Impact of mandatory placements in the final year on choosing a subject for postgraduate training?

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With a predicted shortage of junior doctors, especially in general medicine and surgery, we were interested to find out (a) what factors affect medical students or graduates when choosing their specialty and if a medical school has the means to influence this choice, (b) how the elective specialty for postgraduate training develops over the course of medical studies, (c) when medical students decide on the subject for their postgraduate training, (d) which specialties are mostly chosen and (e) if clerkships and the mandatory stages in the final year have an impact on the specialty choice.
An extensive literature research of German and international literature shows that mentoring and positive role models are very important factors in choosing the specialty. Our own evaluation data from final-year students demonstrate that practical placements like clerkships and mandatory subjects in the final year play a decisive role in taking a mandatory subject into consideration for specialty training.

1 The junior staff scenario – are there enough places for medical studies in Germany?

Shortly after the turn of the millennium (2003/2004), *Germany's federal Association of Statutory Health Insurance Physicians* (*SHI physicians, Kassenärztliche Bundesvereinigung, KBV*), followed by the professional associations initiated the discussion about a looming shortage of junior doctors after experiencing an excess of medical graduates in the 1980s and 1990s – the so-called *abundance of physicians*. This discussion coincided with a fundamental change in the *German Medical Licensing Regulations for Physicians* (*Approbationsordnung für* Ärzte*,* ÄAppO) of 2002. By establishing more small-group instruction in the medical curriculum, including bedside teaching and block courses while maintaining the same level of faculty in the medical schools, the number of places for medical students decreased. An all-time low was reached with a total of 78,545 students in 2007/2008. Since then, the number of medical students has increased by about 20% to 98,736 in 2019 (Statistisches Bundesamt, 2020). However, the specifications of the *Master Plan for Medical Studies 2020* (BMBF, 2020), again emphasising more practical training and promoting general practice, could again lead to a reduction in the number of study places – even if politically unwanted.

According to the *Medical Report 2012* (*Medizinerreport 2012*, Schwarzer & Fabian, 2012), the drop-out rate for medical students in 2010 had decreased to 5% (*Association of Medical Schools,* Medizinischer Fakultätentag, MFT, 2010) and now ranges between 5% and 11%, which is significantly lower than for all other study programmes.

In 2006, when the first cohort of students completed their medical studies according to the new ÄAppO of 2002, the number of graduates was 8,724. Since then, this number increased to about 10,000 graduates each year (Institut für medizinische und pharmazeutische Prüfungsfragen, IMPP, 2020). This shows that the decline in the number of graduates was stopped, though it did not reach the level of graduates in the 1990s – e.g. 11,978 graduates in 1994 (Kopetsch, 2010).

Meanwhile, the question of whether the medical graduates had really started working as physicians was raised, too. The *Bavarian Graduate Panel* (*Bayerisches Absolventenpanel*, Falk et al., 2016), including data from 479 medical graduates about one and a half years after completing their studies, showed that 98.2% had taken up or were planning to take up specialty training. Less than 1% stated that they were not working in the medical field (Falk et al., 2016; Gartmeier et al., 2017). Schwarzer and Fabian (2012) also show that 94–98% of medical graduates work in patient care.

1.1 How serious is the current shortage of young medical professionals?

Forecasts in 2010 (Kopetsch, 2010; KBV, 2012) postulated that the shortage of junior doctors in outpatient medicine in 2020 would be so severe that many positions for SHI physicians would not be filled.

However, it is difficult to verify whether these forecasts have come true and to calculate precisely how many junior doctors are actually lacking in which specialty – and how many are needed in the future (Heinz & Jacob, 2012; Stengler et al., 2012).

The shortage of general practitioners predicted especially for rural regions had already broadened to the specialist practice area in 2010, e.g. ophthalmology and ear, nose and throat medicine (KBV, 2012).

At the same time surgical specialties started to discuss the difficulties in attracting junior doctors – especially for general surgery and trauma surgery (Mittlmeier et al., 2010; Osenberg et al., 2010).

Thus it remains unclear whether there is a general shortage of junior doctors or more of a distribution problem across the specialties.

1.2 Labour market for junior doctors

The demand for junior doctors, which has now reached hospitals, too, makes graduates a valuable resource. Indeed, the current job market is characterised by strong competition for recruiting medical graduates (Hibbeler, 2012). For the first time, the new generation of junior doctors has a better chance of having the expectations of their future jobs fulfilled (Kopf, 2014).

