Impact of University of Graduation on Prescribing Behaviour

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INTRODUCTION

A physician's choice of what to prescribe is not simply about choosing a medicine and writing a prescription. The process is known to be influenced by many factors and these can be broken down into internal and external factors. The internal factors include the knowledge possessed by the physician of products and therapy areas, prior experience, intuition and preferences. External factors include treatment guidelines, research evidence, the specific needs and choices of his or her patient and the cost of the medication. The physician will also be swayed by the activity of the pharmaceutical industry to educate and inform.

It is also known that the norms of the educational environment, the hospital or clinic and the guidance of senior physicians is influential[1]. But just how important are these factors, the traditions that are instilled into a doctor in his or her junior years? And how long into a physician's career will they still tend to prescribe in the same ways as they learnt during their time at medical school? Understanding the major factors governing prescription choice has implications for the industry as companies seek to develop life-long partnerships with physicians to transition them from non-users to adopters and ambassadors.

Normally insights into prescribing practices would come from structured or open-ended survey questions, which can be hampered by limited sample sizes and responder biases. In this study we have used anonymous prescription data collected directly from pharmacies in order to capture actual prescribing practices to investigate how prescription volumes and product choice can change over the career of a physician and how these can differ for specialists graduating from different universities in Belgium.

We show that there are strong differences that can be explained by the graduating university, and that these differences persist. We also demonstrate the changes in prescription volume that occur throughout a physician's lifetime, allowing companies to understand how potential is likely to evolve.

METHODOLOGY

The objective of this study was to evaluate the impact of physician age (years in practice) and graduating university on prescription volumes and choice of therapy. We have analysed the prescribing behaviour of active doctors from six specialties: neurologists, psychiatrists, cardiologists, gynecologists, gastrologists and internists. The six specialties were selected due to them having sufficiently sizeable populations to permit reliable interrogation.

Doctors were assigned to cohorts according to the university from which they graduated and the year of graduation, as recorded in IQVIA's OneKey database. Pairs of years (e.g. 1988 & 1989) were aggregated to ensure groups had sufficient members for statistical purposes and to protect privacy of individuals. In total our study included 6,517 active doctors, with neurologists being the smallest specialty (691 doctors).

Groups were made for seven universities: Ghent University (UG); K U Leuven (KUL); Université de Liège (ULg); Universiteit Antwerpen (UA); Université Catholique de Louvain (UCL); Université Libre de Bruxelles (ULB); Vrije Universiteit Brussel (VUB). A further set of cohorts was created for those specialists working in Belgium but which graduated outside in another European country (CEE). In each case our groups of doctors were anonymised through a trusted third party to ensure prescribing information could not be traced to any individuals.

Anonymised prescription data was obtained from our pharmacy panel and extrapolated to national level. We investigated current prescription volumes based on a 12-month period (06/2018-05/2019), and narrowed the market scope to the most important 15 therapy classes (ATC4) by volume for each specialty.

Changes In Prescription Volume Associated With Physician Age

It is commonly held that as a physician's career progresses and he becomes established, his patient load will increase and so prescribing volume will follow. The trajectory of the change and the duration of 'peak' prescribing however is not widely reported despite its implications for the industry in identifying likely changes in future potential.

