concerns, in the Clinician of the Future Education survey, we asked respondents several questions about them.

Study–life balance

Globally 64% of students agree they have a good study-life balance. Regionally there is variation, more nursing students report a good balance in LATAM (71%) as do students in India (70%). However, agreement is lower in EMEA, including in the UK (55%) and especially among medical students there (51%). See figure 4 for details.

The findings are in line with the perceptions of practicing clinicians, as shared in the *Clinician of the Future Report 2022*: 57% agreed they have a good work–life balance. Similarly, agreement was lower in Europe (49%) and notably high in India (79%).[32]

Many factors may be contributing to this perceived imbalance, including some of the other concerns that students noted in the survey, such as financial worries and having to learn an overwhelming volume of information.

Studying hours are related to this, particularly a concern if students need to work alongside their education. In the absence of regulations for study hours, most medical schools in the US had a written policy in place to restrict work hours in 2008, and deans agreed that regulation would support student wellbeing.[33] About half of the deans supported the Accreditation Council for Graduate Medical Education's work hours policy for students, limiting them to 80 hours per week.[34]

Such limits are likely to have no adverse effect on performance: according to one study, there is no correlation between the number of hours medical students work and their academic outcomes.[35]

Financial pressure and the cost of studying

Finance is a worry for 68% of students globally; concern about the cost of studying is even higher in NOAM (74%) and LATAM (82%) and among medical students in the UK and USA (76%). Cost is less of a worry among APAC students (62%).

Financial concerns are thought to be a factor in a decline in students' mental health, which may in turn contribute to burnout later on.[36] Financial issues have also been shown to be a major source of stress for nursing students.[37] In a 2018 survey, 60% of students experienced financial pressure during their medical degree, and 41% said that they, or someone they know, have considered dropping out as a result.[38]

The cost of pursuing a medical or nursing degree differs around the world and can be significant, potentially impacting the person for the rest of their life. In 2022, the average US medical student graduated with US$240,000 of student loan debt.[39]

> "I'm not surprised that cost concern in the US is higher. I think we do have a higher medical education burden for finances than most countries in the world. And that's a real problem."
>
> Dr. Sanjay Desai, who attended the US roundtable for the Clinician of the Future Education study

There is a similar picture in the UK, where students can graduate with debts of over £80,000 (almost US$98,000).[40] As a result of financial pressure, almost 62% of students reported having to cut down on essentials like food, heating or professional clothes in 2022, over 44% expected to run out of money before the end of the academic year, and over 5% were planning to leave their courses as a result.[41]

> "The reason that people in the UK are not confident that they're going to complete their studies is that they're not confident they want to do medicine at this moment in time with how things stand in the UK. Some of that also then spills over into the cost of studies: If you're investing £9,000 a year, plus your living costs, plus everything else, you're building huge student debt."
>
> Dr. Will Carroll, who attended the UK roundtable for the Clinician of the Future Education study

In India, the rising cost of medical school is causing many aspiring clinicians to study abroad, in Russia, Bangladesh and the Philippines, where fees are lower.[42]

Many students are working alongside their courses to lessen this financial pressure. In the BMA's 2022 Medical student survey, 75.7% of respondents worked alongside their studies, either during term time, in the holidays or both. Of those that worked during term time, 73.1% reported it having a negative impact.[43]

Worrying about the cost of studies is not a short-term or insignificant problem. As one US clinician noted in the Clinician of the Future 2022 survey, "The new stressors of having on average sicker patients, higher student debt, lower relative wages (in residency), and higher costs of living, especially in very wealthy parts of the country, make it harder to support a family and make medicine an overall harder career to enjoy." [44]

On the whole, students don't expect their financial worries to end at graduation. In the Clinician of the Future Education survey, almost two-thirds of nursing students and just over half of medical students are worried about their future income as clinicians. Concern about future income is lowest in NOAM (50%) and highest in LATAM (81%). Medical students in the USA are least concerned (47%) and UK nursing students are most worried (74%).

Academic pressure, knowledge and misinformation

Given that medical knowledge is estimated to double every two to three months,[45] medical and nursing students not only have to learn an enormous volume of information but also continuously update their knowledge. In the Clinician of the Future Education survey, 72% of students globally report feeling overwhelmed with the amount of information they need to retain.

This is an important concern to consider, since academic pressure has been predicted to be a contributing factor to burnout.[46] Research has also shown that the academic workload, particularly in clinical practice, is the main source of stress among nursing students.[47]

Digital technology, specifically artificial intelligence (AI), has a role to play in easing the pressure on students to gain knowledge by providing new approaches to learning and freeing up time by taking on routine tasks.[48] It may even help improve information retention.[49] See chapter 2 on page 22 for more on AI in health education.

The challenge of misinformation is another form of information overload, as students need awareness in order to combat it. In the Clinician of the Future Education survey, 75% of students globally are concerned by the amount of misinformation about science and healthcare there is today. This is especially the case in LATAM, where almost all students (90%) are concerned, and less so in NOAM (68%). There is some disparity in India, where 67% of nursing students are concerned, compared to 85% of medical students.

Future shortages and burnout

Most respondents to the Clinician of the Future Education survey agree that in 10 years' time there will be a shortage of doctors (62% globally, rising to 75% in EMEA), of nurses (64% globally, with agreement higher in EMEA (77%) and other healthcare professionals (66% globally, 77% in EMEA).

Students are more positive than their practicing counterparts: in the 2022 study, more clinicians predicted there will be a shortage of nurses (74% agreed globally) and doctors (68%).[50]

Projected shortages are a concern for most students, especially in EMEA. In the current study, globally, 69% of students (65% medical students and 72% of nursing students) are worried about clinician shortages and the impact it will have on them as clinicians. Concern is significantly higher in EMEA (78%) and lowest in APAC (63%).

Given the role clinician shortages play in burnout, it is perhaps unsurprising that today's students are worried they will suffer burnout in the future. This is the case for 62% of respondents to the Clinician of the Future Education survey, with highest agreement in LATAM (79%) and lowest in APAC (55%).

> "I always think the students are slightly protected from burnout and low morale, as that's something that happens in the hospital. And then as they get up to the point of graduation, suddenly, they're acutely aware of it. So I'm slightly surprised."
>
> Dr. Euan Sandilands, who attended the UK roundtable for the Clinician of the Future Education study

What is needed?

There is a vicious cycle at play here. One of the factors affecting the wellbeing and commitment of today's medical and nursing students is concern about future shortages and risk of burnout, which are exacerbated by shortfalls in incoming clinicians. How can we adjust education to future-proof the healthcare workforce?

Provide guidance and support

If students feel unable to seek support for mental health issues, they are more at risk of declining wellbeing and therefore more likely to quit their studies. Ensuring the study environment is welcoming and supportive, and that wellbeing resources are available and accessible, could help.

> "I think it really is important that educators be attuned to asking the right questions at the right time, not skirting around psychosocial issues that contribute to student success, and being able to actually really connect with those students so they feel safe in exploring their vulnerabilities and working through those feelings in an environment that is uplifting and therapeutic."
>
> Dr. Diane Evans-Prior, who attended the US roundtable for the Clinician of the Future Education study

Harness the power of AI

AI has the power to change medical and nursing education. Institutions can use it to develop better, more personalized assessments, helping each individual student progress at their optimal rate. Trainers can use it to automate repetitive tasks, freeing up time for student contact. And students can use it as a learning tool, helping them digest a rapidly growing amount of information.

> "Everyone that comes in is at a completely different starting point, so you will naturally slow down the development of one person and accelerate through the development of somebody else because of the approach that we use. Personalization takes a lot of effort and energy, and there are many barriers to it. But there are ways to do it, especially now with technology."
>
> Dr. Sanjay Desai, who attended the US roundtable for the Clinician of the Future Education study

Accelerate the evolution of education

As we noted in the Clinician of the Future 2022 and 2023 studies, medical and nursing education will need to evolve to keep up with developments in technology in particular. Given how rapid those developments are, it is important that curricula are adjusted to ensure tomorrow's clinicians are equipped to work in partnership with patients in a digital world.

> "I'm optimistic that AI and technologies like that may help us improve the experience of care delivery sufficiently that the motivations and forces that lead to people just thinking about quitting will be reduced."
>
> Dr. Sanjay Desai, who attended the US roundtable for the Clinician of the Future Education study

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Harnessing the power of GenAI

Chapter 2

Harnessing the power of GenAI

Technology – particularly GenAI – is an enabler to learning, students welcome it and it is widely used today despite some concerns. This suggests the upward trend in support and use that we predicted in previous *Clinician of the Future* reports will continue in the next generation of clinicians.

How can GenAI best be harnessed to support learning while alleviating students' concerns?

➤ 62% feel excited about the use of GenAI for their education

➤ 51% of students are using GenAI to support their learning

➤ 43% of students say instructors are welcoming of GenAI

➤ 70% think GenAI will aid diagnoses, treatments and patient outcomes in the future

➤ 56% fear the negative effects of GenAI on the healthcare community

Most students are excited about AI in their education

GenAI is rising as a beneficial tool for students in various disciplines, including nursing and medicine. Tools such as ChatGPT and Bard can support studying in a number of ways, from helping generate ideas and structure arguments to summarizing information and improving grammar.

What is GenAI?

GenAI, short for generative artificial intelligence, refers to a category of artificial intelligence systems and models that have the ability to generate data, content, or other outputs that are similar to those created by humans. These AI systems are designed to produce new and original content rather than simply process or analyze existing data.[1]

The majority of medical and nursing students globally are enthusiastic about the use of generative artificial intelligence (GenAI) in their education. About three-fifths (62%) of respondents to the Clinician of the Future Education survey agree they are excited about the use of GenAI (tools like ChatGPT and Bard) for their medical or nursing education.

There is somewhat less excitement in NOAM (55%) and EMEA (56%) compared to APAC (66%). Agreement is highest in India (73%). Enthusiasm is more tempered in the USA (55%) and UK (53%), where nursing students are least excited (53% and 48% respectively).