Now junior doctors can usually choose a specialty and location for their postgraduate training and often are spoilt for choice. Freshly licensed junior doctors visit their favoured hospitals for a one-day work shadowing and extended interviews and discussions with the head of department and registrars (Kopf, 2014). The question of "work-life-balance", – raised by more than 90% of medical students – is becoming increasingly more important. In addition, 92.6% of medical students want to have children or 5.5% already have children (KBV, 2019). As a result, women in particular, but increasingly men as well, are seeking part-time work to be able to combine family and career.

Furthermore, the next generation of doctors consists of more women. Since 1999, the first year in which more women (51.5%) than men enrolled in medical studies, the proportion of female medical students has increased constantly up to 62.5% in 2019. According to the *German Medical Association* (Bundesärztekammer, BÄK, 2020), now 47.6% of doctors are women.

In conclusion, considerably more physicians need to be trained to obtain the same workforce. So, what do we know then about the health care and workplace situation in which the new generation of junior doctors has to fit in?

1.3 What causes an increased demand for junior doctors?

1.3.1 Demographics and geography

The change in Germany's population structure has resulted in more and more multimorbid elderly people needing outpatient care. It is unclear whether medical expenditures concerning costs and medical staff are merely postponed to a later age and thus the disease burden actually remains the same (morbidity compression theory) or if a longer life span is traded off for a longer phase of chronic diseases (morbidity expansion theory) (Heinz & Jacob, 2012; KBV, 2012, 2015, 2019; Stengler et al., 2012). The trend towards urbanisation and numerous job opportunities there has prompted an excess of doctors in cities and metropolitan areas and a shortage in rural areas (Stengler et al., 2012).

1.3.2 Physician demographics

The baby boomers will retire in the next few years and leave a considerable number of gaps behind. According to current statistics of the BÄK (2020), 20% of physicians were 60 years and older and expected to retire in the next 5–8 years. By the end of 2019, the average age of SHI physicians was 54.3 years whereas in 2009, it was 51.9 years (BÄK, 2020). The junior specialists to follow (30–34 years) and the increase of the total number of physicians by around 2% cannot compensate for the loss (BÄK, 2020).

With the scenario of a possible shortage of SHI physicians and the free choice of a specialty in mind, we wanted to find out how medical schools can influence the specialty choice.

2 Choice of specialty and role of medical schools – our research questions

The curriculum of a medical school in Germany comprises 6 years of study. During the clinical period (3rd–5th year of study), four months of clerkships are mandatory; they can be chosen freely except that one clerkship in general practice is required. In addition to these clerkships, the final year (6th academic year) constitutes a coherent practical phase of 48 weeks. Here the students have to complete 16 weeks of mandatory placements in surgery, internal medicine and an elective subject.

For years, professional associations have been investing considerable effort to strengthen their specialties in the medical curriculum. There has even been a political tug-of-war underway concerning the subjects required in the final year because, according to the *Master Plan for Medical Studies 2020*, general practice should be incorporated as an additional mandatory subject in order to attract more students to this specialty.

Freshly licensed junior doctors in Germany can choose from 34 specialties for their postgraduate training. Considering the competition in recruiting medical graduates, it is very interesting for medical schools to know

- what factors affect medical students or graduates when choosing their specialty and if a medical school has the means to influence this choice,
- how the elective specialty for postgraduate training develops over the course of medical studies,
- when medical students decide on the specialty for their postgraduate training,
- which specialties are mostly chosen and
- if the mandatory placements during the final year had an impact on the specialty choice.

2.1 What factors play a role in choosing a specialty?

To address these questions, we conducted an extensive literature search of the German and international literature. In the US research, a ground-breaking meta-analysis on choosing primary care as specialty was published already in 1995 (Bland et al., 1995). In Germany, research on specialty choice only started around 2009/2010. For a decade now, numerous studies have been published which assess the needs of medical students with regard to their future professional wishes and expectations as well as to their choice of specialty.

Examples include the *Medical Report 2012* (Schwarzer & Fabian, 2012) and the three waves of the *Professional Monitoring for Medical Students* (KBV, 2012, 2015, 2019), the work of Heinz and Jacob (2012), Gibis et al. (2012) and the *Bavarian Graduate Panel* (Falk et al., 2016). Moreover, surveys of medical students have been conducted for individual specialties, especially in general practice (Böhme et al., 2013; Kiolbassa et al,. 2011) and surgery or orthopaedics and trauma surgery (Fröhlich et al., 2018, 2019; Kasch et al., 2016; Osenberg et al., 2010; Schmidt et al., 2016) because of the growing concern about a possible upcoming shortage of these specialties.

