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To cite this article: Fraukje Wiersma, Josephine Berkvens & Olle ten Cate (2017) Flexibility in individualized, competency-based workplace curricula with EPAs: Analyzing four cohorts of physician assistants in training, Medical Teacher, 39:5, 535-539, DOI: 10.1080/0142159X.2017.1297526

To link to this article: http://dx.doi.org/10.1080/0142159X.2017.1297526

Published online: 10 Mar 2017.

Article views: 295
Flexibility in individualized, competency-based workplace curricula with EPAs: Analyzing four cohorts of physician assistants in training

Fraukje Wiersma, Josephine Berkvens and Olle ten Cate

Faculty of Health Care, University of Applied Sciences, Utrecht, The Netherlands; Center for Research and Development of Education, University Medical Center, Utrecht, The Netherlands

ABSTRACT

Background: Entrustable professional activities (EPAs) were introduced as a principle for individualized physician assistant (PA) workplace curricula at the University of Applied Sciences (UAS) Utrecht in 2008. We studied how the focus on EPAs served the competency-based flexibility intention of the program.

Methods: We analyzed data of those 119 students who enrolled in the program 2010 through 2013, and completed the program before April 2016. We analyzed the number of EPAs per student at start and end of the program, number changed during training and the reasons for change.

Results: Data of 101 students were suitable for evaluation. Excluded were 16 students ending the program prematurely and two with study delay.

Mean number of EPAs per student at the start was 6.8 (range 4–12) and at the end 6.6 (range 3–13). On average 1.5 EPAs were altered (range 0–13). Reasons included extension of the EPA package during training (n = 10), lack of proficiency at planned moments of summative entrustment decisions (n = 9) and procedures not being suitable for PAs at closer look (n = 6). All changes resulted in a curriculum meeting the school’s standards for graduation.

Conclusions: The flexibility of the EPA concept enabled changes in the individualized curriculum of students, according to the intended competency-based nature of the educational program.

Introduction

The physician assistant (PA) constitutes a relatively new profession in the Netherlands, created to enable taking over selected medical tasks from physicians. The first training started in 2001, and in 2004 the first Dutch PAs graduated. The first PAs were introduced in the Netherlands as aids in the operation theater of cardiothoracic surgery at University Medical Center (UMC) Utrecht and gradually expanded across numerous health care disciplines. Early 2016, the Netherlands had over 900 PAs who had graduated from one of the five training centers in the country.

One of these training centers is the University of Applied Sciences (UAS) Utrecht, with currently 285 PA graduates and 80 in training (June 2016). The training takes 30 months (150 European ECTS Credits). The Master of Physician Assistant (MPA) is a program on top of a bachelor in an allied health profession. Students applying must have at least two years of relevant job experience. The program is based on a dual work-education model; students are employed as PA in training within a medical specialty of their interest, while they are enrolled at the same time in the PA Master’s program. During the program, the students spend almost one third of the time at school, approximately one third of their time at various other medical specialties, and one third at their current and future medical specialty of employment. In-school learning, focusing on general knowledge and skills, is combined with workplace-based learning. The workplace program is organized around EPAs and follows the CanMEDS competency framework (Frank 2005). We refer to an earlier publication for a more detailed description of the educational principles in this program (Mulder et al. 2010).