Statement: I am excited about the use of generative artificial intelligence (AI) tools like ChatGPT/Bard for my education

Region and Country	Base Sizes	% Students Agree (n=2108)		% Medical Agree (n=1326)		% Nursing Agree (n=782)	
TOTAL	2108	62		61		62	
NOAM	441	55 🔴		57		53	
LATAM	211	65	NO, EM	64		66	NO
EMEA	635	56 🔴		56 🔴		56	
APAC	821	66 🟢	NO, EM	65	NO, EM	66	NO, EM
USA	424	55 🔴		57		53	
UK	318	53 🔴		59		48 🔴	
INDIA	432	73 🟢	US, UK	70 🟢	US, UK	75 🟢	US, UK

🟢 🔴 Significantly higher or lower than total

Significantly higher than Role/ Region/ Country (indicated by first two letters e.g. AP = Asia Pacific)

Asia Pacific = AP
Europe, Mid. East & Africa = EM
North America = NO
Latin America = LA
India = IN
UK = UK
USA = US
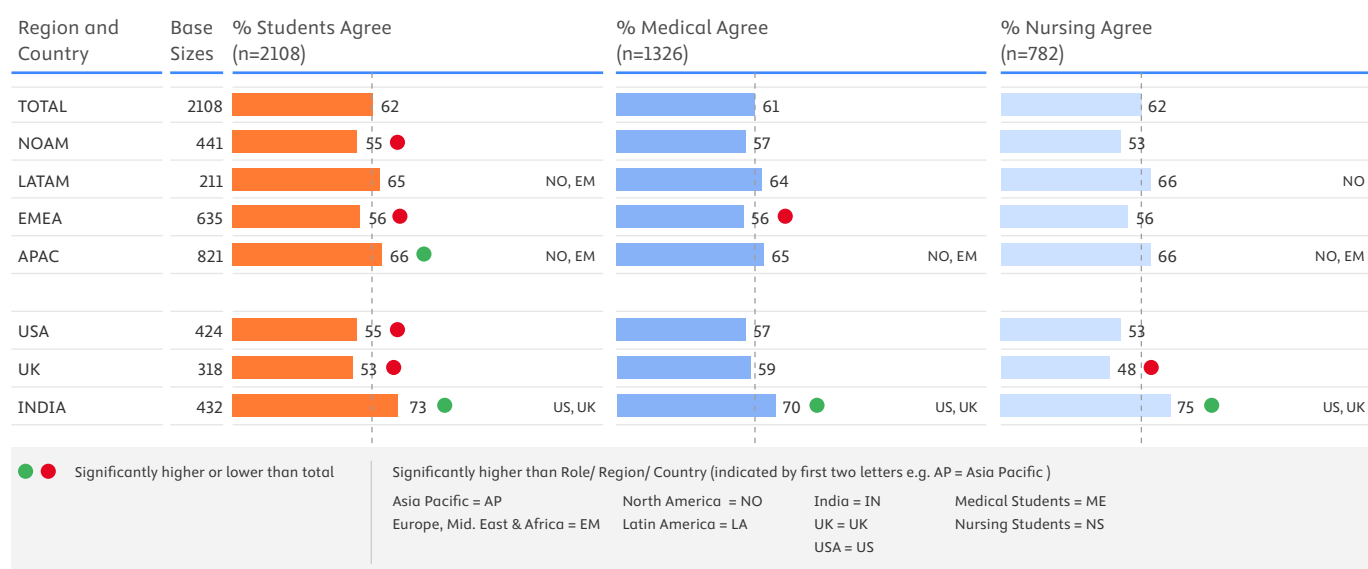Medical Students = ME
Nursing Students = NS

Fig 6. Question: Now we would like to discuss topics related to your medical / nursing school and the curriculum imparted. To what extent do you agree or disagree with each of the following statements?

In the 2023 survey of practicing clinicians, 50% consider using GenAI desirable to learn nursing. Similarly, 51% consider AI desirable for medical students[2] he students' views reported in this study suggest a significant upward trend in support for GenAI in learning,

The benefits and drawbacks of GenAI were a key topic of conversation at the UK roundtable held for the Clinician of the Future Education study. While attendees acknowledged the utility of GenAI for supporting knowledge acquisition, they also highlighted its limitations. In particular, they believe GenAI is unable to train students in the soft skills and practical experience they require to be successful clinicians.

> "AI is not even going to get close to some of the practical skills you need; even the best simulation kit in the world is nowhere near what it's like to actually calculate a 24-weeker. A whole range of skills are required, and knowledge is just a small part of that. Therein lies the real conundrum: knowledge, if anything, is the easy bit."

Dr. Will Carroll, who attended the UK roundtable for the Clinician of the Future Education study

In the Clinician of the Future Education survey, about half (51%) of students globally are worried about the use of GenAI tools like ChatGPT and Bard for their medical or nursing education, rising to 60% among medical students in the USA.

Clinicians' concerns include GenAI posing a danger of replacing practical experience, teaching inaccurate information and hindering critical thinking, and they stress that GenAI should be used as an adjunct to in-person learning.[3]

> "Medical students should learn the thinking process in basic Medicine. They shouldn't only seek the result."

Doctor (Japan), Clinician of the Future 2023 survey[4]

Several concerns are widespread regarding GenAI, including its potential inaccuracy, ethical considerations and risk of bias. Because it is built by humans, GenAI is susceptible to bias, and students will need to develop strong critical thinking skills to determine the reliability of its output.[5] At a deeper level, there is also a risk of GenAI affecting the way students think, which any changes in curriculum should consider.[6]

Most students are using GenAI and social media

A similar pattern emerges when looking at whether students are already using digital technologies, including generative GenAI, in their studies.

GenAI use among medical and nursing students

The majority of students are already using GenAI: in the current study, half of students globally (51%) have used tools like ChatGPT and Bard for their medical or nursing education. Use is high among students in India (61%), particularly nursing students (66%), while use lags in the UK (44%). Again, this pattern follows that of the more general usage: India has the second largest share of ChatGPT users (7.6%).[7]

This is in line with research involving broader student populations. In one survey of 1,000 students in the USA, 30% reported using ChatGPT on their written homework, and 60% of those students said they use the platform for more than half of their assignments.[8]

In the current study, the top three uses among respondents are for coursework, exam preparation and to get updates on their field of study.

Of those who use GenAI in their studies, most students globally report using it for their coursework (67%), with medical students (70%) more likely than nursing students (64%) to do this. Globally, 58% use GenAI for help preparing for exams, with use for this purpose higher among medical students in India (71%) and nursing students in the USA (68%). And 40% of students globally use GenAI to get updates on the latest news and developments related to their field of study, with use notably low among UK medical students (23%) compared to UK nursing students (38%).

What are medical and nursing students using GenAI for? The Clinician of the Future Education survey highlighted several uses of tools like Chat GPT and Bard in addition to the top three.

➤ Research and to find resources such as literature

➤ Simplifying content or text

➤ Summarizing large quantities of information

➤ Help with studying (e.g. creating flashcards, presentations and mnemonics)

➤ To get a general outline or background of a topic before reading in detail

➤ Organisational tasks

➤ Getting answers to questions

➤ Writing or correcting emails or letters

Today's clinicians have a similarly positive attitude towards the use of GenAI in learning, noting that as a training tool, GenAI could help make learning time and cost efficient. Half (50%) of respondents to the 2023 Clinician of the Future survey considered using GenAI desirable to learn nursing and 51% considered GenAI desirable for medical students.[9]

Pivoting to digital technology

Since the COVID-19 pandemic, there has been an increase in virtual learning environments for medical and nursing students. According to the British Medical Association's (BMA) Medical student survey 2022, nearly 90% of students received some remote teaching, and half said all or most of their teaching had been online.[10] Post-pandemic, the balance is shifting back in favor of in-person learning, but online classes are still held.

Students are not always enthusiastic about online education. Research with medical students in China suggests that their expectations of the quality and impact of these classes may be low, leading them to consider the provision of online medical training less important than other internet services.[11] And a study in India, in which students were introduced to an online platform for classes, showed that almost half of students prefer in-person teaching.[12]

Despite embracing some digital technologies, educational institutions have been slower to get on board with AI.[13] Following this lag, there is evidence that many are starting to harness it to supplement teaching and support students.

In the Clinician of the Future Education survey, 43% of students globally say their instructors welcome the use of GenAI for education purposes. Nursing students are significantly more likely to agree (49%) compared to medical students (38%). Agreement varies greatly by location: 50% report instructors welcoming GenAI in NOAM, while only 27% agree in LATAM.

When it comes to our focus countries, agreement is higher in the USA (49%) than the UK (37%), and students are significantly more likely to have instructors that welcome GenAI in India (53%), particularly nursing students (60%).

In the roundtables, while noting the potential limitations of the technology, instructors were welcoming of students' use of GenAI.

> "I'm starting to see that faculty are utilizing generative AI to set up [example] case studies, and they're brilliant. You can say, 'Okay, here's my case study for a 72-year-old diabetic person with acute renal failure' and put in the parameters, and it'll write your case study in click-style questions and a grading rubric for discussion board postings. Obviously, they're not perfect, but it's so much easier to edit that than edit a blank page. So I see it being very, very exciting."

Dr. Diane Evans-Prior, who attended the US roundtable for the Clinician of the Future Education study

In the UK roundtable, key opinion leaders discussed the use of GenAI in teaching and assessment. They acknowledged that it's early days and there is as yet no certainty about the role GenAI might play in the future, but they highlighted the need for institutions to understand the technology, including the pitfalls, and shape its role in education.

Several of the roundtable participants shared their use of GenAI, specifically for assessments. They noted the benefit of GenAI for testing assessments, and, for example, its potential role in the standard-setting aspect of test development.

> "We ran our finals through ChatGPT. There were certain things it didn't do so well, like pediatrics and toxicology. But it did cardiology, GI and respiratory very well. The performance was excellent... frighteningly excellent, actually."

Dr. Euan Sandilands, who attended the UK roundtable for the Clinician of the Future Education study

While this discussion is indicative of a wider move towards instructors embracing GenAI, some are doing so cautiously, including by developing policies to control students' use of GenAI. It is clearly important to establish guidance and frameworks for the use of GenAI in education, but too many regulations imposed by institutions may stymie the use of GenAI, and it may mean they are not preparing students fully for clinical practice.

Acknowledging the challenges ahead in terms of adapting to the use of GenAI in education, researchers warn of the risks involved in waiting. As technology develops, the companies behind it gain power and control. It is advisable for health educators and other actors in the healthcare ecosystem to shape their digital future before it is out of their hands.[14, 15]

Curricula are evolving to prepare clinicians for a digital future

More broadly than GenAI, are institutions providing clinical education that keeps pace with the rapid developments happening in healthcare today? This was a key topic in the 2022 Clinician of the Future study, with clinicians identifying training in the effective use of digital health technologies and healthcare training and education to stay up-to-date as priorities.

Globally, 83% of clinicians agreed their training needs to be overhauled to keep pace with technological developments.[16] And when asked about their top 3 priorities for the coming decade, 38% of clinicians identified training in the effective use of digital health technologies to assist in the delivery of patient care remotely, and 25% identified training in the effective use of data to help deliver better patient care.[17]

One year on, and looking at the next generation of clinicians, there may be some signal of progress in this area. Globally, 61% of students in the Clinician of the Future Education study agree their school is adequately teaching them to use the digital health technologies they will encounter in the clinic. Agreement is higher among nurses (68%) and among students in NOAM (73%). Those in LATAM are least optimistic (48%), particularly medical students (40%).

There are barriers to the adoption of digital health technologies in practice, including skills (a lack of technical training) and culture (resistance to change).[18] Solving the latter could be a matter of time: research suggests that students are aware of the need for and benefits of digital health technologies. In one survey of medical students in China, respondents ranked 'Clinical Service,' 'Decision Aids,' and 'Public Health' as the three most important health-related services that should be offered online.[19]

However, in line with the present study, research suggests that a large proportion of students are unprepared to work with digital health technologies as clinicians. In a survey of medical students, less than half reported feeling prepared to take advantage of the technological developments within the medical field. The authors of the study highlight the importance of not assuming today's students are digitally literate enough for the technologies they will encounter in the clinic.[20]

Attitudes to AI in the clinic are mixed

Students foresee that AI will be a part of their digital future as clinicians. In the Clinician of the Future Education study, students' views were cautiously optimistic. Globally, 62% find the possibilities that AI present for clinicians exciting. Agreement is lower in NOAM (55%) and higher in APAC (66%), with students in India most optimistic (71%). Students in the USA (55%) and UK (52%) are notably cautious, with UK nursing students (49%) least excited.

Statement: The possibilities artificial intelligence (AI) presents for clinicians excite me.