Due to the abundance of studies, we decided to concentrate on reviews, meta-analyses and investigations that looked at the process of specialty choice.

A detailed meta-analysis on the US (Bland et al., 1995) proposed a *"model of medical student specialty choice"* (*Bland-Meurer model*) which was confirmed by Querido et al. in 2016 (*BEME Guide No.33*). The meta-analysis included 73 studies focusing on junior doctors who chose to become "primary care physicians", roughly corresponding to general practitioners in Germany. In the *"model of medical student specialty choice"*, factors such as "*student characteristics and views*" and the graduates' "*needs to satisfy*", the "*mission and structure*", the "*faculty composition*", the *"curriculum*" of the medical school and the "*characteristics of each specialty*" all play an important role.

Bland et al. (1995) suggested that general practice is chosen as a specialty more often if a medical school has actively decided to enrol students from rural areas with an interest in general practice. They pointed out that a medical school should have its own department of general practice that is empowered to influence not only the student selection process but also the curriculum. They recommended further to establish a mandatory general practice placement (6–8 weeks), preferably in the third year of study. As the most important factor seemed to be the duration of the mandatory placements, it would be even better to offer a longitudinal course or a separate curriculum track.

Moreover, Bland et al. (1995) stated that students often do not know enough about the specialties or have misconceptions, e.g. about internal medicine.

In focus group interviews, Gebhard and Müller-Hilke (2019) identified the following factors for the choice of a specialty: "*personal skills/personal character*" ("*student characteristics"* in Bland et al., 1995), "*personal experiences*", *"work-life balance"* ("*needs to satisfy"* in Bland et al., 1995), "*role models", "professional perspectives" and "expectations/esteem from outside".* They found that students who are still undecided at the end of their studies focus on family-friendly environments and work-life balance and are influenced by external expectations from family members and friends. This also includes the image of certain specialties conveyed in popular television series.

Another review by Schmidt et al. (2016) focused on the factors that influence medical students in the US to start a surgical career. They identified mentorship and positive role models as two very important factors and addressed the major role of surgical faculty and residents (Erzurum et al., 2000; Quillin et al., 2012).

A positive experience with surgical mentors during a general surgery placement prompted 82% of medical students to choose surgery as specialty (Lindeman et al., 2013). Schmidt et al. (2016, p. 71) state: "*Teaching and mentoring that occurs during procedures, simulations, or in the operating room is the true factor influencing medical students to pursue a career in surgery*."

Stahn and Harendza (2014) reported similar results in a qualitative study of senior physicians and registrars in internal medicine and laboratory medicine, adding "*extent of patient contact*" as a relevant factor for specialty choice apart from role modelling and mentoring.

Negative "*stereotypes and misconception*" (Schmidt et al., 2016) are other important factors that often hinder students from choosing surgical training. Kozar et al. (2004) reported that fellow students, teachers and the media could also contribute to a negative perception of surgery. Hill et al. (2014) described how the characteristics of surgery – a "*competitive, masculine specialty, requiring sacrifice"* – and the demeanour of surgeons – "*self-confident and intimidating"* – leads to students losing interest in surgery. In a study by Sanfey et al. (2006, p. 1089), "*70% of medical students believed that surgeons did not lead well-balanced lives*" and therefore are discouraged to choose surgery. However, early personal contact to surgeons in clerkships can change this negative impression (Cochran et al., 2005).

Yang et al. (2019) weighed the various factors that influence the choice of a specialty in their review. They concluded that the most important factor is "*academic interest"* in a specialty whereas the level of income plays a much smaller role in the students' choice – unless students have accumulated considerable debt during their studies, which is often the case in the US educational system.