EPAs are units of professional practice that trainees are allowed to execute with limited supervision, once they have demonstrated adequate competence (Ten Cate 2005; Ten Cate & Scheele 2007; Wijnen-Meijer et al. 2013). Critical is their use to arrive at summative entrustment decision to allow trainees to work without direct supervision (Ten Cate et al. 2015; Ten Cate & Scheele 2007; Wijnen-Meijer et al. 2013). The recommended number of EPAs in a PA master program is 4–8. EPAs have gained substantial interest across the world and many programs are currently in an early phase of implementation of EPAs (Gilhooly et al. 2014; Ten Cate et al. 2015; Ten Cate & Scheele 2007; Wijnen-Meijer et al. 2013). Critical is their use to arrive at summative entrustment decision to allow trainees to work without direct supervision (Ten Cate et al. 2015; Ten Cate & Scheele 2007; Wijnen-Meijer et al. 2013). The recommended number of EPAs in a PA master program is 4–8. EPAs have gained substantial interest across the world and many programs are currently in an early phase of implementation of EPAs (Gilhooly et al. 2014; Ten Cate et al. 2015; Ten Cate & Scheele 2007; Wijnen-Meijer et al. 2013). Critical is their use to arrive at summative entrustment decision to allow trainees to work without direct supervision (Ten Cate et al. 2015; Ten Cate & Scheele 2007; Wijnen-Meijer et al. 2013). The recommended number of EPAs in a PA master program is 4–8. EPAs have gained substantial interest across the world and many programs are currently in an early phase of implementation of EPAs (Gilhooly et al. 2014; Ten Cate et al. 2015; Ten Cate & Scheele 2007; Wijnen-Meijer et al. 2013).
The Utrecht program for PA training is one of the earliest established examples of the use of EPAs. The EPA concept was introduced for PA training at UAS Utrecht in 2008 as a core element in the workplace curriculum of PAs in training (Mulder et al. 2010). The initial set of EPAs is determined for each student individually, jointly by the local site of workplace training, the school that offers the program and the PA in training who enrolls. This unique construction of the individual workplace curriculum makes that, PAs are not identical when they graduate. This raises the question how the school can guarantee that every graduate meets the requirements of the MPA diploma that is awarded. The quality of the package of EPAs, even though different, must meet the standards set by the school. An individual workplace curriculum proposal, negotiated between site and candidate must eventually always receive the school’s approval. The unique nature of this program allows learners to qualify with a set of EPAs that meet local needs, which is logical, as training and subsequent employment are linked. Conversely, relocation before or after graduation will require the PA to adapt and, if necessary, be trained in new EPAs, specifically if the clinical domain is different.

This contribution provides details of our experience with this EPA-based workplace educational program. The purpose of our study is to evaluate the use of EPAs in the Utrecht program between 2010 and 2013 and to gain insight whether the model has served to create a flexible, individual, and competency-based program.

For the purpose of this study, we defined an individual EPA-based workplace curriculum as a competency-based program, defined by a set of EPAs as learning outcomes, tailored to both the needs of a specific workplace and the background and ambitions of an individual student, while meeting the requirement of a school, with the intent to employ the student after graduation at this or a similar workplace.

**Methods**

We conducted a retrospective document analysis regarding all PA students who enrolled in the Utrecht program on the 1 September 2010, 2011, 2012, and 2013. Data from students enrolled in 2014 and 2015 were not included, because their course has not yet been finished. Data from students enrolled in 2008 and 2009 were neither included, because of an incomplete data-archive with respect to EPAs. Another reason for exclusion of student data was a premature termination of the course.

Since 2010, the school’s archives include for each student both the intended set of EPAs at the start and those completed with summative entrustment decisions, which may not be identical sets. We analyzed the data for the medical specialties in which the students were trained. The number of EPAs per student at the start of the program was analyzed, as was the number of summative entrustment decisions at the end of the program per student (i.e. EPAs formally awarded with permission to act without direct supervision). We analyzed the number of changes in the EPA package among all students and the reasons for change.

**Results**

In total, 119 students enrolled the program in Utrecht in 2010, 2011, 2012, and 2013. Data of 101 students (18 men and 83 women) were suitable for analysis. Sixteen students terminated the program prematurely and were not included. Two students who started in 2013 were excluded because of a study delay. They had not received summative entrustment decisions for all EPAs at the time of this study. Ten students had up to a few months study delay but finished the program within our study period. Reasons for delay included pregnancy (n = 3), switch of workplace (n = 2), on personal (n = 4), and development not being at intended speed (n = 1). The PAs were trained across 28 different medical specialties, including Rehabilitation Medicine (n = 13), Cardiology (n = 9), Surgery (n = 8), Anesthesiology (n = 7), Family Medicine (n = 7), and Orthopedics (n = 6).

The mean number of EPAs to be mastered was 6.8 at the start of the study per student (range 4–12) and 6.6 actually mastered at the end of the program (range 3–13). One student graduated with only three EPAs because of inability to work fulltime due to health reasons. This exception proved acceptable because of the breadth and weight of the three EPAs. All such decisions were taken by the school to ensure that the quality of the program and objectives are maintained.