Region and Country	Base Sizes	% Students Agree (n=2131)		% Medical Agree (n=1348)		% Nursing Agree (n=783)	
TOTAL	2131	62		64		61	
NOAM	454	55 🔴		58		52	
LATAM	218	63	NO	68	NO, EM	59	
EMEA	638	59		57 🔴		61	
APAC	821	66	NO	68	NO, EM	63	NO
USA	437	55 🔴		58		52	
UK	311	52 🔴		56		49 🔴	
INDIA	434	71 🟢	US, UK	73 🟢	US, UK	70 🟢	US, UK

🟢🔴 Significantly higher or lower than total

Significantly higher than Role/ Region/ Country (indicated by first two letters e.g. AP = Asia Pacific)

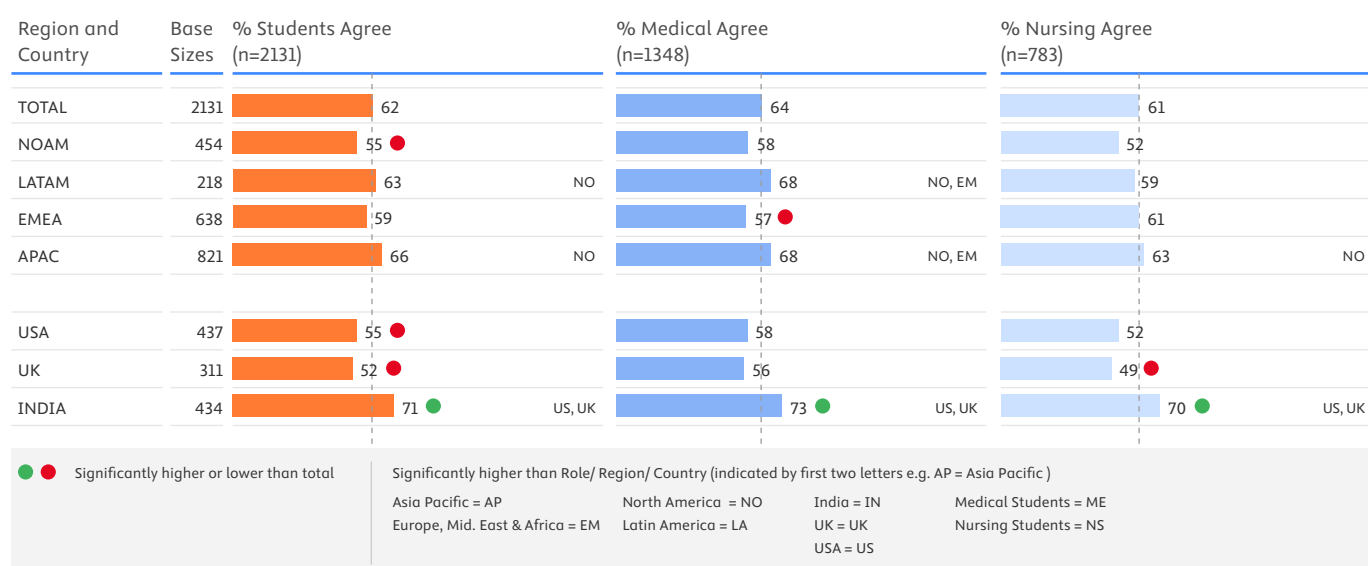|		
Asia Pacific = AP	North America = NO	India = IN	Medical Students = ME
Europe, Mid. East & Africa = EM	Latin America = LA	UK = UK	Nursing Students = NS
		USA = US	

Fig 7. Question: What are your expectations after graduating as a clinician? Please rate the extent to which you agree with each of the following statements.

Tempering this enthusiasm, over half of students (56%) fear the negative effects AI can have on the medical community. Concern is fairly even around the world, with slightly more overall in India (62%). This was echoed in clinicians' feedback in the 2023 survey, in which 28% found it undesirable for physicians to use GenAI tools such as ChatGPT and Bard to help make clinical decisions.[21] Clinicians' concerns varied, notably including the possibility for error. You can read more on page 20 of the *Clinician of the Future Report 2023*.

Nevertheless, 7 in 10 students believe AI advancements will aid in diagnoses, treatments and patient outcomes, with slightly higher agreement among medical students (72%). Students in LATAM (77%) and APAC (73%) are most positive about the potential impact of AI on patient outcomes, while those in NOAM (64%) and EMEA (65%) are less so. Agreement is particularly high in India (74%) compared to the USA (64%) and UK (63%).

Statement: I believe artificial intelligence (AI) advancements will aid in diagnoses, treatments and patient outcomes.

Region and Country	Base Sizes	% Students Agree (n=2134)		% Medical Agree (n=1342)		% Nursing Agree (n=792)	
TOTAL	2134	70		72	NS	67	
NOAM	456	64 🔴		64 🔴		64	
LATAM	217	77 🟢	NO, EM	77	NO, EM	78 🟢	NO, EM
EMEA	632	65 🔴		67		63	
APAC	829	73	NO, EM	77 🟢	NO, EM	68	
USA	439	64		64 🔴		64	
UK	305	63 🔴		65 🔴		62	
INDIA	434	74	US, UK	76	US, UK	72	

🟢🔴 Significantly higher or lower than total

Significantly higher than Role/ Region/ Country (indicated by first two letters e.g. AP = Asia Pacific)

Asia Pacific = AP	North America = NO	India = IN	Medical Students = ME
Europe, Mid. East & Africa = EM	Latin America = LA	UK = UK	Nursing Students = NS
		USA = US	

Fig 8. Question: To what extent do you agree or disagree with each of the following statements with regards to your expectations around digital health technologies in healthcare in 10 years' time? Please consider the future of healthcare within the primary country that you work in.

These findings are supported by research into the attitudes of medical students to AI and radiology, which showed that 88% of students believe AI will play an important role in healthcare.[22]

Students expect AI to be part of their future as clinicians

Students expect to see a rise in the use of AI and GenAI in the clinic and among patients. Most students (56%) globally predict that in 10 years' time clinical decisions will be made with the assistance of GenAI, with nursing students (60%) more likely than medical students (53%) to agree. This expectation of GenAI to become a staple of the clinician's workflow is lowest in LATAM (45%) and highest in APAC (61%), reflecting the general trends in the use of AI.

With the shift towards the role of the future clinician as a partner for health, working in a team with the patient at its center, AI likely has a role to play in the coming decade. Most students (63%) expect AI to become an integral part of the healthcare team, again, with agreement significantly higher in India (70%), particularly among medical students (74%).

Furthermore, 61% of students expect that the majority of patients will use GenAI tools to help manage their treatment. Agreement is lowest in the UK (54%), especially among nursing students (51%) and highest in India (65%), especially among medical students (67%).

Statement: Clinical decisions will be made with the assistance of Artificial Intelligence (AI) tools such as ChatGPT/Bard

Region and Country	Base Sizes	% Students Agree (n=2072)	
TOTAL	2072	56	
NOAM	434	56	LA
LATAM	209	45 🔴	
EMEA	617	54	LA
APAC	812	61 🟢	LA, EM
USA	417	56	
UK	299	55	
INDIA	428	61	

🟢 🔴 Significantly higher or lower than total

Significantly higher than Role/ Region/ Country
(indicated by first two letters e.g. AP = Asia Pacific)

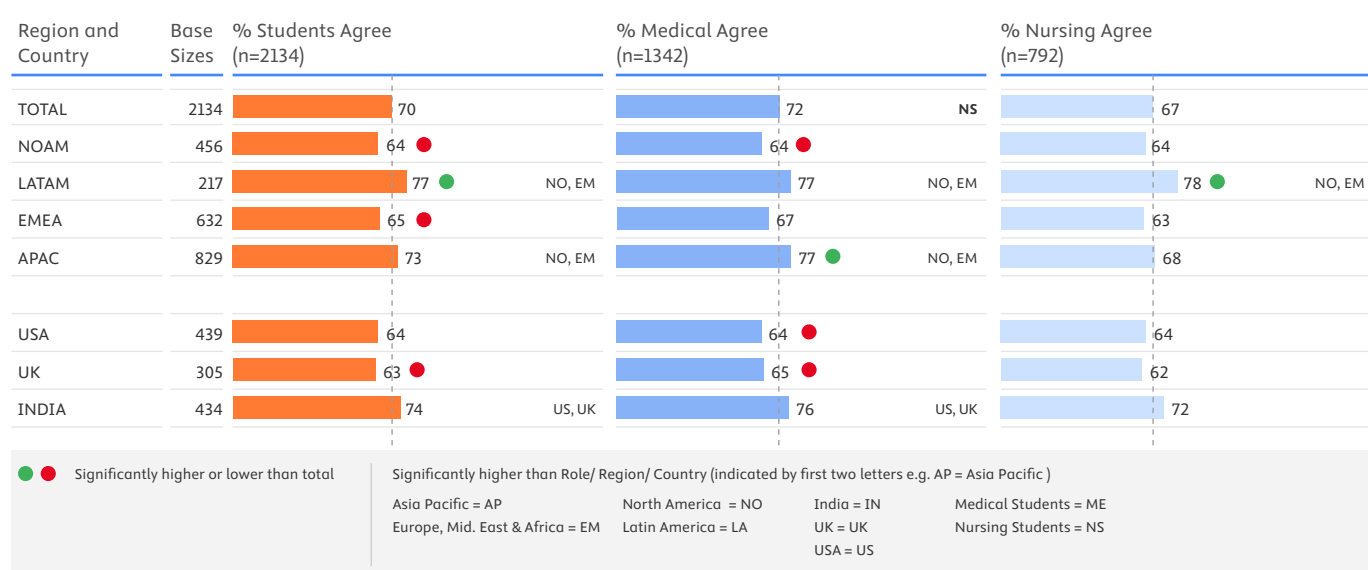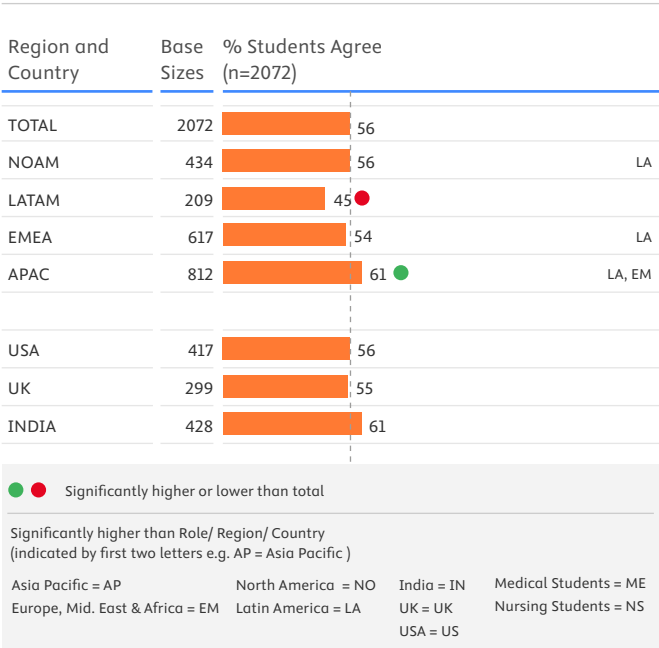|		
Asia Pacific = AP	North America = NO	India = IN	Medical Students = ME
Europe, Mid. East & Africa = EM	Latin America = LA	UK = UK	Nursing Students = NS
		USA = US	

Fig 9. Question: To what extent do you agree or disagree with each of the following statements with regards to your expectations of where healthcare will be in 10 years' time?

What is needed?

Students largely acknowledge the potential benefits of AI and GenAI for their studies and their future as clinicians, and most are already using GenAI tools in their education. But institutions may not be moving fast enough to ensure medical and nursing students are using it effectively as well as being sufficiently prepared to thrive as clinicians in a digital future. How can GenAI best be harnessed to support learning while alleviating students' concerns?