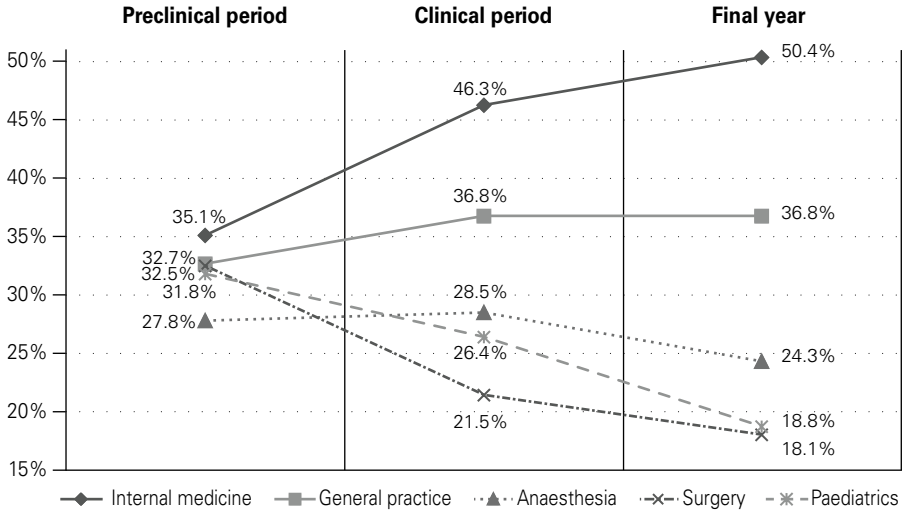
2.2 How does the specialty choice develop over the course of medical studies?

Bland et al. (1995) reported that most students began their medical studies without a concrete idea of what kind of specialty they would like to pursue. Babbott et al. (1988) found that almost 80% of students would have chosen a different specialty before enrolling than they actually chose at graduation. Rabinowitz (1990) reported that only 24% of students who would have chosen general practice at the beginning of their studies actually chose it at graduation. However, students who had the choice between several medical specialties indicated that they rated the ultimately chosen specialty "*moderately inclined to select"* in "*70% of the time"* and "*strongly inclined to select"* in "*37% of the time"* (Carline & Greer, 1991).

Falk et al. (2016) stated that only 9.5% of the 423 graduates had already made their choice of specialty before starting their studies. Indeed, 64.1% made their choice during their studies and 26.5% afterwards. Clinical placements had a major impact on the choice of specialty, e.g. final-year training (77.3%) or clinical clerkships (50.8%). Course content (52.9%) was important, too, and the influence of faculty (15.1%) was somewhat higher than that of parents and relatives (12.5%). Multiple answers were possible. Therefore, the curriculum and the final year, in particular, can have a great impact on the choice of a specialty.

The *Professional Monitoring for Medical Students,* an online survey of the University of Trier in cooperation with the *SHI* and the *Association of Medical Schools* (KBV, 2019), invites all German medical students to participate in the study every 4 years since 2010. Figure 1 shows how the choice of the five most popular specialties develops over the course of medical studies. Up to three specialties could be selected.

Figure 1: Choice of specialties during medical studies



Percentage of students, Professional Monitoring for Medical Students, 2019.

While general practice is more often chosen in the clinical period and final year, paediatrics and adolescent medicine and surgery show a decline during the course of studies. This loss is drastic for surgery: from 32.5% of the students in the preclinical period to 21.5% in the clinical period, the number of students interested in surgery decreases to only 18.1% in the final year. This trend is now proven across all three survey waves in 2010, 2014 and 2018 of the *Professional Monitoring for Medical Students* (KBV, 2012, 2015, 2019). Similar results were reported by Osenberg et al. (2010) in their survey of medical students from Bochum, Germany, in the winter term 2006/2007 (multiple choice of specialties possible): At the beginning of their studies, more than one-third (34.4%) of the students indicated surgery as a desired subject, while this was only the case for 16.5% in the final year.

While some specialties – e.g. paediatrics and surgery – indeed can lose possible future junior doctors in the course of their studies, the survey by Osenberg et al. (2010) showed that interest in internal medicine, urology and ear, nose and throat medicine increased over time.

Let us now take a closer look to the role of practical training placements such as the clinical clerkships or the final year. Can they increase interest in the respective specialties?

2.3 The role of practical placements

Kasch et al. (2016) and Schmidt et al. (2016) pointed out that "*early positive practical experiences*" have a significant effect on the professional interest in a specialty. After a clerkship in orthopaedics and trauma surgery, 67.3% of the students indicated that they intended to choose it as a final-year elective. Among final-year students who finished their mandatory placement in surgery, 49.5% reported both positive and negative influences of the placement on their specialty choice (Fröhlich et al., 2019).

We can resume that for practical placements, the following factors are crucial for a positive evaluation of this period: good integration into the clinical team, acquisition of practical competencies and support and contact to the senior physicians and registrars. Schmidt et al. (2016) accentuated that students should be actively involved, e.g. in leading the camera during operative procedures/laparoscopy. Also one-to-one clerkships increased the interest in surgery (Cook et al., 2015).