Figure 1. Development of prescription volumes according to physician

Chart shows average annual prescription volumes in units for gynecologists.
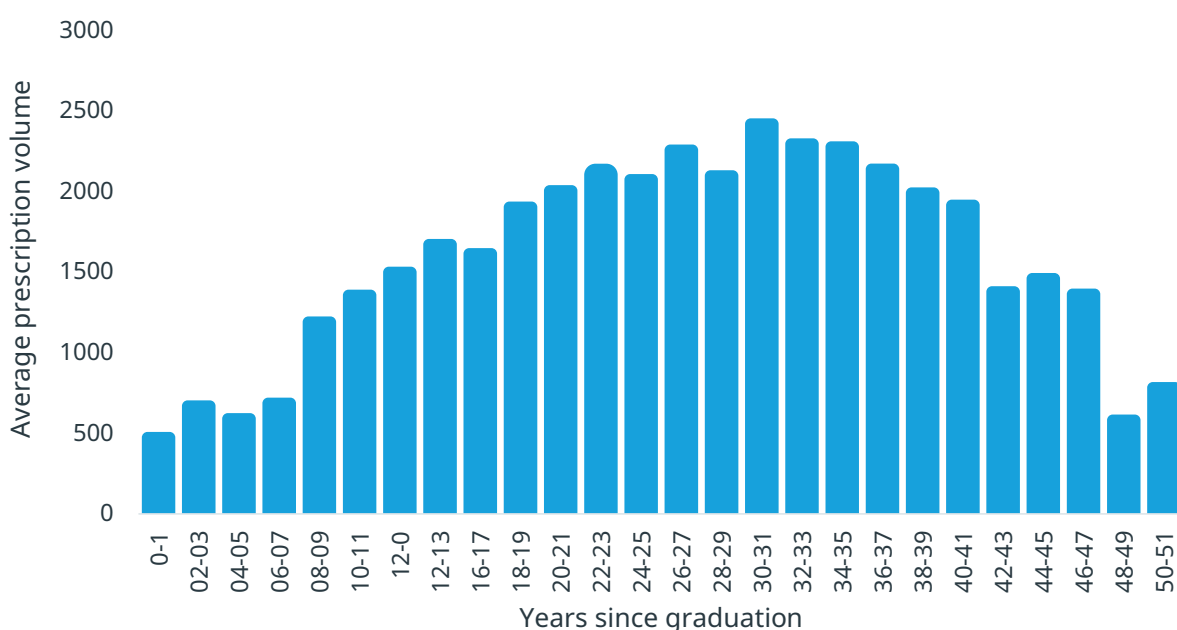
We have observed a clear increase in potential from the time of graduation to a point to maximum potential which occurs after at least 20 years of practicing. This is then followed by a decline. An individual 5 years into his career (in our study this is the 2014-2015 year group) would be expected in the future to annually have a prescription volume of three times his current level (Figure 1) and over a thirty year career will prescribe in total approximately 50 times his current annual volume. This tendency is common in all specialties, although the age of maximum prescribing volume varies.

Among our cohorts we observe that most therapy classes tend to account for a similar share of total prescriptions irrespective of physician age. However, there are some exceptions and certain therapy classes tend to be preferred by recent graduates and others

by more experienced physicians. For example iron products (B03A1) are seen to be disproportionately prescribed by younger doctors, whilst oestrogen & progestogen combinations (G03F0) are favoured by more well-established gynecologists (Figure 2). Such a phenomenon has been described elsewhere in the literature. Choice of narrow- or broad-spectrum antibiotics for example is reported to differ between interns and younger physicians compared to locums and older physicians; as is adherence to treatment guidelines[2]. The literature also identifies that differences in physician age and prescription volumes are associated with early adoption of new pharmaceutical products, among other physician factors such as attitudes to risk, and environmental factors including patient preferences[3,4].