Establish guidelines

AI, and especially GenAI, is still a relatively recent addition to the digital context in which clinicians learn and work, and as such, there are as yet few guidelines and standards underlying its use. It will be vital for actors across the healthcare ecosystem to collaborate in the development of such guidelines. But it is also important to ensure this doesn't slow progress – institutions can be working with these tools in the meantime.

> "It's here and it's going to stay. There are some who have said that we should slow down until the frameworks and the guardrails for ethics and for appropriate use, etc., are in place, and I think that's wise. But I think we need to accelerate that, because as technology outpaces our organization of the space, there are risks."

> Dr. Sanjay Desai, who attended the US roundtable for the Clinician of the Future Education study

Incorporate AI into the curriculum

As we have seen, students' knowledge of digital technologies, including AI, should not be assumed – it needs to be incorporated into the curriculum for nursing and medicine. Students do not yet feel prepared to work with AI,[23] and they advocate for the inclusion of AI in their medical education.[24] Experts recommend connecting medical and nursing students to the people developing the technologies early on in their studies, for the benefit of both parties.[25] There are also calls for short cross-disciplinary courses in digital health.[26]

> "[Deep learning] DL and AI have significant potential to transform medical education and clinical practice. As these technologies gain traction in clinical practice and pedagogy, it may become necessary for medical educators to find space for them in undergraduate curricula. However, significant attention should be given to when, how, and why these skills are introduced to students."
>
> Jai Prashar, writing in Academic Medicine[27]

Encourage the development of critical thinking skills

Despite optimism about the transformative potential of AI in healthcare and education, the concerns around biases and misinformation, and the risk of AI changing the way students learn, are significant. This can be addressed in the medical and nursing curricula by emphasizing the teaching of critical thinking skills, including through connection between students and the experts developing the tools.[28]

> "Hopefully we can train our medical students to be aware of the resources, the limitations, and also develop the things that they can be strong in to complement the medical force of the future."
>
> Dr. Philip Xiu, who attended the UK roundtable for the Clinician of the Future Education study

> "AI can turn out great, and it can turn out really terrible, and understanding the difference, I think, is an issue that is going to be very important in education."
>
> Dr. Lois Margaret Nora, who attended the US roundtable for the Clinician of the Future Education study

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Students predict their futures

Chapter 3

Students predict their futures

Looking at students' expectations of the future compared to the expectations of today's practicing clinicians can highlight potential trends. Students see the patient of the future being more empowered, and they expect more personalized treatment. They expect preventive care will be the standard approach and digital healthcare to be the norm, though many acknowledge the potential for this to introduce inequalities in access to care and put additional pressure on clinicians. They envisage a more diverse, more digitally powered future, with AI playing a role in the healthcare team.

How can we help medical and nursing students transition to their roles as the clinicians of the future?

➤ **The Future Clinician as a Partner for Health:**
67% agree the relationship of clinicians and patients will be a partnership

➤ **The Future "Total Health" Clinician:**
80% students consider managing public health a top priority

➤ **The Future Tech-Savvy Clinician:**
71% agree digital health technologies will enable positive transformation of healthcare

➤ **The Future Balanced Clinician:**
60% agree use of digital health technologies will be a challenging burden on clinicians' responsibilities – lower than clinicians today

➤ **The Future Accessible Clinician:**
58% agree the use of digital health technologies will exacerbate health inequalities

Projecting student expectations to shape our vision of tomorrow's clinicians

Today's medical and nursing students are the clinicians of the future. While they do not yet have direct experience of working in the field, their attitudes, experiences and expectations can indicate trends when compared to feedback from today's clinicians.

In the Clinician of the Future study in 2022 and 2023, we explored clinicians' views of the healthcare workforce and ecosystem. Through global surveys, qualitative interviews and roundtable discussions with key opinion leaders, we have developed a vision of the clinician of the future from five angles. We enhanced and refined this vision of the clinician of the future in the 2023 survey, identifying areas that require action in order to ensure a future-proof health workforce.

In the *Clinician of the Future: Education Edition*, we have explored many of the same themes and questions, aiming to build on the picture we have developed so far. In this chapter, we will look at students' input in terms of the five aspects of the clinician of the future.

The Future Clinician as a Partner for Health

Works flexibly in partnership with patients, using digital technology to make informed decisions

The clinician of the future will work in partnership with the patient of the future, who clinicians predict will be more empowered, more aware of their social determinants of health (SDOH) and more health literate. We also looked at the rise of the patient-consumer in the 2022 Clinician of the Future study, and 90% of clinicians said quality measures, including patient satisfaction, have driven change in healthcare in the last decade.[1]

Students' responses in the Clinician of the Future Education survey reveal higher expectations across a number of areas including working in partnership with their patients, a greater focus on the quality of the patient experience as well as more believing those patients that actively maintain their health will be given preference for treatment.

In the next 10 years...	% Students Agree	% Clinicians Agree
The relationship between clinicians and patients will be more of a partnership	67	62
There will be a greater focus on the importance of quality patient experience	79	75
A much higher proportion of patients will proactively review their own medical health records themselves	69	74
Where applicable, patients who demonstrate that they actively maintain their health will be rewarded with lower health insurance premiums	58	60
Patients who demonstrate that they actively maintain their health (e.g. via wearables) will be given preference for treatment (e.g. surgery, medication)	55	46
Personalized treatment approaches will be more widely used	81	77
Real-time patient analytics will be critical to personalized care	80	77
Every individual will have their genome sequenced to help prevent disease/illness	57	43
Scientific research will be integrated into clinical practice	81	72

Students 2023: N = 2,212   Clinicians 2022: N = 2,838   Exact numbers vary by statement.
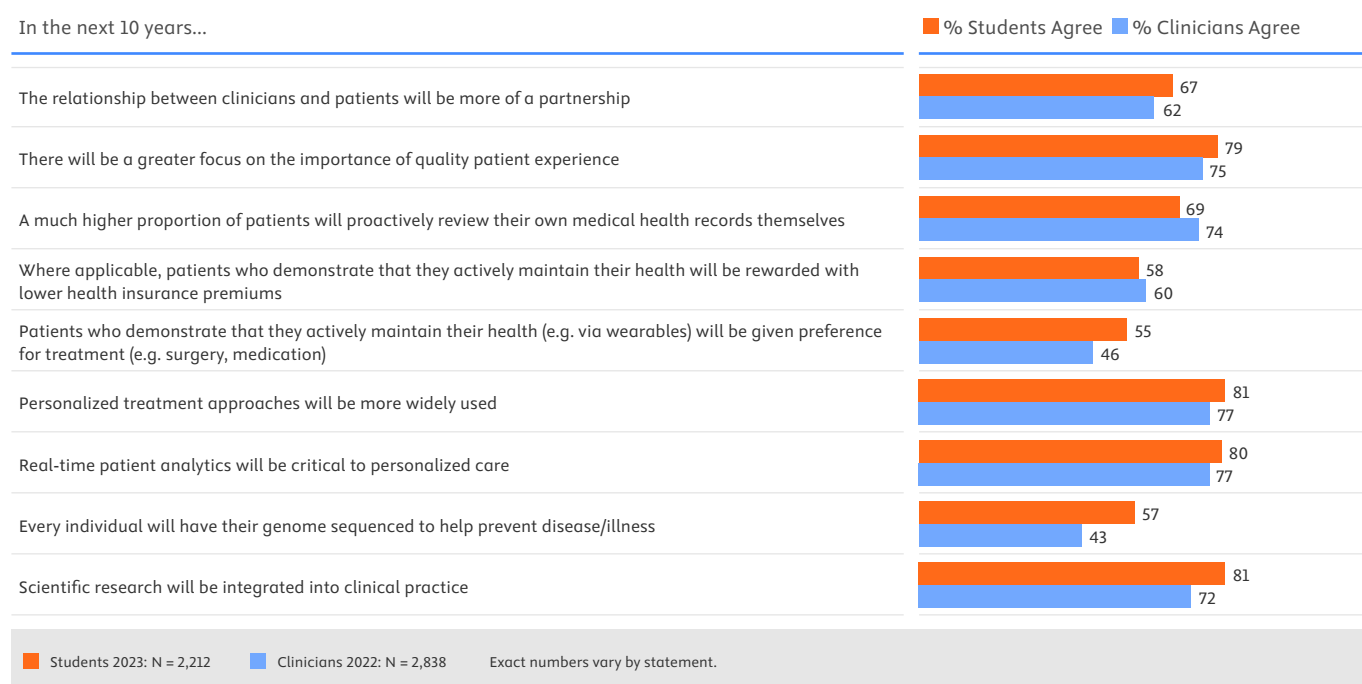
Fig 10. Question: To what extent do you agree or disagree with each of the following statements with regards to your expectations around patients in healthcare in 10 years' time?

The clinician–patient partnership

Globally, 67% of students agree the relationship of clinicians and patients will be a partnership, with agreement lowest in LATAM (60%) and highest in APAC (71%). This is in line with previous clinician responses (62%).

Statement: The role of the clinician will be more of a partnership with the patient.

Region and Country	Base Sizes	% Students Agree (n=2120)	% Medical Agree (n=1329)	% Nursing Agree (n=791)
TOTAL	2120	67	66	67
NOAM	453	64	62	65
LATAM	201	60 ●	57 ●	63
EMEA	635	64	62	65
APAC	831	71 ● NO, LA, EM	72 ● NO, LA, EM	70
USA	437	64	63	66
UK	312	62	60	65
INDIA	432	67	68	67

● ● Significantly higher or lower than total

Significantly higher than Role/ Region/ Country (indicated by first two letters e.g. AP = Asia Pacific)

Asia Pacific = AP
Europe, Mid. East & Africa = EM
North America = NO
Latin America = LA
India = IN
UK = UK
USA = US
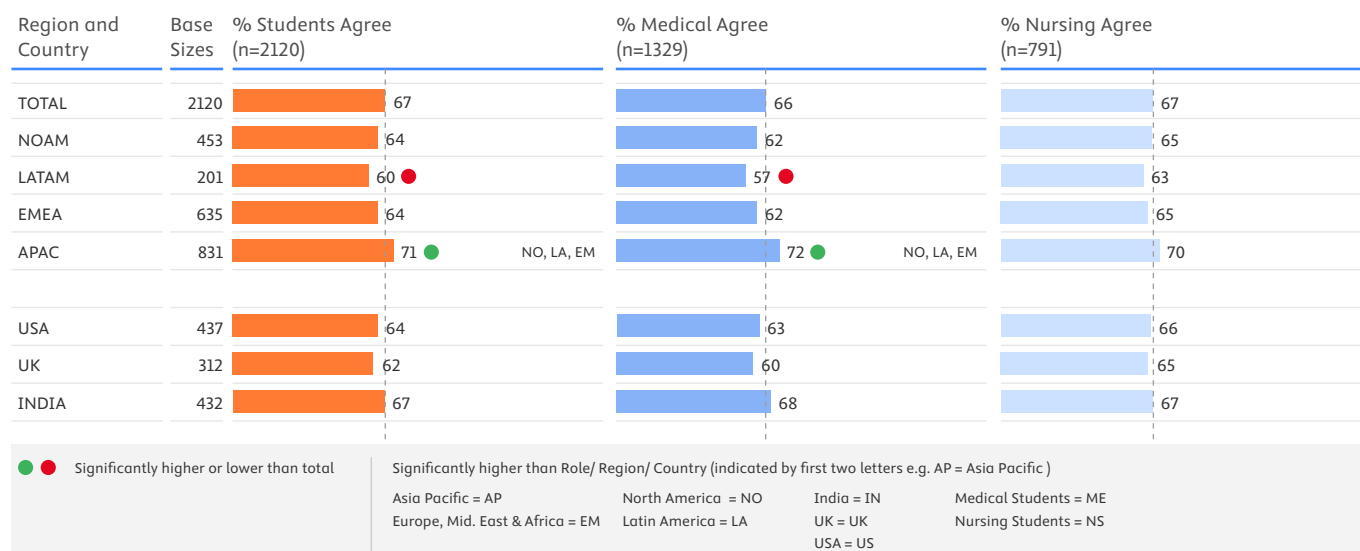Medical Students = ME
Nursing Students = NS

Fig 11. Question: To what extent do you agree or disagree with the following statement?

