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# The influence of a vertically integrated curriculum on the transition to postgraduate training

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## ABSTRACT

**Background:** Recently, many medical curricula have been changed into vertically integrated programmes. One of the aims of vertical integration is to facilitate the transition from theoretical to clinical education and from medical school to postgraduate training.

**Aims:** The aim of this study was to determine whether a vertically integrated curriculum affects the transition from medical school to postgraduate training.

**Method:** We carried out a survey study among graduates of two cohorts of the Utrecht Medical School, who followed either the traditional or the innovative, vertically integrated, curriculum. Topics of the questionnaire were: (a) activities since medical school, (b) required amount of time and number of applications to get admitted to residency, (c) the process of making career choices.

**Results:** Graduates from the vertically integrated curriculum had made their definite career choice earlier compared to those who followed a traditional programme. Graduates of the new curriculum also needed less time and fewer applications to obtain a residency position.

**Conclusions:** A vertically integrated curriculum at medical school positively affects the transition to postgraduate training. Additional research, among a larger population, is required to determine which components of the curriculum cause this effect and to specify under which conditions these effect occurs.

## INTRODUCTION

### Reason and relevance

In recent years, many medical curricula have become more vertically integrated. In vertically integrated programmes basic and clinical topics are studied in parallel and in integration with each other (Lie 1995). Another important characteristic of most of the vertically integrated curricula is early clinical experience, by means of clerkships or other types of patient contact (Dornan & Bundy 2004; Kamalski et al. 2007; Ten Cate 2007).

One of the major goals of vertical integration is to stimulate the transition, both from classroom learning to clinical education and from medical school to postgraduate training (Dornan & Bundy 2004). The transition from medical school to postgraduate programmes is a central issue in The Netherlands. It is often stated that



this period needs to be shorter (Bleker & Blijham 1999). At present, an average of 2-3 years is spent before a medical school graduate starts with postgraduate training (Van der Velden & Hingstman 2003).

### Practice points

- Many curricula of medical schools recently have become more vertically integrated to facilitate the transition to postgraduate training.
- We found that graduates from a vertically integrated curriculum had made the definite career choice at an earlier stage and need less time and fewer applications to obtain a residency position in comparison with those who followed a traditional programme.
- Additional research, among a larger population, is required to determine which elements of the curriculum cause this effect and to specify under which conditions it occurs.

### Situational context

In 1999, the Utrecht Medical School replaced its traditional curriculum by an innovative curriculum. The traditional curriculum (H-shaped, Figure 1) is based on a traditional instructional design. In this curriculum, the theory is mainly discipline based and is programmed in the first 4 years, while clinical education is allocated in the 5th and 6th years. The innovative curriculum (Z-shaped, Figure 1) is vertically integrated and has a more contextualized approach of learning (Ten Cate 2007). During the first 2 years the basic sciences are studied in combination with clinical cases. In addition, much attention is given to clinical and practical skills, which are required for the early clerkships 'Internal medicine' and 'Surgery' (both 6 weeks) in the 3rd year. The remainder of the 3rd year is spent on thematic blocks and electives. Regular clerkships are programmed in the fourth and fifth years.

### [FIGUUR 1]

An important feature of the innovative curriculum is what has been called a *transitional year*, which is a rearranged final year of the medical course. In this year, students are asked to choose "residency-like" internships from a range of possibilities offered. By making adequate choices, they can distinguish themselves from other students and prepare themselves for a specific postgraduate programme. During these internships, students work more independently and are given more responsibility than before, comparable with the responsibility of starting residents. In The Netherlands two (of eight) universities have introduced this transitional 6th year, both of them in 2004, namely Utrecht University and Leiden University. Other medical faculties have shown interest or intentions to do so in the future. The transitional year can be best compared to the internship in the USA and to what in the UK is called preregistration house officer year or the first year of the foundation programme. A significant difference between these years and the Dutch transitional year is that the latter is an integral part of the 6-year university programme and not put on top of the programme. A crucial aspect of the transitional year is that the medical school has the authority and the obligation to shape this year and control its educational content, whereas in other countries trainees do this extra year after they have finished medical school.

Throughout the Utrecht transitional year students are stimulated to develop general competencies and to monitor their development in a portfolio. A competency is considered as an integration of knowledge, skill and attitude that is necessary to adequately execute a specific professional activity within a given context. The general competencies in the Utrecht transitional year are founded on the CanMEDS framework, which is initially designed in Canada and which is organised around seven roles: medical expert, communicator, collaborator, health advocate, manager, scholar and professional (Frank et al. 1996). The Dutch Central College of Medical Specialists imported this framework in 2004 and adapted it for the Dutch situation. Instead of roles, seven fields of competencies were defined, covering the same CanMEDS domains (Bleker et al. 2004).