The number of intended EPAs at the start of the study was equal to the number of EPAs at the end of the program for 49 students. For 42 of these 49 students, the complete set of EPAs remained unchanged. In seven cases, changes were made to the EPA package (one single EPA changed in four cases, two EPAs changed in two cases, seven EPAs changed in one case, because of a move to a different workplace, and discipline during the study period). The size of the EPA package changed in 52 students; it became smaller at the end of the program for 42 students, with a varying loss of number of EPAs from one to seven EPAs. In the remaining 10 students, the package was larger at the end of the program than at the beginning of the program, varying from one to eight EPAs added to the set of initial EPAs (Table 1). As mentioned above, in one case the number of EPAs counted eight EPAs more than at the start. In this case, the initial set of five broad EPAs was rewritten into a package of 13 smaller specific EPAs.

The mean number of EPAs that changed during the study was 1.5 per student (range 0–13 EPAs). The various reasons for change of the EPA package are summarized in Table 2.

<p>| Table 1. Occurrence of change in the number of EPAs across the training period. |</p>
<table>
<thead>
<tr>
<th>Change</th>
<th>N students</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 or more EPAs retracted</td>
<td>2</td>
</tr>
<tr>
<td>3–4 EPAs retracted</td>
<td>2</td>
</tr>
<tr>
<td>1–2 EPAs retracted</td>
<td>38</td>
</tr>
<tr>
<td>Number unchanged</td>
<td>49</td>
</tr>
<tr>
<td>2–1 EPAs added</td>
<td>7</td>
</tr>
<tr>
<td>3–4 EPAs added</td>
<td>1</td>
</tr>
<tr>
<td>5 or more EPAs added</td>
<td>2</td>
</tr>
</tbody>
</table>

Please note that this table reflects only the changes in number of EPAs and does not reflect the changes in the content of the EPAs.
Over fifty percent of the EPA packages of the 101 students have undergone one or more changes across the period studied. The most frequent reasons were (i) an extension of the package with one or more EPAs \( (n = 10) \) or (ii) a failure to meet the requirements to obtain a summative entrustment decisions for specific EPAs within the time frame of the program \( (n = 9) \). In these latter cases, the EPAs that were mastered were deemed adequate to constitute a package sufficiently extensive to meet graduation standards for the student. All nine students planned to complete the remaining EPAs after graduation. An illustration of change of a set of EPAs of a PA in training is shown in Table 3. This particular student extended the package with an additional fifth EPA after one and a half year because of above average progress in the initial four EPAs. In some cases, reasons for change were beyond control of the students. Students faced problems because of complexity in the execution process of an EPA \( (n = 4) \), performing an intubation or faced lack of support by medical staff members or the professional association to perform a specific activity \( (n = 2) \), for example, performing an EPS (electrophysical study) or starting and ending an arthroty. In eight cases, there was a combination of reasons for a change of the EPA list. For example, one student changed the package because of a lack of patients available to train for that specific EPA. The student skipped that EPA and added another one to keep the volume of EPAs large enough. In four cases, the package changed because of the student’s workload or because it did not fit the particular student. For example, one student had difficulty proceeding with pleural punctures. At graduation, the student did not become qualified to execute this procedure, and graduated with six EPAs instead of seven EPAs. This student resumed training in pleural punctures afterwards.

Several students faced logistic difficulties. These difficulties were unrelated to their performance, but were related to changed circumstances in their health care context during the study. For example, when health insurance conditions changed, fees for a specific therapy altered and a change in patient population followed with consequences for exposure to patients, and the nature of work.

As mentioned above, the number of changes per EPA package varied markedly and ranged from no changes to 13 changes in one single student. Students who relocated to a different workplace during the program showed the most changes. The EPAs then had to be re-identified to fit a new medical specialty. Two of three students transferring to another workplace and specialty showed a study delay.