Tomorrow's clinicians are aware of the central role patients will play, with 79% of students agreeing there will be a greater focus on the patient experience in the future, again in line with clinicians' views.

At the same time, students also acknowledge the role patients will play in managing their own health, albeit with lower expectations than today's clinicians. In the 2023 survey, clinicians expected more of their patients to actively manage their own health in five years (49%) than today (38%).[2]

Along similar lines, 69% of students in the current study agree a much higher proportion of patients will proactively review their own medical health records, with agreement higher in APAC 73%.

Patient empowerment and digital tech

Previous Clinician of the Future research signaled the rise of wearables and patient empowerment. Globally, 58% of students agree that, where applicable, patients who demonstrate that they actively maintain their health will be rewarded with lower health insurance premiums. This is in line with clinician responses.[3]

In comparison, students are more likely than clinicians to expect patients to be rewarded by being given preference for treatment: 55% of students agree that patients who actively maintain their health will be given preference for treatment.

The rise of personalized medicine

In the 2023 Clinician of the Future survey, 40% of respondents considered adapting services to offer personalized treatment approaches a top priority.[4] This sentiment is echoed in the student responses, with 81% globally agreeing that personalized treatment approaches will be more widely used in the next ten years.

Although agreement is high globally, students in NOAM (75%) and EMEA (77%) are less likely to expect the widespread use of personalized approaches. Agreement is much higher in APAC (85%), particularly among medical students (89%).

There is a similar upward trend in the expectation that real-time patient analytics will be critical to personalized care in the future, with 80% of students globally in agreement, in line with clinicians' opinions.

Student opinion is more divided on genome sequencing. Globally, 57% expect every individual will have their genome sequenced to help prevent disease or illness — markedly higher than the 43% of clinicians who agreed in 2022.[5] Nursing students (60%) are more likely to agree than are medical students (55%), and agreement is lowest in LATAM (49%).

Much higher is the expectation that scientific research will be integrated into clinical practice — leaping from 72% of clinicians in 2022[6] to 81% of students in 2023. Agreement is higher among students in LATAM (89%) and lower in NOAM (74%).

The Future "Total Health" Clinician

Is skilled in communication and leadership and works within an integrated healthcare system that focuses on prevention

In addition to the rise of the empowered patient and the associated shift towards preventive and personalized care, clinicians identified two major drivers of change in 2022: the aging population (93%) and noncommunicable diseases (NCDs) (94%).[7] If anything, these drivers have since accelerated.

In the current study, students agree with clinicians about the importance of preventive care and the move to care at home, and more expect to play a role in public health. Students' responses also reveal higher expectations to work in partnership with their patients, but overall slightly lower expectations of patients to manage their own health, working within a diverse team.

In the next 10 years…   ■ % Students Agree ■ % Clinicians Agree

	% Students Agree	% Clinicians Agree
Managing public health will be a key priority within a clinicians' role	73	80
The healthcare workforce will be more diverse to better represent the local population	62	75
The majority of healthcare will be provided in a patient's home instead of a healthcare setting (e.g. hospital/clinic)	49	49

■ Students 2023: N = 2,212   ■ Clinicians 2022: N = 2,838   Exact numbers vary by statement.
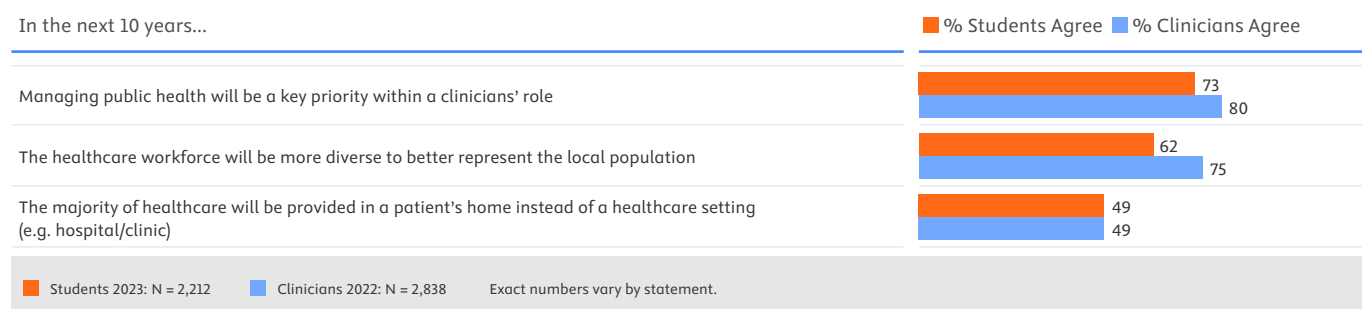
Fig 12. Question: To what extent do you agree or disagree with each of the following statements with regards to your expectations of where healthcare will be in 10 years' time?

Public health and prevention

Eight out of 10 students expect that managing public health will be a key priority within their roles as clinicians, higher than the expectations of today's clinicians. Agreement ranges from 72% among medical students in the USA and 88% among medical students in India. Overall, nursing students (82%) are more likely to agree than are medical students (78%).

In the Clinician of the Future 2023 study, we also noted progress in preventive care, indicated by the decline in the proportion of clinicians who think more needs to be done in this area.[8] Today's students are prepared to take this on as clinicians: 73% think that a much higher proportion of patients will be 'prescribed' exercise, health wearables or educational courses as preventive measures instead of medication. Agreement ranges from 65% in NOAM to 79% in LATAM.

Statement: Managing public health will be a key priority within their roles as clinicians.

Region and Country	Base Sizes	% Students Agree (n=2140)		% Medical Agree (n=1343)		% Nursing Agree (n=797)	
TOTAL	2140	24		78		82	ME
NOAM	458	73 ●		72		75	
LATAM	218	83	NO	80		85	NO
EMEA	634	78		73 ●		83	NO
APAC	830	83	NO, EM	83 ●	NO, EM	82	
USA	441	74		72		76	
UK	313	82 ●	US	78		86	US
INDIA	435	85 ●	US	88 ●	US, UK	81	

● ● Significantly higher or lower than total

Significantly higher than Role/ Region/ Country (indicated by first two letters e.g. AP = Asia Pacific)

Asia Pacific = AP
Europe, Mid. East & Africa = EM

North America = NO
Latin America = LA

India = IN
UK = UK
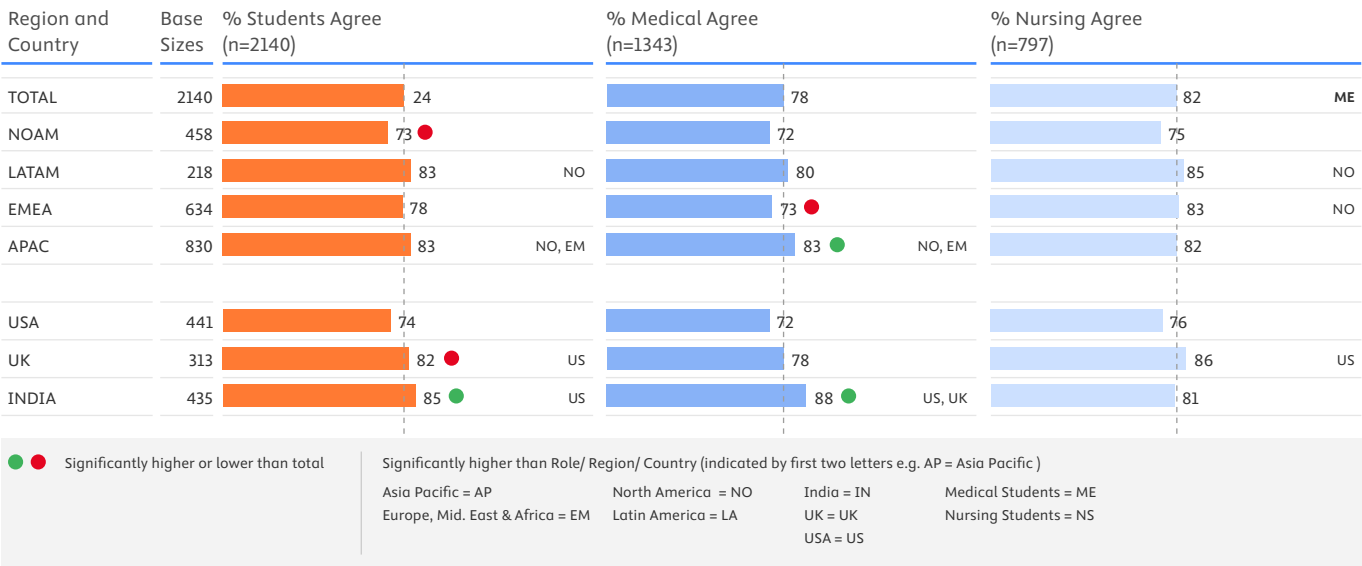USA = US

Medical Students = ME
Nursing Students = NS

Fig 13. Question: To what extent do you agree or disagree with each of the following statements with regards to your expectations of where healthcare will be in 10 years' time?

This preventive approach to healthcare, which fits with a value-based model, benefits from a diverse, multidisciplinary team. In the 2022 study, 63% of clinicians agreed the healthcare team will better represent the diversity of the local population.[9] In the current survey, a significantly higher proportion of students expect diversity in their teams, with 75% globally expecting the healthcare workforce to be more diverse and better represent the local population.

The move to patient-centered, value-based care

As we saw in the previous section, students expect a more personalized approach to healthcare in the future, in line with a value-based approach, which may go hand in hand with less focus on hospitals and clinics as standard healthcare locations. Indeed, in the Clinician of the Future 2023 survey, 73% of clinicians expected most patients to be managed in primary care settings, and 69% expected hospital stays to be shorter in a value-based care model.[10]

In the current survey, about half (49%) of students expect the majority of healthcare to be provided in a patient's home instead of a healthcare setting. More nursing students (55%) than medical students (44%) agree. These expectations are in line with those of clinicians, 49% of whom agreed in the shift to home-based healthcare in the 2022 survey.[11]

The Future Tech-Savvy Clinician

Is skilled in the use of digital health technologies and often meets patients remotely, providing data-based personalized care

The major evolution in the tech space since the 2022 report is in AI, particularly GenAI. For today's students — and tomorrow's clinicians — GenAI tools like ChatGPT and Bard are changing the landscape, influencing everything from the way they study to the way they work with patients.