These results are supported by those of Gebhard and Müller-Hilke (2019), who identified that *"personal experiences"*, i.e. clerkships, clinical and final-year placements and contact with physicians, are the most important factor in choosing a specialty. Fröhlich et al. (2019) also noted a lack of structure in the clerkships and final-year placements as well as a lack of didactic training in clinical teaching. This can explain why many possible candidates are lost for postgraduate training in surgery.

2.4 When do medical students decide on the specialty for their postgraduate training?

Brooks (1991) asked the same group of students at the end of the preclinical period and at graduation about their career choices. He found that, ultimately, 37% of the students had changed their specialty choice, often from general practice towards surgical specialties.

Two other studies in the US surveyed career preferences at six different points in time during the course of medical studies. Here, 45% of the students had already indicated their chosen specialty at the beginning of their studies. However, half of them had had doubts in between (Zeldow et al., 1992, McLaughlin et al., 1993).

Hochberg et al. (2014) reported that 62% of the residents had already chosen surgery before starting their studies, 13% in preclinical years and 25% during clerkships. Kozar et al. (2004) and Drolet et al. (2014) also described an early choice in second-year medical students.

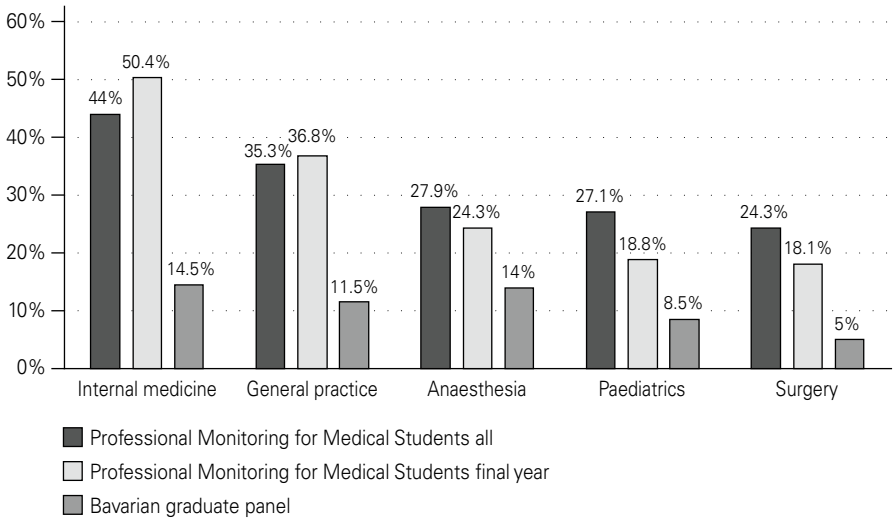
Gebhard and Müller-Hilke (2019) showed for medical students in Rostock, Germany, that about one-third of the first-year students had already decided on a specialty and about three-quarters of the students had chosen a specialty by their final year.

The situation in general practice is different: Kiolbassa et al. (2011) revealed that a choice in favour of general practice was made only towards the end of studies or during early residency.

2.5 Which specialties are notably popular?

Figure 2 shows a ranking of the five most popular specialties elected by medical students during their course of studies – students could select up to three subjects – and the real choice being made after graduation (KBV, 2019; Falk et al., 2016).

Figure 2: Ranking of specialties



Internal medicine and general practice rank first whereas surgery is eventually chosen by only 5% of all graduates. This is very problematic since it is assumed that 10% of a graduating class – about 1,000 surgeons – will be needed (Fröhlich et al., 2018).

In the study by Stengler et al. (2012), young doctors (age < 40 years) without a specialty designation were asked by five *federal state medical associations* in 2007 about their continuing education goals. Here, 3,059 candidates for specialty training participated. The majority (57%) wanted to begin specialty training in the following four areas: general practice 17.7%, internal medicine 16.4%, paediatrics 11.6% and gynaecology 11.7%.

In summary, the situation for general practice is significantly better than for surgery.

2.6 Which impact do mandatory placements during the final year have on specialty choice?

Let us turn back to the final year. To examine the impact that the two mandatory final-year subjects – surgery and internal medicine – have on choosing one of them as a specialty, we analysed the anonymous evaluation data collected from final-year students of the Medical Faculty Mannheim, Germany, before the final year and quarterly after each placement. Answers to the following questions from 2013 to 2020 were included:

- "*If surgery was not a mandatory subject, would you have chosen it as an elective?*" ("*yes/no*")
- "*If internal medicine was not a mandatory subject, would you have chosen it as an elective?*" ("*yes/no*")
- "*I could imagine working in this specialty*". (5-point Likert item with answers (1) "*fully agree*" … (5) "*fully disagree*") We coded the answers with ratings of (1) and (2) as "yes", (4) and (5) as "no".