**Table 2. Reason of change EPA package.**

<table>
<thead>
<tr>
<th>Reasons</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPAs added during training</td>
<td>10</td>
</tr>
<tr>
<td>Not at required level at end of study</td>
<td>9</td>
</tr>
<tr>
<td>Content modified/clarified</td>
<td>6</td>
</tr>
<tr>
<td>On closer inspection activity not suitable for PA</td>
<td>6</td>
</tr>
<tr>
<td>Lack of time or opportunity for practice</td>
<td>5</td>
</tr>
<tr>
<td>High workload or bad individual fit</td>
<td>4</td>
</tr>
<tr>
<td>Reasons external to student</td>
<td>4</td>
</tr>
<tr>
<td>Switching of workplace</td>
<td>3</td>
</tr>
<tr>
<td>EPAs merging into one</td>
<td>4</td>
</tr>
<tr>
<td>Combination of reasons</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>101</td>
</tr>
</tbody>
</table>

**Table 3. Example of one planned individual workplace curriculum and the expected levels of entrustment at various stages of training.**

<table>
<thead>
<tr>
<th>EPAs</th>
<th>Year 1 modules</th>
<th>Year 2 modules</th>
<th>Year 3 modules</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPA 1 Medical care in hospital stroke patients</td>
<td>2  3  3  3  3</td>
<td>3  3  3  3  4</td>
<td>4  4  4  5  5</td>
</tr>
<tr>
<td>EPA 2 Lumbar puncture in neurologic patients</td>
<td>2  3  3  4  4</td>
<td>5  6  7  8  9</td>
<td>10 10 10 10 10</td>
</tr>
<tr>
<td>EPA 3 Consult of neurologic patient at Emergency Room</td>
<td>–  –  –  –  2</td>
<td>2  3  3  3  4</td>
<td>4  4  4  4  5</td>
</tr>
<tr>
<td>EPA 4 Indication and interpretation of neuroradiologic investigations</td>
<td>–  –  –  –  2</td>
<td>2  3  3  3  4</td>
<td>4  4  4  4  5</td>
</tr>
<tr>
<td>EPA 5 Botulinum toxin treatment in dystonic or spastic patients (added EPA)</td>
<td>–  –  –  –  –</td>
<td>–  – 1  2  3</td>
<td>4  4  4  4  4</td>
</tr>
</tbody>
</table>

*The levels of supervision: (1) observation, but no execution, (2) execution under direct supervision, (3) execution under indirect supervision, (4) execution under distant supervision, and (5) provide supervision to others.*

**Discussion**

We identified changes in the packages of EPAs in over half of all PAs in training. While, this may seem a disadvantage for individual students, we consider the great flexibility of the program and the serious consideration of each EPA in each student’s package to be a convincing proof-of-concept experience in using EPAs for a competency-based and not time-based approach to training in health care. So far, despite the many admonitions to move from a time-based to competency-based training programs in health care (Snell & Frank 2010; Frank et al. 2010; Carraccio et al. 2016), hardly any program has shown this possibility. Our study shows as one of the first that this concept is actually possible using EPAs. The concept is firmly anchored in the Utrecht PA program and can serve as an example of such an approach.

This study showed that per student an average 1.5 EPAs changed during the full course. The shift from a time-based to competency-based approach can be illustrated by the fact that the most frequent reason for change in this study was the wish for students to add an additional EPA to their package somewhere during the program. When it turns out that students master the needed qualities for the original EPAs before the end of the study, there is space to add an additional EPA. The use of EPAs can be helpful to actually shorten programs of some students. In contrast, the second common reason for change that the PA in training was not proficient enough at the planned moment of a summative entrustment decision or at the end of the course for a specific EPA and could not receive the certificate for that specific EPA. In most cases however, the volume and level of the set of EPAs was still sufficient to match the required standards of the program, a conclusion drawn from discussions between the clinical supervisors and the school. Therefore, they could still receive a Master’s degree. Most of these students planned to qualify after graduation and obtain that summative entrustment decision for the specific lacking EPA at a later moment. In fact, several qualified PAs, have been training for additional EPAs after graduation.
EPAs can thus be used as a guideline for personal professional development after graduation. In other words, the EPA concept provides the possibility for continuing development of competencies after graduating (“lifelong learning”) and above all creates the possibility for PAs to extend their EPA portfolio or even to change in medical specialty during their career as PA. As this process is now in development, a protocol must still be developed to guarantee quality of assessment of post-graduation EPAs. The recently established national association for MPAs or medical specialty associations may serve to accredit for these EPAs.