### Aim and research questions

The aim of this study is to determine whether the innovative, vertically integrated curriculum including the transitional year, affects the transition from medical school to postgraduate training. Several components of the innovative curriculum can possibly contribute to the development of necessary competencies and therefore to the facilitation of the transition to postgraduate training. As a result of early clinical experience and larger responsibility, students learn in an early stage of their medical training programme to act as a professional (Dornan & Bundy 2004). Besides this, as students must choose internships during the final



year of undergraduate medical training, they need to think about their specialty career choice and to create a distinct profile for themselves (Hannafin 1984; Kinzie et al. 1988). Because of the use of portfolios, students may be more aware of their own strengths and weaknesses and are stimulated to develop their competencies (Driessen et al. 2003).

The hypothesis in this study is that an innovative curriculum that includes a transitional year facilitates the transition to postgraduate training. Medical graduates from the innovative curriculum feel better prepared for a specific postgraduate programme of their choice and feel more confident about their competencies and career choice. Because of that, they need less time to decide to start postgraduate training and the period before becoming a resident is shortened. We expected that the graduates who followed the innovative curriculum had made the definite specialty career choice at an earlier stage and that they needed less time and less applications to obtain a residency position in comparison with the graduates from the traditional curriculum. Because of that, we also expected to find that they are more satisfied with the course of their careers.

To investigate this hypothesis a case study was carried out among graduates of two cohorts of the Utrecht Medical School, who followed either the traditional or the innovative, vertically integrated programme. Questionnaires were used to gather data.

The following questions were addressed:

- At which moment was the definite specialty career choice made?
- What was the influence of the transitional year on the process of making a career choice?
- What was the length of the period between graduating medical school and starting residency?
- What was the number of applications to obtain a residency position?
- What was the general satisfaction about the career since medical school?

## **METHOD**

### **Population**

The study population consisted of all medical school graduates from Utrecht University who entered medical school in 1998 (traditional curriculum) and 1999 (innovative curriculum) and graduated before March 2007. A questionnaire was sent in July 2007 to a total of 416 graduates: 205 of them started medical school in 1998 and 211 in 1999. Addresses were acquired from the student administration of Utrecht University. After 1 month a reminder was sent.

### **Instrument**

The graduates were asked about the internships they had chosen during the final year of medical school, their preferences with regard to the specialty career choices at several moments during medical school and after graduating, activities they had carried out since medical school, whether they were involved in a postgraduate training programme, required amount of time and applications to get admitted to a postgraduate training programme. Finally, they were asked to indicate on a 10-point Likert scale (from 1 = very dissatisfied to 10 = very satisfied) to what extent they were satisfied with the course of their careers at the moment of the research. In addition, questions on respondent's characteristics were included: gender, age, ethnic background and domestic circumstances, for instance, whether they had children.

### **Analysis**

For the analysis, the results of the two cohorts were compared with regard to the process of making specialty career choices, the length of the period before the graduates got admittance to postgraduate training, the number of applications to obtain a residency position, and general satisfaction about the course of their careers since medical school. Statistical differences for most of the topics were analysed with Chi-square tests. The difference between the two groups regarding satisfaction about their careers was analysed with a T-test.

## **RESULTS**

### **Response and characteristics**

In total, 81/205 graduates who started in 1998 and 72/211 graduates of cohort 1999 returned the questionnaire (response rate 40% and 34%, respectively). Graduates, who had started with the traditional



curriculum and switched over to the innovative curriculum, were excluded, as well as foreign students who were already licensed in their home country but had to follow an additional programme. Consequently, groups of 72 (cohort 1998) and 71 (cohort 1999) subjects were left for statistical analysis.

The difference in gender was almost the same for the two groups: 64% (cohort 1998) and 66% (cohort 1999) were women, respectively. Graduates of cohort 1998 were logically older than the graduates who started in 1999 at the moment of research. When the age is corrected for the cohorts, it turns out that the average age of cohort 1998 was also a little higher when they entered medical school (average 19.2 years vs. 18.9). Other characteristics of the two cohorts (ethnic background and domestic circumstances) did not differ from each other.