To determine whether students changed their preference after their final-year placement in internal medicine or surgery, we analysed contingency tables using Chi-squared tests. We calculated Phi as effect size due to the large sample sizes. Phi is interpreted as a small effect at $\varphi \geq 0.07$, a medium effect at $\varphi \geq 0.21$ and a large effect at $\varphi \geq 0.35$.

Furthermore, we compared the groups of students with and without a change in preference using the scores of the scale "final-year training". This scale is the essential part of the "*Mannheim Questionnaire for the evaluation of training conditions and satisfaction with the placement in the final year*" (*Ma-FEZ-PJ*, Schüttpelz-Brauns et al., 2019). The scale consists of 27 items on the quality of the final-year training. Students can rate the items on a five-point Likert scale from (1) "*fully agree*" to (5) "*fully disagree*" or from (1) "*extremely satisfied*" to (5) "*extremely dissatisfied*", depending on the wording of the statement.

To analyse data and compare the groups, we employed one-way analyses of variance with post hoc Scheffé tests. Again, we calculated the effect using eta-square as effect size with $\eta^2 \geq 0.0099$ meaning a small effect, $\eta^2 \geq 0.0588$ a medium effect and $\eta^2 \geq 0.1379$ a large effect.

2.6.1 Results for surgery

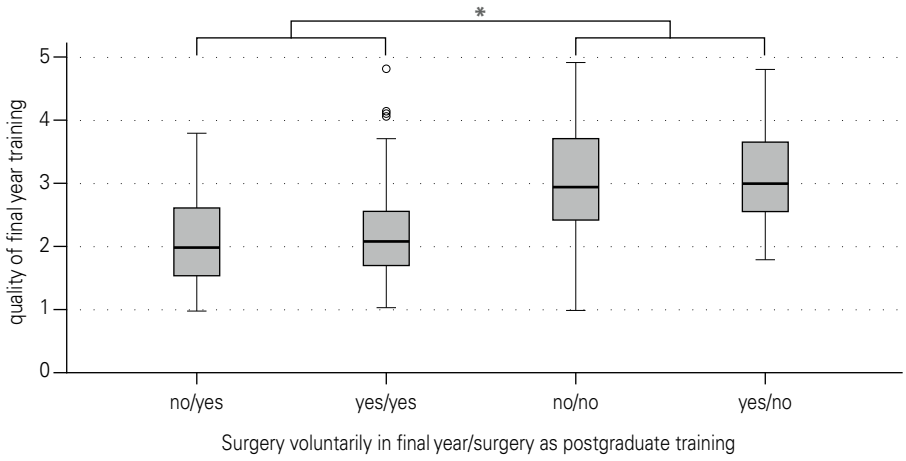
We collected data from 526 students after their placement in surgery but only 370 students answered both questions concerning the voluntariness of the subject in the final year and their specialty preference (see Table 1). Here, 63% of the final-year students did not change their preference towards or against surgery as their future specialty. However, 38% changed their minds (sum > 100% due to rounding). Whether students can imagine becoming a surgeon depends on whether they had chosen this subject voluntarily: $\chi^2(1) = 25.67$, $p < 0.001$; $\varphi = 0.26$, meaning a medium effect.

Table 1: Number and percentage of final-year students voluntarily choosing surgery in the final year in combination with choosing surgery as specialty training

		"I could imagine working in this specialty"		
		Yes	No	Total
"If surgery was not a mandatory subject, would you have chosen it as an elective?"	Yes	85 (23%)	39 (11%)	124 (34%)
	No	100 (27%)	146 (40%)	246 (67%)
Total		**185 (50%)**	**185 (50%)**	**370 (100%)**

As figure 3 shows, we found that students who consider surgery for their postgraduate training (see Table 1) rated the quality of their final-year placement significantly higher than those who were not interested in surgery as a specialty after their final-year placement. Low scores in the scale "final-year training" of *Ma-FEZ-PJ* (Schüttpelz-Brauns et al., 2019) indicate that the quality of the final-year placement was rated high.

Figure 3: Voluntarily choosing surgery as final-year subject and/or as specialty choice in comparison to the quality of the final-year training



* = significant difference between the two groups.