Figure 2: Some therapy classes tend to account for greater share of total prescriptions in physicians
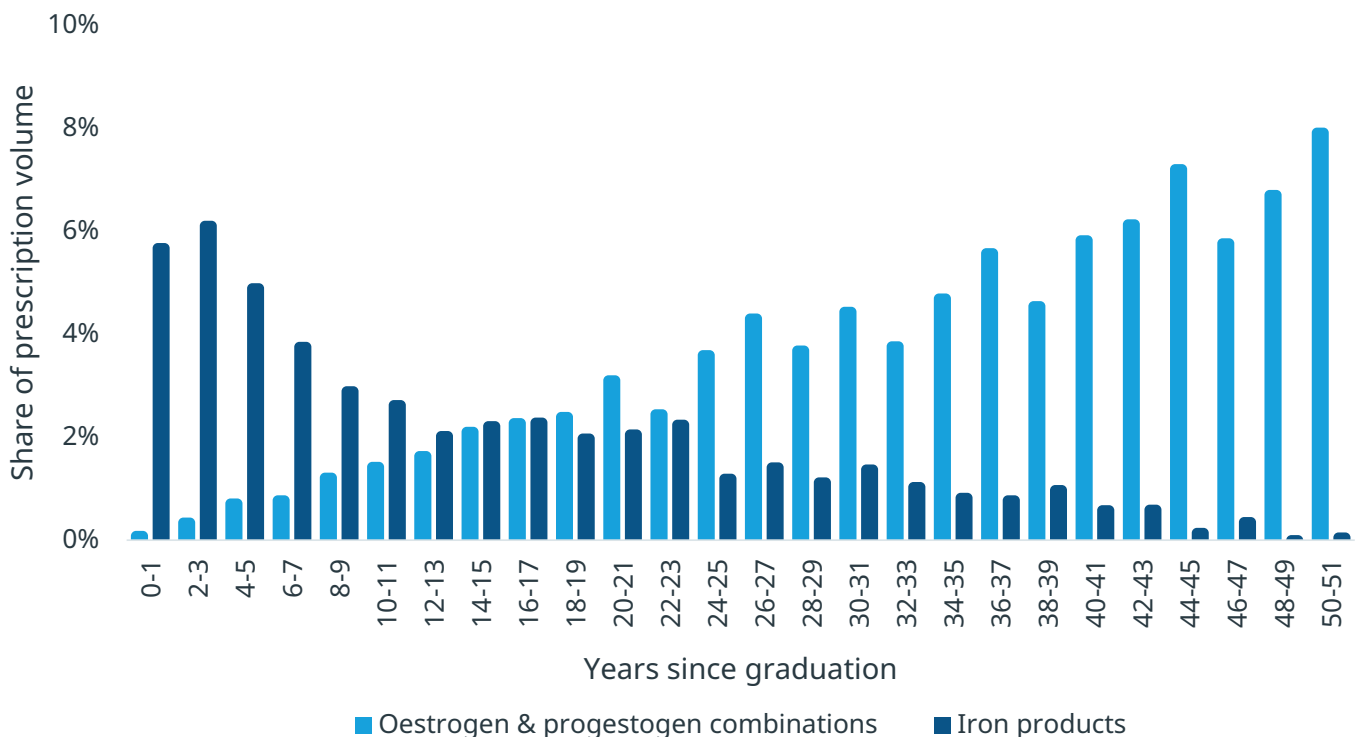
Impact Of University Graduation On Prescription Patterns

Across all six of our specialties we observed different median prescribing volumes for graduates of different universities. A doctor from the highest volume university will prescribe about twice the volume of a doctor from the lowest volume university, but for each specialty it is not the case that it is always the same universities at each end of the spectrum.