Another frequent reason for changes in the EPA package is shown in Table 2. EPAs may be rewritten during the program to better clarify the content of the EPA. Although several guidelines, techniques and methods have been developed to descript and select EPAs (Mulder et al. 2010; Ten Cate et al. 2015; El-Haddad et al. 2016), it shows that it can be difficult to design an EPA, which requires practice effort of students and supervisors collaboratively to establish high quality. When properly rewritten, EPAs serve as a helpful guide for the student and supervisor throughout the program. Changes in the set of EPAs are always deliberated with the student, the clinical supervisor and the cohort coordinator. These adjustments can be processed in about a week, but is dependent on the experiences with EPAs of the involved persons. Changes are documented in the individual workplace curriculum of the student. This procedure of creation, review and eventual revision is comparable in the different medical specialties and training sites allied with the UAS.

In some cases, changes in the set of EPAs were made because on closer look they appeared not appropriate, either being too complex or not finding support among the rest of the medical staff. This leads us to recommend that if a department decides to delegate medical tasks to PAs, they should first establish consensus about the specific tasks, then create an individual workplace curriculum in cooperation with student and then propose this curriculum to the school for quality approval.

This study pertained to a local initiative, to explore the possibilities of an EPA-based PA training program, started in a time when EPA was an unknown concept. Establishing an institutional, national or perhaps even an international bank of elaborated EPAs per specialty is recommended, following current initiatives among clinical departments with the same medical specialty to share elaborated EPAs. This would make it much easier to create an EPA package and still keep the set of EPAs individualized, but with an adequate balance between volume and number of EPAs for MPA students. This Utrecht program requires four EPAs of sufficient breadth as a threshold number for graduation. It is difficult to establish how many EPAs are considered enough (El-Haddad et al. 2016). As mentioned earlier, it is the aim to design comparable EPA sets among students in terms of level and comprehensiveness. Although the differences in level and comprehensiveness of EPA sets among students have diminished over the years with our growing experience, they still vary somewhat. Some students have a very extensive EPA, while other students have EPAs of limited scope. For example, one EPA for one single student included the total medical care of patients including admission, stay and dismissal, for example, at a cardiology department, while another individual program divided this broad EPA into three different EPAs. As mentioned by Ten Cate et al. (2015), the size of the EPA is related to the number of EPAs. This limits the significance of absolute numbers of suitable EPAs, but it still confirms the flexibility of the use of EPAs for the students.

The most important limitation of our study is the nature of the Utrecht PA program that allows for substantial flexibility, compatible with a highly individualized and competency-based approach. This may not ever be possible to this extent in a medical course that requires identical objectives and core EPAs for all graduates. Variations in content in other health profession’s programs may be severely limited, but elective EPAs can open a way to more individualized education in a direction that resembles some of the features of the PA program.

Conclusions

In conclusion, this contribution showed our experience with EPAs during several years. We showed that sets of EPAs can be altered for PAs in training in the Utrecht program and made suitable for both the PA in training and the clinical environment of employment, while still maintaining the general standards as set by the school. The flexibility of the EPA concept, needed for an individualized program in a competency-based program is reflected in this study.

Acknowledgments

The authors thank Arina Groenheide for the provision of her individual workplace curriculum as an example.

Disclosure statement

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

Glossary

Individual EPA-based workplace curriculum A competency-based program, defined by a set of entrustable professional activities as learning outcomes, tailored to both the needs of a specific workplace and the background and ambitions of an individual student, while meeting the requirement of a school, with the intent to employ the student after graduation at this or a similar workplace.

Notes on contributors

Fraukje Wiersma, MD PhD, was trained as a radiologist and is a staff member for Master PA training at UAS Utrecht.

Josephine Berkvens, MD, is a coordinator of Master PA course at UAS Utrecht.

Olle ten Cate, PhD, is a professor of medical education, the director of the Center for Research and Development of Education at University Medical Center Utrecht and adjunct professor of medicine at the University of California, San Francisco.

ORCID

Olle ten Cate 🐦 http://orcid.org/0000-0002-6379-8780
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