The impact is already clear in the current survey of students: most are using GenAI in their education, and they are preparing themselves for a future powered by AI. But they are also aware of some of the concerns surrounding this technology, as well as the impact it might have on them as clinicians.
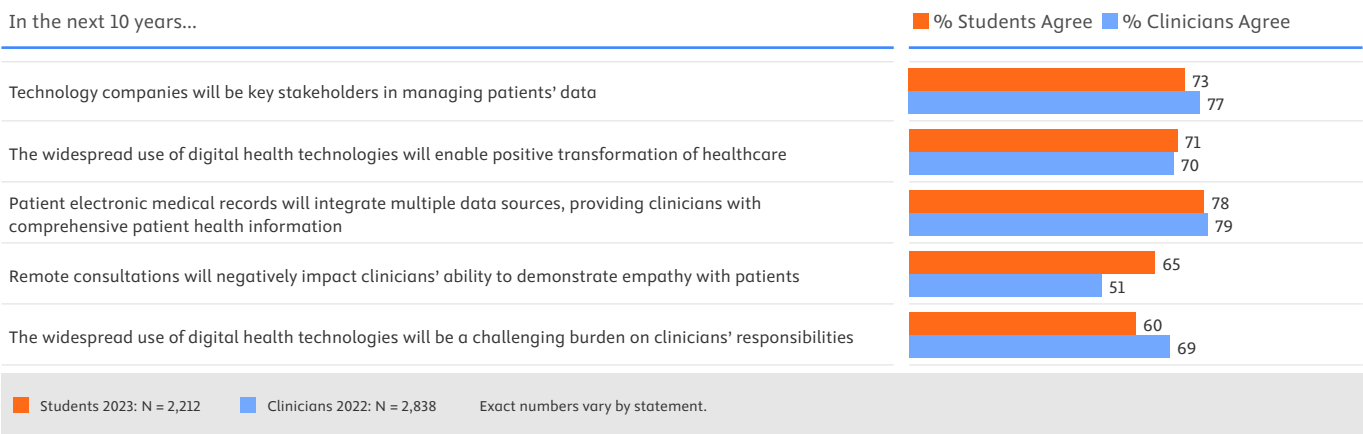
In the next 10 years...	% Students Agree	% Clinicians Agree
Technology companies will be key stakeholders in managing patients' data	73	77
The widespread use of digital health technologies will enable positive transformation of healthcare	71	70
Patient electronic medical records will integrate multiple data sources, providing clinicians with comprehensive patient health information	78	79
Remote consultations will negatively impact clinicians' ability to demonstrate empathy with patients	65	51
The widespread use of digital health technologies will be a challenging burden on clinicians' responsibilities	60	69

Students 2023: N = 2,212   Clinicians 2022: N = 2,838   Exact numbers vary by statement.

Fig 14. Question: To what extent do you agree or disagree with each of the following statements with regards to your expectations of where healthcare will be in 10 years' time?

Preparing for a digital future

As the influence of digital technologies increases in healthcare, so does the presence of the companies behind them. With multiple acquisitions in the healthcare space in 2022, the big four tech companies — Amazon, Google, Microsoft and Apple — are increasingly involved in the industry.[12]

Students see this shift in their field and predict that the technology companies are there to stay: in line with previous clinician findings, 73% of students globally agree these companies will be key stakeholders in managing patients' data in the future. This expectation is lowest in NOAM, including the USA (68%) and highest in APAC (76%), where 81% of Indian medical students agree.

Today's students also see the transformative potential of technology: 71% globally agree that digital health technologies will enable the positive transformation of healthcare. This sentiment is most pronounced in APAC (75%) and less so in NOAM (65%).
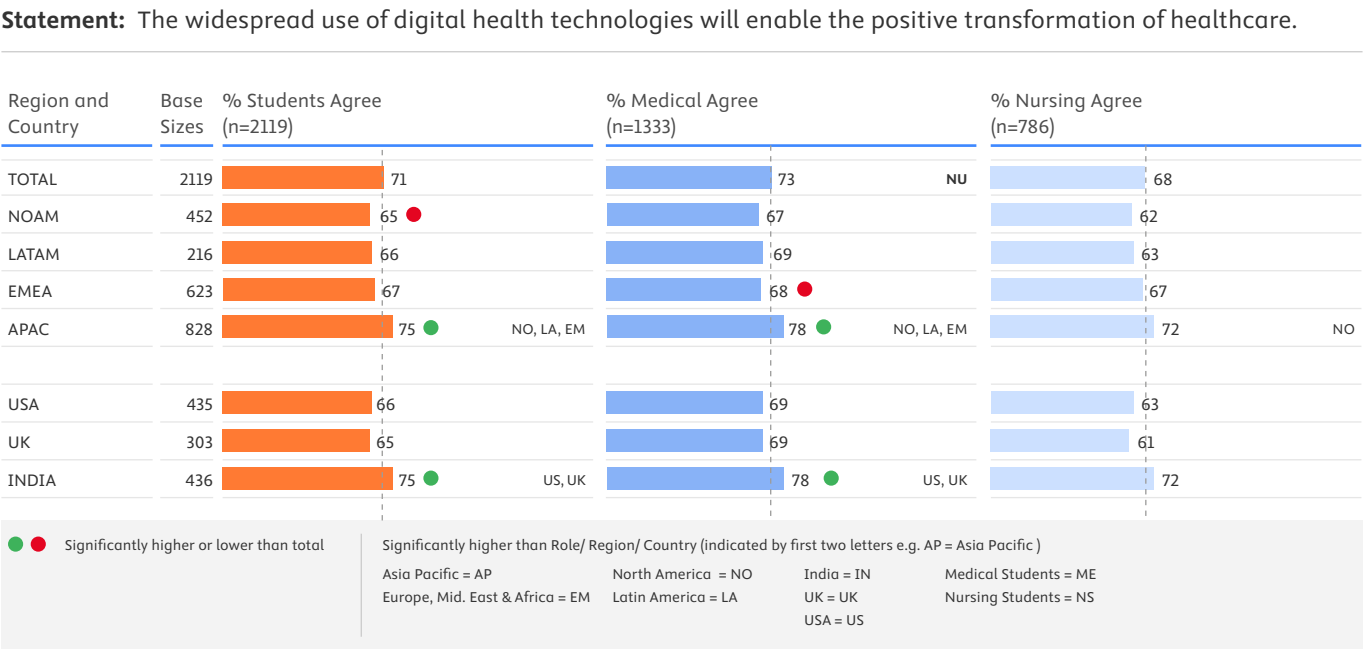
Statement: The widespread use of digital health technologies will enable the positive transformation of healthcare.

Region and Country	Base Sizes	% Students Agree (n=2119)	% Medical Agree (n=1333)	% Nursing Agree (n=786)
TOTAL	2119	71	73 NU	68
NOAM	452	65 🔴	67	62
LATAM	216	66	69	63
EMEA	623	67	68 🔴	67
APAC	828	75 🟢 NO, LA, EM	78 🟢 NO, LA, EM	72 NO
USA	435	66	69	63
UK	303	65	69	61
INDIA	436	75 🟢 US, UK	78 🟢 US, UK	72

🟢 🔴 Significantly higher or lower than total

Significantly higher than Role/ Region/ Country (indicated by first two letters e.g. AP = Asia Pacific)

Asia Pacific = AP   North America = NO   India = IN   Medical Students = ME
Europe, Mid. East & Africa = EM   Latin America = LA   UK = UK   Nursing Students = NS
USA = US

Fig 15. Question: To what extent do you agree or disagree with each of the following statements in 10 years' time?

Digital applications for the practicing clinician

Digital technology has many applications in healthcare, including in patient electronic medical records (EMRs). Both students (78%) and clinicians (79%)[13] expect EMRs will integrate multiple data sources in the future, providing them with comprehensive health information.

AI and GenAI are also expected to play a significant role in the clinicians' future (see details in chapter 2 on page 22). For example, 70% of students believe AI advancements will aid in diagnoses, treatments and patient outcomes and 63% think it will become an integral part of the healthcare team. Considering that 56% of clinicians expect they will make most decisions using clinical decision support tools that use AI in 10 years' time, this suggests an upward trend.[14]

Globally, 56% of students predict that clinical decisions will be made with the assistance of GenAI tools like ChatGPT and Bard, and 61% think their patients will use these tools to help manage their treatment. Again, this is a significant increase from today's reality: according to clinicians in the 2023 survey, only 11% of clinical decisions are currently assisted by GenAI tools.[15]

Students also acknowledge drawbacks to the digital future

Students' concern about their digital future is not limited to the impact of AI. In the Clinician of the Future Education survey, 65% of students agree that remote consultations will negatively impact clinicians' ability to demonstrate empathy with patients. This concern is least prevalent in NOAM (55%) and heightened in LATAM (77%) and EMEA (70%). When compared to the feedback from today's clinicians, this suggests a higher expectation of a negative impact on empathy in the future.

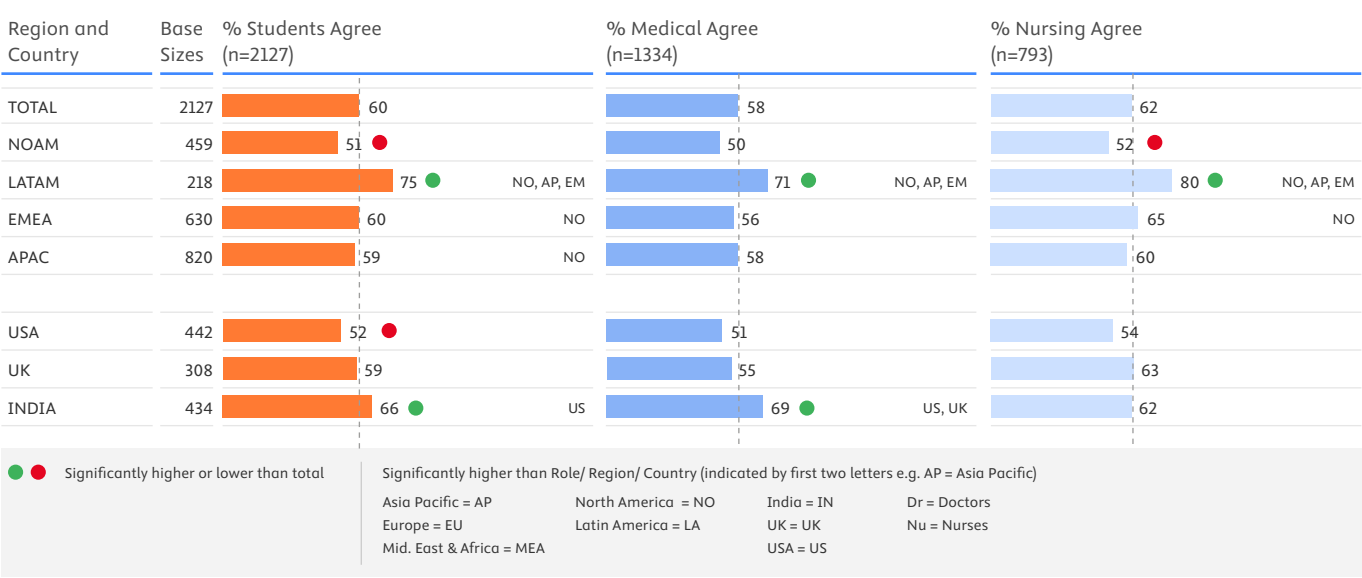More than half (60%) of students also agree that the widespread use of digital health technologies will be a challenging burden on clinicians' responsibilities. Concern among students is lowest in NOAM (51%) and highest in LATAM (75%), where 80% of nursing students predict it will be a challenging burden. Students' familiarity with digital technologies in their education may partly explain their relatively lower levels of concern compared to clinicians here.

Statement: The widespread use of digital health technologies will be a challenging burden on clinicians' responsibilities.