When we drill down to the ATC level we find that most universities will have a distinct overall profile. Significant differences, meaning higher or lower tendency to prescribe in certain therapy classes, are seen for all specialties investigated. Cardiologists graduating from KU Leuven for example, which has the most physicians in our study, have a distinct profile across 15 ATC classes when compared with cardiologists who graduated from all other universities, with two classes in particular (angiotensin-II antagonists C09C0 and tranquillisers N05C0) having much lower volumes than the median for the other universities, as represented by red dots in Figure 3. We see that distinct profiles exist for gastrologists, gynecologists, internists neurologists and psychiatrists that correspond to the doctors' universities.
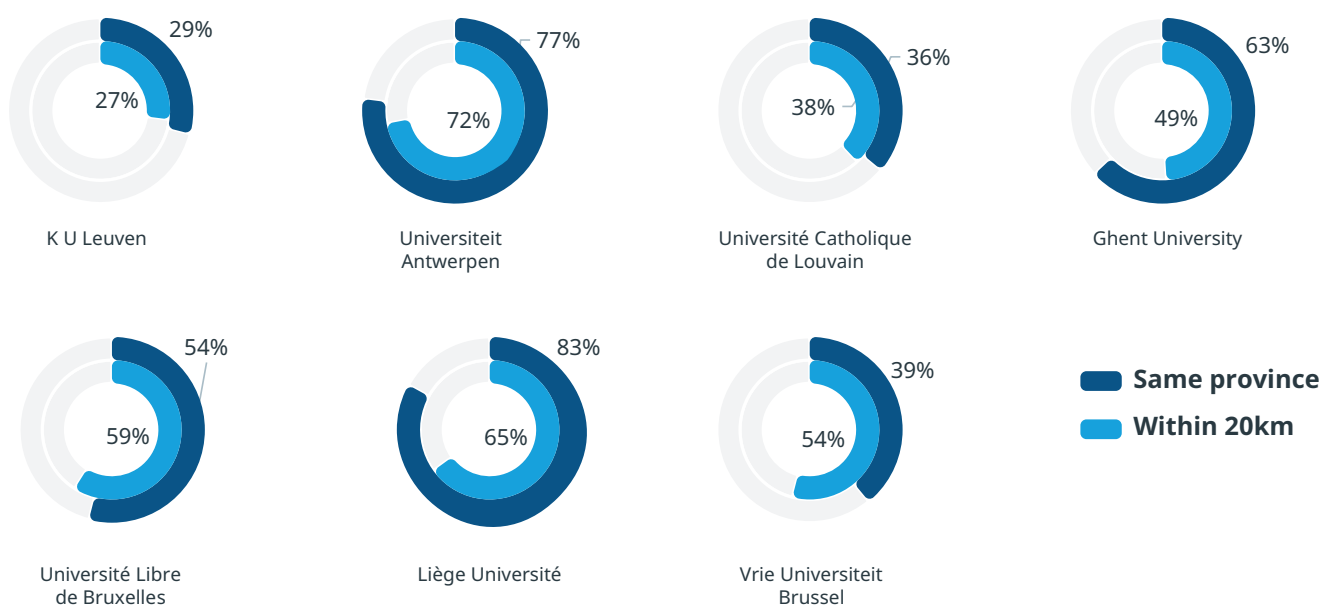
Figure 3: University specific prescribing differences at ATC level
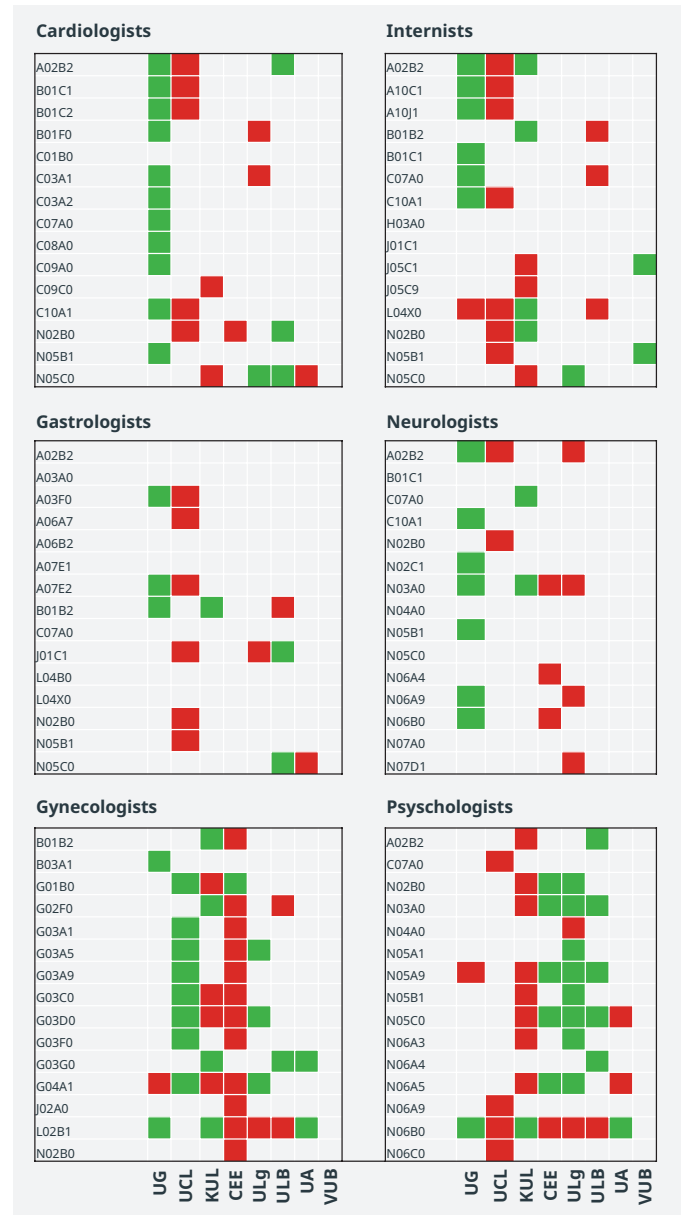
Green cells indicate median prescription volumes that are significantly above that of the other universities. Red cells indicate volumes significantly lower. Unfilled cells indicate no difference at 95% confidence.