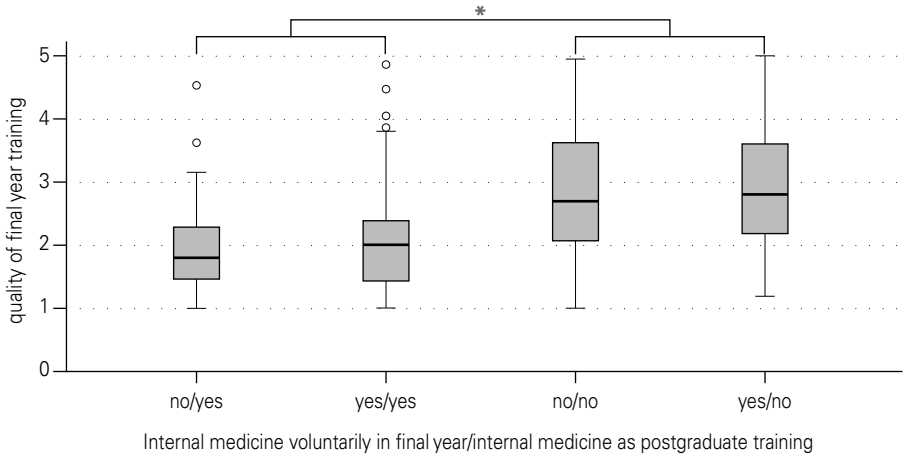
2.6.2 Results for internal medicine

Table 2 shows the results for internal medicine. We collected data from 523 students after their placement in internal medicine. Again, we could only include 379 students who answered both questions concerning the voluntariness of the subject in the final year and their specialty preference. Of the final-year students, 71% did not change their preference towards internal medicine as their future specialty. However, 28% changed their minds (sum >100% due to rounding). Whether students can imagine working in internal medicine depends on whether they would have chosen this subject voluntarily: $\chi^2(1) = 54.97$, $p < 0.001$; $\varphi = 0.38$, meaning a medium effect.

Table 2: Number and percentage of final-year students voluntarily choosing internal medicine as subject in combination with choosing internal medicine as specialty training

		"I could imagine working in this specialty"		
		Yes	**No**	**Total**
"If internal medicine was not a mandatory subject, would you have chosen it as an elective?"	Yes	190 (50%)	47 (12%)	237 (63%)
	No	61 (16%)	81 (21%)	142 (38%)
Total		**251 (66%)**	**128 (34%)**	**379 (100%)**

Figure 4: Voluntarily choosing internal medicine as final-year subject and/or as specialty training in comparison to the quality of the final-year training.



* = significant difference between the two groups.

Figure 4 shows that students who consider internal medicine for their postgraduate training – "*no*" to internal medicine as an elective subject/"*yes*" to internal medicine

as specialty choice and "*yes*" to internal medicine as an elective subject/"*yes*" to internal medicine as specialty choice (see Table 2), respectively – rated the quality of their final-year placement in internal medicine significantly higher than those who were not interested.

The study by Fröhlich et al. in 2019 about final-year placements in surgery points exactly in the same direction: Students who decided to take surgery for postgraduate training or changed their mind towards surgery during their final-year placement were more satisfied with their final-year training.

Our data show that students change their mind concerning specialty choice even in the final year of medical studies and that the effect works in both directions. For example, surgery loses 12% of potential junior doctors after the final-year placement whereas 16% can be attracted through a positive experience during their placement. Internal medicine would be chosen voluntarily by more than half of final-year students, but loses 12% after the placement and attracts 16% of the students.

What we do not know is whether the (new) career preference is eventually chosen after graduation.

Now, let us consider possible measures to increase the preference for certain specialties, especially for surgery.

3 Measures to increase the attractiveness of the specialties – plan of action

In response to the predicted shortage of junior doctors, the major professional societies established junior professional groups (e.g. *Young Internists*, *Forum Surgery*, Achatz, 2013) to bundle the demands of junior doctors. Moreover, they offer a special programme for them and scholarships for medical students attending their annual congresses. The surgical societies now offer a variety of tailored events for interested students: summer schools, career days and preparation courses for final exams are just a few examples.

In the meantime, these initiatives have even reached the *German Doctors' Day (Deutscher Ärztetag),* where a forum was held for the first time in 2019 allowing junior doctors to discuss the future work situation with heads of departments.

Additional marketing campaigns such as "*Don't lose heart*" ("*Nur Mut"*) for surgery or the "*family doctor's campaign"* ("*Hausarztkampagne*") were intended to change the image of these specialties.