Region and Country	Base Sizes	% Students Agree (n=2127)		% Medical Agree (n=1334)		% Nursing Agree (n=793)	
TOTAL	2127	60		58		62	
NOAM	459	51 🔴		50		52 🔴	
LATAM	218	75 🟢	NO, AP, EM	71 🟢	NO, AP, EM	80 🟢	NO, AP, EM
EMEA	630	60	NO	56		65	NO
APAC	820	59	NO	58		60	
USA	442	52 🔴		51		54	
UK	308	59		55		63	
INDIA	434	66 🟢	US	69 🟢	US, UK	62	

🟢 🔴 Significantly higher or lower than total

Significantly higher than Role/ Region/ Country (indicated by first two letters e.g. AP = Asia Pacific)

Asia Pacific = AP	North America = NO	India = IN	Dr = Doctors
Europe = EU	Latin America = LA	UK = UK	Nu = Nurses
Mid. East & Africa = MEA		USA = US	

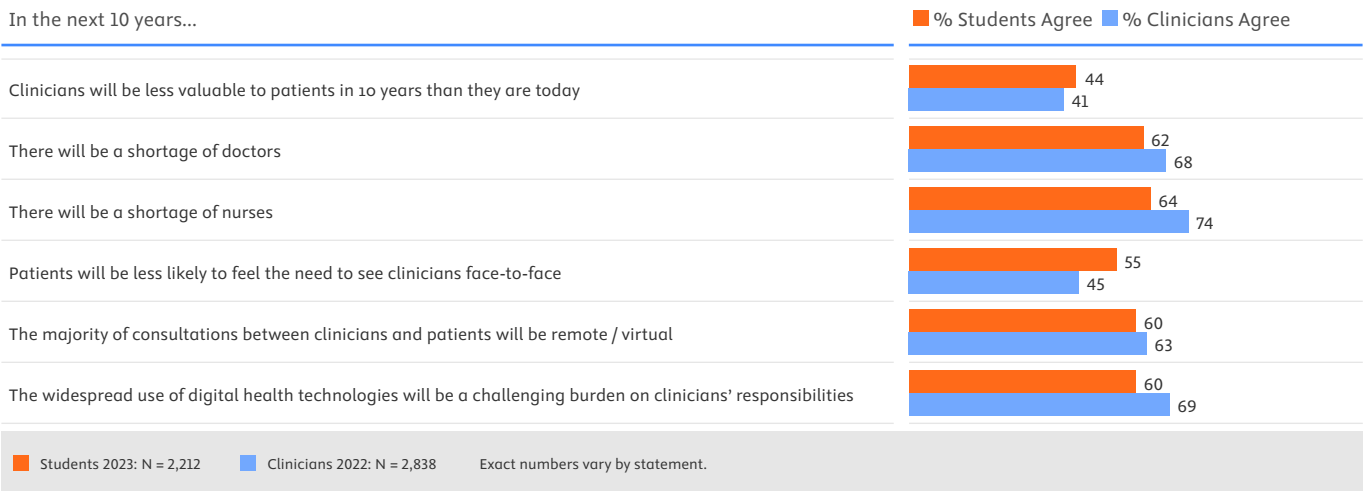**Fig 16. Question:** To what extent do you agree or disagree with each of the following statements in 10 years' time.

The Future Balanced Clinician

Receives the training they need to thrive and manages their own wellbeing in the context of staff shortages by accessing support services

Throughout the Clinician of the Future studies, shortages have been a major concern. The global shortfall of healthcare workers is predicted to be 10 million by 2030.[16] 'Health professionals' rank third in the most common labor shortages by occupations in 2022 in Europe, according to the World Economic Forum (WEF).[17]

Digital technology remains a driving force too, and as today's students predict, the clinician of the future may find this a challenging burden. However, research suggests the rise in tech could help solve the challenge of shortages. For example, more than 40% of companies surveyed for the WEF report expect 'Health and care technologies' to create jobs.[18] While these trends are developing, the reality today is that clinicians need more colleagues, and students are already concerned.

In the next 10 years...	% Students Agree	% Clinicians Agree
Clinicians will be less valuable to patients in 10 years than they are today	44	41
There will be a shortage of doctors	62	68
There will be a shortage of nurses	64	74
Patients will be less likely to feel the need to see clinicians face-to-face	55	45
The majority of consultations between clinicians and patients will be remote / virtual	60	63
The widespread use of digital health technologies will be a challenging burden on clinicians' responsibilities	60	69

Students 2023: N = 2,212   Clinicians 2022: N = 2,838   Exact numbers vary by statement.

Fig 17. Question: To what extent do you agree or disagree with each of the following statements in 10 years' time?

Students predict the challenges ahead

Almost half (44%) of students who responded to the Clinician of the Future Education survey think that clinicians will be less valuable to patients in 10 years than they are today. Agreement is in line with that of current clinicians, 41% of whom think they will be less valuable to patients in 10 years.[19]

However, students also predict that trust, which plays a critical role in every aspect of healthcare, will increase.[20] Globally, 63% of students (58% of medical students and 68% of nursing students) agree trust in healthcare providers and health science will increase. Agreement is lowest among medical students in EMEA (51%).

Staff shortages will continue to impact clinicians

As we saw in chapter 1, students today are concerned about their current mental health and worried that they may face burnout in the future (see chapter 1 on page 18 for details.). This is influenced by their perceptions of future clinician shortages.

Students expect to face shortages of doctors, nurses and other healthcare professionals in the future. Globally, two-thirds (66%) of students predict a shortage of healthcare professionals (not limited to doctors and nurses). About three-fifths (62%) of students agree there will be a shortage of doctors, and 64% expect a shortage of nurses.

Education is one of the solutions to the shortages, but this may not be as effective as hoped given that 58% of students see their current studies as a stepping-stone towards a broader career in healthcare that will not involve directly treating patients. (See chapter 1 on page 11 for more details.)

Telehealth may help support balance

While efforts are made to bolster the global healthcare workforce, digital technologies have the potential to support clinicians during shortages. More than half (55%) of today's students agree that patients will be less likely to feel the need to see clinicians face-to-face in 10 years. This expectation is higher than that among clinicians in the 2022 survey (45%).[21]

As such, 60% of students expect the majority of consultations between clinicians and patients will be remote or virtual and 53% expect that once they graduate, part of their work as a clinician will be done remotely. In both cases, agreement is lower in LATAM (40% and 36% respectively) and highest in APAC (64% and 61% respectively).

While acknowledging the benefits the increased use of digital technology brings, 60% of students agree that the use of digital health technologies will be a challenging burden on clinicians' responsibilities.

The Future Accessible Clinician

Who works in a more equitable, accessible healthcare system and meets patients where they are, helping them maintain their health

In the *Clinician of the Future Report 2022*, 97% of clinicians agreed the COVID-19 pandemic was a key driver of change.[22] This continues to be the case, partly due to the way the pandemic accelerated our use of digital technologies, including in healthcare. While this has had many benefits, research suggests it also widened the gap in access to healthcare for many people.[23]

Today's medical and nursing students see the risk digital technologies pose to access, and they expect to play a role in closing the gap as clinicians, through public health and by monitoring patients' social determinants of health (SDOH).

In the next 10 years...	% Students Agree	% Clinicians Agree
The use of digital health technologies will exacerbate health inequalities	58	64
Managing public health will be a key priority within their role	80	73

Students 2023: N = 2,212   Clinicians 2022: N = 2,838   Exact numbers vary by statement.

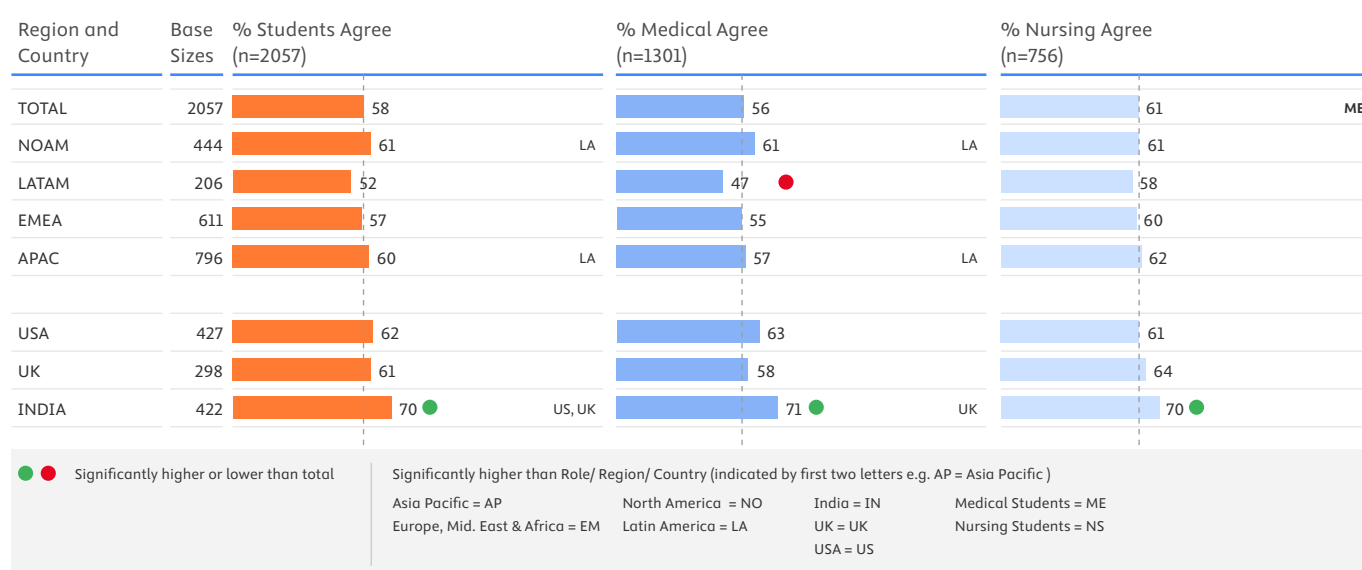**Fig 18. Question:** To what extent do you agree or disagree with each of the following statements in 10 years' time?

Closing the access gap

Despite clinicians' sentiments in previous research that telehealth is improving access and digital tech is empowering patients, both clinicians and students believe the impact of health inequalities will be exacerbated by the greater use of digital health.

There are mixed views among today's students, with 58% globally agreeing the use of digital health technologies will exacerbate health inequalities. Agreement is consistent across regions, but students in India (70%) are much more likely to predict this impact.

Statement: The use of digital health technologies will exacerbate health inequalities.

Region and Country	Base Sizes	% Students Agree (n=2057)		% Medical Agree (n=1301)		% Nursing Agree (n=756)	
TOTAL	2057	58		56		61	ME
NOAM	444	61	LA	61	LA	61	
LATAM	206	52		47 🔴		58	
EMEA	611	57		55		60	
APAC	796	60	LA	57	LA	62	
USA	427	62		63		61	
UK	298	61		58		64	
INDIA	422	70 🟢	US, UK	71 🟢	UK	70 🟢	

🟢 🔴 Significantly higher or lower than total

Significantly higher than Role/ Region/ Country (indicated by first two letters e.g. AP = Asia Pacific)

Asia Pacific = AP
Europe, Mid. East & Africa = EM

North America = NO
Latin America = LA

India = IN
UK = UK
USA = US

Medical Students = ME
Nursing Students = NS

Fig 19. Question: To what extent do you agree or disagree with each of the following statements in 10 years' time?

Students expect to play a role in remedying this as clinicians. Four in five (80% of) students consider managing public health a top priority. Compared to the 73% of clinicians who identified that in 10 years' time managing public health will be a key priority within their role, this suggests growing awareness of the importance of public health.[24] This is reflected in the aspirations of many of the students who see their education as a stepping-stone to a broader career (see page 11 for details).

Indeed, in the 2023 survey of clinicians, 67% expected institutions to monitor patients' SDOH, which are vital to understand in order to improve access to care.[25] Students are already on their way to understanding and addressing these inequities: in the current study, 73% of students globally agree their school considers the many health equity issues facing the global patient population.