Naturally, different regions will have different patient populations with needs that vary from those of other regions, but here the impact of patient socio-demographic factors such as age, gender and social status will be somewhat muted by the fact that under half (48%) of our physicians practice in the region of the institutions in which they qualified, and only a similar proportion (45%) remain within 20 km (Figure 4). Nonetheless, this study does not consider the many factors beyond the physician's graduating university such as differences in current workplace guidelines, patient needs, or exposure to marketing efforts which impact prescription behavior[5].

Figure 4: Proportion of physicians working in the same brick and province as their alma mater

29%
27%
K U Leuven

77%
72%
Universiteit Antwerpen

36%
38%
Université Catholique de Louvain

63%
49%
Ghent University

54%
59%
Université Libre de Bruxelles

83%
65%
Liège Université

39%
54%
Vrie Universiteit Brussel
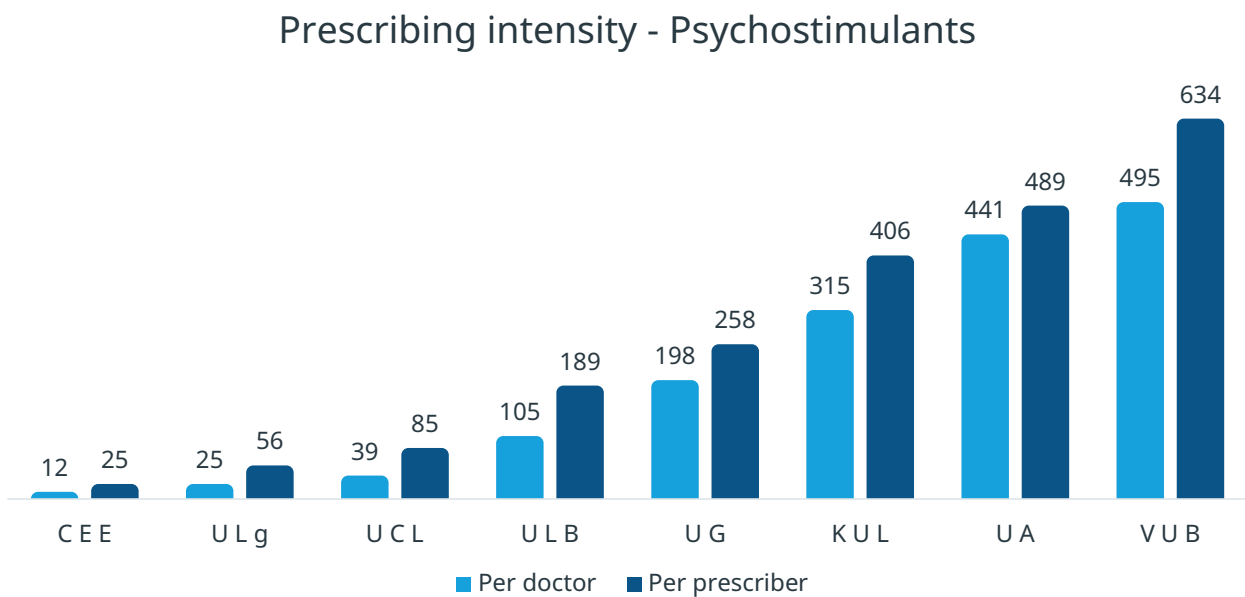
■ Same province
■ Within 20km

Belgium is divided into 11 provinces. Analysis is based on preferred work address recorded in IQVIA's OneKey database.