### **The process of making choices**

The graduates were asked (in retrospect) about the certainty of their career choice on several occasions, namely, before the start of the final (6th) year of medical school and at the time of graduating. These data are presented in Table 1.

#### **[TABLE 1]**

Table 1 shows the degree of certainty about career choice before the start of the final year and at the time of graduation. More than half of all respondents were certain about their future career before the start of their final year. Of the respondents who followed the traditional curriculum 57% were certain about their preference for a specialty. Among graduates who followed the innovative curriculum, this percentage was 65%. The percentage of students who were uncertain of their career choice were 12% and 5%, respectively.

As also shown in Table 1, at the time of graduation the differences were slightly more pronounced. Of the 1999 cohort 84% reported that they were certain about their career choice at the time of graduation with only 16% being uncertain or not entirely certain. Among the 1998 graduates 74% were certain and 26% were uncertain or not entirely certain. The differences were not statistically significant.

Table 2 illustrates in which phase the respondents had made the definite career choice. Based on the structure of the innovative curriculum, the time spent at medical school was divided in three phases, namely years 1-2, years 3-5 and year 6. In the first 2 years the emphasis was laid on the study of basic sciences. In the third, fourth and fifth years, students completed their clerkships. The sixth year was the transitional year. In both groups a small number of graduates had made their career choice already before entering medical school. A few graduates made their decision during the 1st or 2nd year of medical training. In the group of 1998 graduates, 35% had made their decision during the years 3-5 and 31% during the final year. In the 1999 group these percentages were 50% and 30%, respectively.

#### **[TABLE 2]**

Comparing graduates who made their decision during the whole period, more graduates of the innovative curriculum made their decision before graduation than graduates of the traditional programme (83% vs. 67%). Thirty per cent of graduates who followed the traditional programme made their decision about career choice after graduating. In the 1999 cohort this was only 11%. This difference was statistically significant ( $\chi^2 = 0,008, p < 0.05$ ).

### **Admittance to residency**

The respondents who already had obtained a residency position at the moment of research (cohort 1998,  $N = 48$ ; cohort 1999,  $N = 42$ ) were asked about the length of the period between graduating and admittance to residency.

Table 3 shows that more graduates from cohort 1999 (48%) obtained a residency position within 6 months after graduating in comparison with those from cohort 1998 (27%). Though this difference was not statistically significant ( $\chi^2 = 0.09$ ), it suits the expectation that graduates from the innovative curriculum need less time to obtain a residency position.

#### **[TABLE 3]**

As shown in Table 4, respondents who followed the traditional curriculum had to apply for a residency position more times than those who followed the innovative curriculum. Of the graduates from cohort 1999,



93% were invited for a residency position or had to apply only once (cohort 1998: 71%). This difference was statistically significant ( $\chi^2 = 0.03, p < 0.05$ ).

#### [TABLE 4]

##### **General satisfaction**

The graduates were asked to indicate on a 10-point scale to what extent they were satisfied with their careers since medical school (from 1 = very dissatisfied to 10 = very satisfied). In general, respondents of both groups were satisfied, but the graduates from cohort 1999 were a little more positive (average 8.15 vs. 7.82). This difference is not statistically significant ( $T = 0.76$  based on two-tailed T-test).

##### **DISCUSSION**

The purpose of the study was to determine whether a different curriculum at medical school influences the transition to postgraduate training. To investigate this, a questionnaire study was carried out among medical school graduates from Utrecht University. One group of graduates had followed the traditional curriculum and the other group the innovative, vertically integrated curriculum, including a so-called transitional year.

There were several aspects in which graduates of these cohorts differed from each other. Firstly, it appeared that more graduates from the innovative curriculum had made the definite career choice before graduating, despite the fact that they were somewhat younger. Of particular interest is the fact that more graduates from the innovative curriculum had made this decision during the 3rd, 4th or 5th year of medical school (50%), in comparison with the traditional curriculum (35%). Possibly this difference had to do with the fact that, due to the design of the innovative curriculum with elective internships in the transitional year, students had to think earlier about their future plans. Furthermore, it is notable that the percentage of respondents from the traditional curriculum who were (very) uncertain about their career choice had decreased from 12% to 3% during the 6th year, whereas for cohort 1999, it had remained almost unchanged (successively 5% and 4%).

Secondly, graduates of the new curriculum needed less time to get admitted to residency: Forty-eight per cent had been admitted to postgraduate training within 6 months after graduating versus 27% of cohort 1998. This result deviates from the results of a recent Groningen study, which indicates that graduates of a conventional curriculum needed less time to find a residency position than those of a problem-based learning programme (Cohen-Schotanus et al. 2008).