The empowered patient

The clinician of the future will work in partnership with the patient of the future, and clinicians expect them to be more empowered. Clinicians estimate that two in five (41% of) patients are health literate today and predict this will rise to 49% in 2028.[26] Students acknowledge this upward trend and 83% globally agree that patients' health education will become more important and prevalent in the future.

What is needed?

In the current study, medical and nursing students have shared their predictions and expectations of their future in healthcare. Their views are mostly in line with today's practicing clinicians, with a vision of a more digital future in which they work in partnership with patients, focusing on prevention and working in a more diverse, accessible landscape. However, they also share concerns about shortages, mental health issues and the potential negative impacts of digital health technologies.

How can we help medical and nursing students transition to their roles as the clinicians of the future while tackling the challenges they may face?

Provide the foundational skills they need to succeed

➤ Focus on soft skills and hard data in the medical curriculum

➤ Develop training that includes skills for the digital environment

➤ Focus on wellbeing

Students are largely positive about their training and curricula and they feel confident they are prepared to succeed as clinicians (see chapter 1 on page 12 for details). But there is some hesitation around preparedness for a fully digital future that includes AI and GenAI in particular. As students head towards that future, they will need strong foundations in a range of skills to enable them to adapt to the fast-changing environment and use digital tools optimally for the best patient outcomes. According to predictions, skills like critical thinking, communication, teamwork, digital fluency and entrepreneurship will be critical in the future world of work, including in healthcare.[27]

Medical and nursing curricula should incorporate these broader skills, as well as specific training on AI (see chapter 2 page 22 for details). There should also be space for self-care and wellbeing, as well as attention to health equity.

Support the patient of the future

➤ Improve health literacy

➤ Empower patients

➤ Support digital access

Students expect to work in partnership with their patients in the future, and they predict their patients will be empowered, using more digital technologies to track and maintain their own health. However, they also acknowledge inequities that may arise due to digital technology.

Clinicians play a role in the development of patient empowerment, and their training will be key in encouraging this. Good communication skills enable clinicians to explain medical terms to their patients and help them understand how they can manage their conditions. And through their role in public health, clinicians can support the improvement of health literacy more broadly. Ultimately, this could help drive the transformation of healthcare to a more value-based preventive system.

Accelerate transformation of the healthcare system

➤ Ensure a complete workforce

➤ Pivot to a value-based and preventive model

➤ Develop efficient, integrated systems that incorporate AI

Today's students are already concerned about the healthcare systems in which they will work, with the majority being worried about shortages and their risk of burnout. Ensuring a complete workforce will be key to addressing this, which in part can be achieved with changes to the medical and nursing curricula. Any changes made can best be aligned with the intention to incorporate more preventive approaches to healthcare, and the inevitable rise in remote monitoring and telehealth.

Importantly, healthcare systems will benefit greatly from more efficient systems that incorporate AI and GenAI, which the students expect to use in their future roles as clinicians. Robust infrastructure that adheres to standards may help alleviate some of the concerns around the potential negative impacts of AI, as well as freeing up clinicians' time to care for patients.

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Conclusion

Elsevier Health: Supporting the Clinician of the Future

In this report, we have shared the experiences, views and expectations of today's medical and nursing students, with a goal of understanding the implications for the clinician of the future as well as gaining insights into their lives today.

Extending the picture shared by clinicians in our 2022 and 2023 Clinician of the Future studies, students foresee an exciting future with many possibilities around digital technologies like generative AI, and despite some concern, on the whole they feel prepared to face that future. Key opinion leaders shared many of their opinions and offered valuable input on a range of topics.

It is vital that all of us continue to listen to students' voices in order to tackle some of the challenges they predict, including future shortages, burnout and the burden of fast-changing digital technologies. As with the other studies that comprise the Clinician of the Future, at Elsevier, we are applying these insights to help develop solutions that support today's students as well as the clinicians of the future.

Solutions that address real challenges

Elsevier has played a role in healthcare by supporting clinicians for more than a century. Clinicians rely on our trusted, evidence-based content and clinical solutions to help improve patient outcomes. Elsevier Health's information, decision tools and analytics have evolved with the development of new technologies to ensure clinicians can make the most of cutting-edge solutions to benefit patient care.

Preparing the future clinician

Educational resources to ensure that current and future healthcare professionals have the latest clinical knowledge, leadership and data science skills.

Empowering new nurses

Our Transition to Practice virtual learning platform helps new nurses build professional skills and confidence through a supportive new nurse orientation experience.

AI-powered clinical decision systems

Integration of the latest high-quality research with other data in a smart system that leverages artificial intelligence (AI) and enables clinicians to provide better patient outcomes.

Improving health literacy

With access to trusted patient education materials, clinicians can enable patients to be more informed and empower them to manage their own health.

Supporting the move to digital with systems and infrastructure

Digital tools that support the patient–clinician partnership, reduce administrative burden that help build and maintain empathy in a virtual setting.

Efficient, well-integrated systems (and the opportunity to master them)

With better integrated systems, clinicians could have less administrative burden and more time for patients and learning.

This remains a dynamic picture, and as students continue to move through their training and enter the global health workforce, the landscape will evolve. We want to keep listening to clinicians, including those on their way to qualification.

We invite you to share your thoughts and input with us.

https://tinyurl.com/CotF2023e

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Clinician of the Future 2023: Education Edition

Methodology

This study comprised a global survey of students and two roundtable sessions with key opinion leaders in the USA and UK.

Student survey

10-15-minute online survey

n=2,212 students from 91 countries

April and May 2023

The student survey, carried out by DJS Research on behalf of Elsevier in June and July 2023, focused on attitudes and perceptions among students, in order to uncover the paradigm shifts expected to have maximum impact on the way healthcare is delivered in the future.

Respondents are a sample of students (Medical and nursing) from a variety of sources including a panel provider. The sources included:

➤ Users of Elsevier solutions aimed at medical and nursing students, as well as Elsevier's marketing database

➤ External respondents from Dynata healthcare panel (voluntary sign up)

Participants were recruited using an email invitation containing a link to the online survey, which took approximately 10-15 minutes to complete. To qualify, participants had to be registered as a medical or nursing student at the time of fieldwork.

In total, there were 2,212 surveys completed by students across 91 countries. Please refer to the appendix (page 49) for a more detailed breakdown.

We weighted the results based on OECD statistics data by region, and to equally represent medical and nursing students in the totals. The weighting was aligned to the other Clinician of the Future studies.

The following weighting was applied:

Asia Pacific = 46%; Europe, Middle East and Africa = 29%; and NOAM/SA = 25%; plus an efficiency to ensure the total data included a ratio of 50:50 roles (doctor and nurse).

Despite the weighting, the study is not without limitations due to self-selection, non-response biases and the lower response rate typical for online surveys of this nature. Therefore, there will be some non-sampling error associated with this study, as we cannot be sure responses accurately represent the views of the population for a given country. Statistical differences shown in this report should be interpreted within this context, and while showing notable difference between groups, results are not necessarily generalizable to a whole country. Given the non-probability sampling methods, these tests are indicative.

Roundtables

We conducted two online roundtable events — one with key opinion leaders in the UK and one in the USA — in which experts shared their reactions to the survey results and offered their own insights from the clinician and instructor angle. Participants are listed in the acknowledgments on page 48.

Acknowledgments

Clinician of the Future Education Program Participants

Appendices

Sample bases for reporting groups		TOTAL	Medicine	Nursing
	TOTAL	2212	1385	827
Gender	Woman	1239	648	591
	Man	944	719	225
	Other	19	12	7
	Prefer not to say	10	6	4
Age	18-24	1412	953	459
	25-29	380	226	154
	30-34	123	64	59
	35-39	76	22	54
	40+	67	14	53
	Prefer not to say	154	106	48
	Mean	24.2	23.3	25.7

Questions: C01 - Which gender do you most identify with? C02 - Please record your age in years in the space provided, as of your last birthday… S03. Which of the following titles best describes your current studies?

Sample bases by region/country

Region/country	TOTAL	Medicine	Nursing
Algeria	1		1
Argentina	18	5	23
Armenia		1	1
Australia	78	110	188
Austria	5	2	7
Bahamas	1		1
Bahrain	1		1
Belgium	1	2	3
Belize		1	1
Bhutan	1	4	5
Bolivia	5		5
Brazil	6	7	13
Bulgaria		1	1
Canada	6	8	14
Central African Republic	1	1	2
Chile	5	3	8
China	80	33	113
Colombia	21	5	26
Congo, Democratic Republic of the		1	1
Costa Rica	3	1	4
Cote d'Ivoire		2	2
Croatia	1	3	4
Cuba	2		2
Czechia	1		1
Denmark	1		1
Dominican Republic	3	3	6
Ecuador	7	1	8
Egypt	9	1	10
El Salvador		3	3
Estonia	1		1
Eswatini	1	1	2

Region/country	TOTAL	Medicine	Nursing
Fiji	3		3
France	39	14	53
Georgia	2		2
Germany	61	6	67
Ghana	1		1
Guatemala	5		5
Honduras	3		3
Hong Kong	3	2	5
Hungary	1	1	2
India	342	103	445
Iraq		1	1
Israel		1	1
Italy	1		1
Jamaica	1		1
Japan	28	2	30
Jordan	1		1
Kenya	2	1	3
Lebanon	3	1	4
Libya	1	1	2
Malaysia	5	1	6
Mexico	76	9	85
Morocco	2		2
Namibia		1	1
Nepal	6	1	7
Netherlands	3		3
New Zealand	5	23	28
Nicaragua	6		6
Nigeria	5	1	6
North Macedonia	1		1
Oman	1		1
Pakistan		1	1
Palestine	1		1

Clinician of the Future 2023: Education Edition

Appendices

Region/country	TOTAL	Medicine	Nursing
Panama	2		2
Paraguay	2		2
Peru	12	3	15
Philippines	2		2
Poland	3		3
Portugal	4		4
Romania	5		5
Russia		1	1
Samoa	1		1
Saudi Arabia	1		1
Senegal	1		1
Slovakia	2		2
South Africa	3	1	4
South Korea	1	9	10
Spain	64	52	116
Sudan	1		1
Sweden	1		1
Switzerland	2		2
Taiwan	4	1	5
Timor-Leste		2	2
Turkey	2		2
Uganda		4	4
Ukraine	1	2	3
United Arab Emirates	1		1
United Kingdom	174	151	325
USA	225	231	456
Venezuela	3	1	4
Zimbabwe	1		1

Regions

NOAM includes: USA, Bahamas, Belize, Canada, Jamaica.

APAC includes: Australia, New Zealand, India, Armenia, Bhutan, China, Fiji, Hong Kong, Japan, Malaysia, Nepal, Pakistan, Philippines, Russia, Samoa, South Korea, Taiwan, Timor-Leste.

EMEA includes: Algeria, Austria, Bahrain, Belgium, Bulgaria, Central African Republic, Cote d'Ivoire, Croatia, Czechia, Democratic Republic of the Congo, Denmark, Egypt, Estonia, Eswatini, France, Georgia, Germany, Ghana, Hungary, Iraq, Israel, Italy, Jordan, Kenya, Lebanon, Libya, Morocco, Namibia, Netherlands, Nigeria, North Macedonia, Oman, Palestine, Poland, Portugal, Romania, Saudi Arabia, Senegal, Slovakia, South Africa, Spain, Sudan, Sweden, Switzerland, Turkey, Uganda, Ukraine, United Arab Emirates, United Kingdom, Zimbabwe.

LATAM includes: Argentina, Bolivia, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Venezuela, Brazil.