Psychostimulants case

Some therapy classes seem to be more subject to variation between universities than others. Here we have focused on psychostimulants (N06B0) as it reveals some interesting insights and allows a deeper investigation. The N06B0 class is primarily prescribed for the management of attention-deficit hyperactivity disorder and other behavioural conditions – for which various treatment options exist, including non-medical alternatives such as behavioural interventions and counselling – so there is scope for physicians to make alternative recommendations.

Psychiatrist graduates coming from 8 different universities have different average prescribing volumes in this class and the magnitude of this variation is substantial: from a minimum of 12 units per active physician from CEE and 25 units from ULg to 495 units per physician from VUB over a 12 month period (Figure 5). If we look at prescription intensity (that is average prescription volume per prescriber, rather than average volume from the full cohort) the trends are the same and there is the same ranking of which cohorts correspond to high volumes and which correspond to low volumes.

Figure 5: Variation in average psychostimulant prescribing volumes for psychiatrists graduating from different universities

Prescribing intensity - Psychostimulants

University	Per doctor	Per prescriber
CEE	12	25
ULg	25	56
UCL	39	85
ULB	105	189
UG	198	258
KUL	315	406
UA	441	489
VUB	495	634

There are also university-level differences in prescriber breadth, that is to say what proportion of active doctors prescribe in this therapy class: 90% of UA graduates prescribe class N06B0, almost twice that of ULg graduates (46%, Figure 6).

Figure 6: Psychostimulant prescriber penetration – proportion of active psychiatrists prescribing – is seen to vary substantially
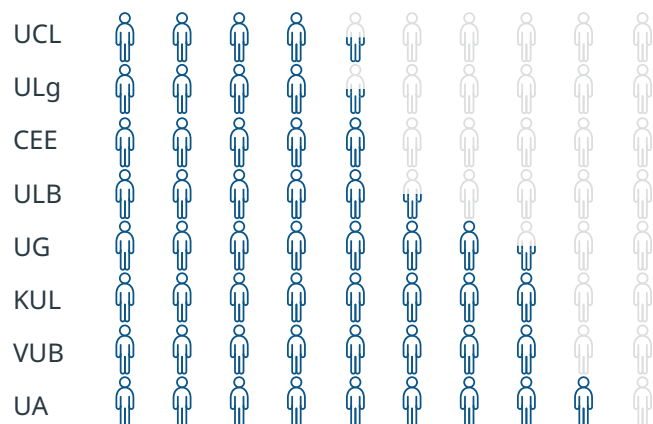
One full figure indicates 10% of the active population is prescribing. A half-filled figure represents 5%.

If we go to the product level we also see differences. The N06B0 therapy class contains two molecules (methylphenidate and modafinil) and 8 products, the most prominent of which is Novartis' Rilatine. Graduates from all universities apart from CEE had significantly different prescription volumes of Rilatine compared to all other cohorts, and most cohorts prescribed different volumes of competing products Equasym XR, Medikinet and Concerta and generic methylphenidate – so these university effects are impacting many different manufacturers. These differences in prescriber breadth and prescription volumes could be explained by the university conventions and norms that lead to a preference to either medicate or select non-medical interventions such as therapy.

For How Long Does A University Effect Persist?

We have seen that the university from which a specialist graduates relates to differences in prescribing volumes and prescribing profiles, but does this effect weaken with time as the doctor develops their own knowledge and experience?

We divided each of our university cohorts into three age categories: those graduating recently (in the last 2-11 years – 2008-2017); those graduating in the decade prior to that (1998-2007); and those graduating a further decade before (1988-1997), and again reviewed prescription volumes. As shown in Figure 7, among more recent graduates we observe that there are many therapy classes prescribed in volumes that are distinct for a university, but for doctors who graduated much earlier there are fewer significant differences. This suggests that more recent graduates prescribe in ways similar to their peer group and this tendency lessens as the doctor's career develops. This is most notable for internists and gynecologists, but since the trend is not observed in all specialties – indeed, for cardiologists it is among the oldest graduates that we see the greatest difference between the university cohorts – it is not possible to define how long a 'university' effect will persist.