The graduates of the innovative curriculum also needed fewer application attempts to obtain a residency position. Ninety-three per cent of graduates who followed the innovative programme were invited for a residency position or had to apply only once. In the 1998 cohort this percentage was 71%, which is significantly lower. There are a number of possible explanations for this difference. The fact that more graduates from the innovative curriculum had decided about their career before graduating is probably important. Besides this, they had more opportunities to show their competencies, because they were given more responsibilities during their final clerkships.

Finally these graduates seemed somewhat more satisfied with the course of their careers until the moment of the research, but this difference was not significant.

##### **CONCLUSION**

In conclusion, the results of this study support our hypothesis that the vertically integrated curriculum at Utrecht Medical School, including a transitional year, affects the transition to postgraduate training in a positive way. Although not all of the differences between the two groups are statistically significant, they suit our expectations. As our findings are based on data from one medical school in The Netherlands, and the response rate was mediocre, the results cannot automatically be generalized to other populations. Furthermore, the groups compared in this study, had started and finished medical school in different years, with possible different labour market circumstances. Therefore, additional research is needed, preferably with more graduates from different universities who entered medical school at the same time. In particular, further research should attempt to identify which components of the innovative curriculum - like early clinical experience, larger responsibility during internships, internship electives or portfolio - causes the



effects found in this case study and elsewhere (Cave et al. 2007). Also further research is needed in the specification of conditions under which these curriculum effects occur.

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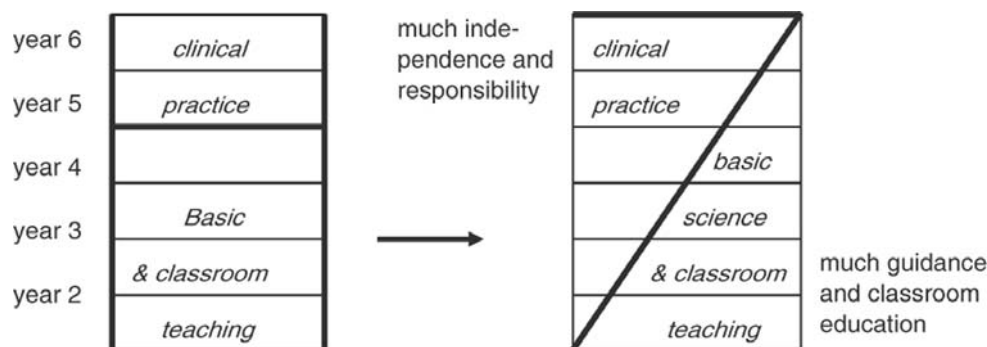
*Declaration of interest:* The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

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### FIGURE AND TABLES

Figure 1. The traditional H-shaped medical curriculum is being replaced by a Z-shaped curriculum model.





<b>Table 1. Degree of certainty about career choice before the start of the final (6th) year and at the time of graduation (in retrospect)</b>			
		<b>Cohort (%)</b>	
		1998 (N = 72)	1999 (N = 71)
Before the start of the final (6th) year of medical school	(Very) certain	57	65
	Not entirely certain	31	31
	(Very) uncertain	12	5
At the time of graduation	(Very) certain	74	84
	Not entirely certain	23	12
	(Very) uncertain	3	4

<b>Table 2. Period in which students make their definite career choice</b>					
		<b>Cohort (%)</b>			
		<b>1998 (N = 72)</b>		<b>1999 (N = 71)</b>	
* <i>p</i> < 0.05.					
Before entering medical school			3		6
During medical school	1st or 2nd year	1		3	
	3rd, 4th or 5th year	35	6*	50	83*
	6th year	31		30	
After graduation from medical school			30*		11*

<b>Table 3. (Required) time between graduating and admittance to residency</b>			
		<b>Cohort (%)</b>	
		1998 (N = 48)	1999 (N = 42)
Before 6 months after graduating		27	48
Between 6 and 12 months after graduating		31	17
More then 12 months after graduating		42	36

<b>Table 4. Number of applications to obtain a residency position</b>			
		<b>Cohort (%)</b>	
		<b>1998 (N = 48)</b>	<b>1999 (N = 42)</b>
* <i>p</i> < 0.05.			
0 or 1 applications	71*	93*	
2 or 3 applications	19	5	
4 or more applications	10	2	