3.1 Extracurricular measures at medical schools

In addition to these initiatives, medical schools are developing promising approaches, such as the *specialist debate* at LMU Munich (*Facharztduell*, Welbergen et al., 2014), the "*Cutting Open Day*" ("Aufschneidertag", Kauffels-Sprenger et al., 2019) in Göttingen, the "*Sectio chirurgica"* in Tübingen (Shiozawa et al., 2017) and commented live broadcasts from the operating theatre in Leipzig.

In order to raise the students' interest in surgery, Patel et al. (2013) organised a *Surgery Saturday*, offering training in suturing, knot tying, open instrument identification, operating theatre etiquette and basic laparoscopic skills.

Gebhard and Müller-Hilke (2019) reported that e.g. the Mayo clinic and Columbia University offer career counselling programmes.

Here are some recommendations – following Bland et al. (1995) – that support medical schools in recruiting more junior doctors:

- Give career advice! Bland et al. (1995, p. 637) recommend: "*Establish a career counselling program*."
- Try to get the most out of clinical placements such as the block courses, clerkships and the final-year placements!
- Train doctors to be good teachers/mentors – it should be an honour to teach medical students and not an annoying duty on the side.
- Appoint permanent mentors both in the final year and for specialty training!
- Be aware of being a good role model! Do not consider students in the final year and in clerkships as a burden but as future colleagues.
- Invest in the final-year training and integrate these students into your team – many students make their specialty choice in the final year!
- Give students the opportunity to choose their placements! In the existing medical curriculum most courses are compulsory and there is little room for students to pursue their own interests.

4 Limitations

None of the available surveys of medical students on their future career preferences can be considered representative. The number of participants of the *Professional Monitoring for Medical Students* (KBV, 2019) and the O+U study by Kasch et al. (2016) are high, with almost 14,000 and 9,000 participating students, respectively.

However, in relation to the approximately 94,000 medical students in 2017 respectively 73,400 in 2011 (Statistisches Bundesamt, 2020), the response rate is just 17% (KBV, 2019) and for Kasch et al. (2016) 12%.

It is not clear whether students will accomplish their goals concerning their specialty choice. Bland et al. (1995) stated: "*This confusion as to what students are reporting in studies (their unimpeded preferences or their realistic choices) calls into question the validity of many of the studies of specialty preference stability"* (p. 635).

Most of the German studies included in this work investigate the students' expectations of their future labour situation and preferences, but not realities (*Thomas-Effekt*, KBV, 2019). However, it is important to take the impressions of the final-year students very seriously as they gather authentic work experience.

5 Conclusion

5.1 Conclusion regarding research

Finally, the decision-making process of choosing a specialty is not clear yet. Katz et al. (1984) describe it as "hypothesis testing", i.e. students test their choice against their experience and new information about the specialty. In our view, the final year of medical studies should be considered a "reality check" for future professional work, which helps to choose a specialty.

We did determine, however, that positive experiences in practical placements can increase the preference for the respective specialty. Whether these intentions are realised, however, also depends on the influence of "life-style factors".

Overall, not a single longitudinal study in Germany has linked the development of the specialty choice during the course of medical studies with graduates' final decision to pursue training in a specific specialty. One option would be to draw on student evaluations of medical schools with questions on the specialty choice and linking them to preferably nationwide surveys of graduates as it is done in the US.

According to Gebhard and Müller-Hilke (2019), an initial longitudinal study is planned in Rostock, Germany. This is especially important because the changes put forth by the *Master Plan for Medical Studies 2020* for strengthening general practice should be monitored with regard to the effect on the specialty choice. Furthermore, as mentioned by Querido et al. (2018), we do not know enough about how the factors for choosing a specialty are interlinked and influence each other, and therefore need more qualitative studies on this topic.

5.2 Conclusion concerning the medical curriculum

Positive individual experiences during final-year placements substantially contribute to taking a mandatory subject into consideration for specialty training. Therefore, it is indispensable that clinicians who work in a (mandatory) subject of the final year invest time and effort in a high-quality final-year training – e.g. in mentoring, observing and giving feedback – to attract junior doctors.

The changes for the final year based on the *Master Plan for Medical Studies 2020* – dividing the final year into four quarters and introducing outpatient medicine – should be regarded as a good opportunity for students to focus on their own subjects of interest. Since early practical experience in a subject strengthens the specialty choice, longitudinal placements in surgery should be introduced in clinical studies.

This could help to solve the existing distribution problem across the specialties.

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