Figure 7: Number of significant ATC level differences between each university cohort and all other cohorts, by graduating period
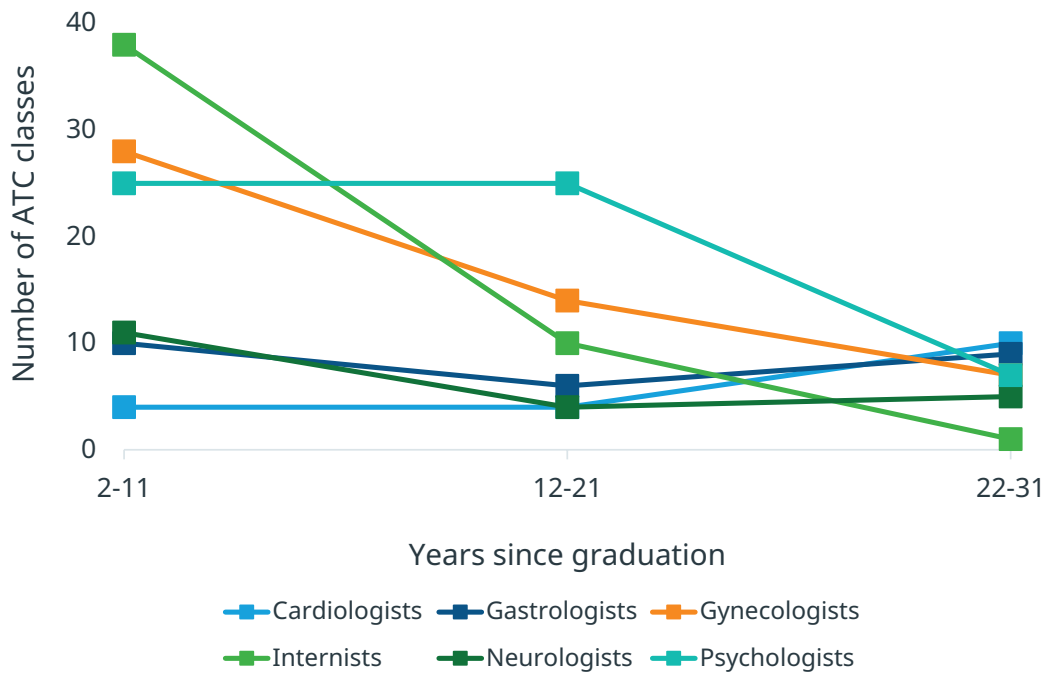

Figure 7 shows the number of occurrences of universities having significantly different volumes in prescriptions at ATC level. For example for internists graduating 2-11 years ago (from 2008-2017) we saw 38 ATC4 classes which are prescribed in different volumes between different university cohorts, but for internists graduating 22-31 years ago (from 1988-1997) only prescription volumes of A10J1 from KUL graduates were significantly different from all other classes and universities. Data for doctors graduating prior to 1988 were excluded from university level studies due to small counts.

CONCLUSIONS

We have demonstrated that real differences exist in the prescribing behaviour of specialists graduating from different universities. These include total volumes and tendencies to prescribe certain therapy classes and products. We also demonstrated how the value of a physician tends to increase over time, allowing a simplistic indication of remaining productive years. This knowledge is of value for segmentation and prioritisation of physicians.

HOW CAN THESE DIFFERENCES BE EXPLAINED?
Formal hierarchies are described as a core aspect of professional socialization in medicine, with senior clinicians having responsibility for patients and setting norms, and doctors in training tending to

follow the example of the seniors[6]. Hence supervising physicians can have a strong influence on prescribing behaviour of young doctors[7]. Hierarchies and social norms influence not just the prescribing decision itself but also views of sources of support for making the prescribing decision, including the value of guidelines and to what extent the opinions of other health care professionals should be taken into account. Different university settings will have different hierarchical structures and doctors in training will have different perceptions of responsibility and accountability[8]. This study corroborates this understanding that the training environment has a significant and lasting impact on a doctor's practice, and underscores the value of targeting the most influential physicians and key opinion leaders as a means to foster a lasting impact on the junior physicians they train.

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