Peer reviewed article

One-on-one long-term tutorials in general practitioners' practices – a successful new teaching concept in primary care medicine

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Summary

To improve teaching in practical and communicative skills and knowledge in day-to-day medical practice, in 1997 we introduced one-on-one tutorials in general practitioners' offices as a mandatory part of medical students' academic education. Students participate actively half a day per week in their 3rd and 4th academic years (out of 6) in the office or clinic of a trained personal tutor. We recruited 270 general practitioners in town or from surrounding rural areas for this purpose. 85% of students choose general practitioners as their tutors and 15 % tutors in hospitals. To test whether the tutorials' aims were achieved, in 2005 we performed a detailed questionnaire evaluation after seven years' experience of one-on-one tutorials. All 236 students involved were asked to participate. The response rate was almost complete (98%). 233 anonymous questionnaires were analysed.

Students reported improvement in knowledge, social and communicative skills and personal motivation. The overall rating of the one-on-one tutorials obtained 5.3 on a 6 point scale and achieved the top ranking among all university medical faculty classes.

In-practice long-term one-on-one medical student-general practitioner tutorials can be recommended for implementation.

Key words: one-on-one tutorials; long term teaching in general practice

Introduction

In 1997 academic teaching in the medical faculty of the University of Basel was restructured. The aim of the reorganisation was to expand teaching by general practitioners and improve medical students' practical training.

Prior to 1997, the traditional concept of academic medical teaching involved a three-year preclinical and a three-year clinical part. It was only in the third academic year that basic clinical subjects were instructed. As in other countries and universities there were no personal individualised long-term one-on-one tutorials in general practitioner practices. Practical aspects of medicine were almost entirely absent in the first years of academic teaching, which excluded early training in social and communicative skills and instruction by general practitioners.

Original and systematic literature outcome review articles consistently report that early experience and exposure to clinical and community settings in medical education helps medical students acquire a range of subject-specific skills and makes their learning more real and relevant. It has also potential benefits for teachers and patients, and may influence career choices [1–11]. Currently there is a demand for general practitioners in Switzerland, and thus early experience and exposure to community settings may help to recruit the GPs of the future.

The aim of the one-on-one tutorials was to improve teaching of students' practical and communicative skills and offer student-centred problem-based learning and the opportunity to apply medical knowledge day by day in the tutor's practice. Therefore we introduced one-on-one tutorials in 1997 for implementation in the third and fourth academic teaching year. Students work half a day per week in their tutor's practice or clinic and experience the medical profession's daily routine. Tutors are recruited among private general practitioners of our region. 50 hospital physicians from our region act as one-on-one tutors in patient-oriented hospital medicine. Students choose a physician in a practice (general

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practitioner) as their tutor in 85%, while 15% choose a hospital tutor.

A structured learning system for instruction by the personal tutors is important [12]; in our programme [13, 14] they are prepared for the task at an introductory seminar and given yearly notice of further specialist and didactic training. The prerequisite is a specialist medical title and at least three years' practical experience as general practitioner or senior hospital physician. They receive part payment for their work. Almost all tutors have been in permanent teaching as tutors, and, according to published reports [8, 15], with personal enthusiasm. In consequence, very few general practitioners terminated their involvement.

270 general practitioners offered regular student-primary care patient contacts earlier than in traditional academic medical education. Moreover, and as a novelty, the patient contacts took place in a real practice context in a single general practitioner's own office over a prolonged two-year period. Established tutorials elsewhere are mainly provided by primary care medical centres [3, 7], have a shorter duration [3, 5, 7] or are not based on a constant personal student-tutor relation in a general practitioner's office [8]. The cornerstone of our personal one-on-one tutorials as a teaching method is a long-term stable interactive student-tutor relationship that confronts and motivates the students early on with primary care patient contact and with active practical work in a real world general practitioner's office in which many of the students may later work.

After seven years 1997–2003 of ongoing one-on-one tutorials, all third- and fourth-year medical students in 2005 evaluated the one-on-one tutorials by questionnaire. Our aim was to determine whether the tutorials' objectives were attained, i.e., better practical and communicative skills and acquisition of knowledge in day-to-day medical practice. In addition, an external evaluation of the questionnaire results and of the overall rating of the one-on-one tutorials was performed and compared to the ratings obtained by other teaching classes.

Methods

We did not find validated questionnaires to evaluate personal one-to-one tutorials. Besides measuring of increase in knowledge and of practical skills, we intended to measure the increase in social and communicative skills, to assess the tutor's role and motivational changes in the students as a result of the one-on-one tutorials. To address these questions, therefore, we developed a specific questionnaire.

The questionnaire was developed in an iterative process. Initially, we designed and proposed a questionnaire. Its preliminary items were then tested and further selected together with other tutors and questionnaire and didactic experts. Subsequently, a trial evaluation based on this 99-item questionnaire was conducted in 2004 with 207 students of the 3rd (121 students) and 4th (86 students) academic year. The precision, factorial structure and practicability of the questionnaire were tested in order to define an improved revised questionnaire.

The questionnaire then came under statistical scrutiny. Items identified as unsatisfactory by comprehensive item analysis were deleted or modified, and new items were generated. This new revised final version of the questionnaire was used as an evaluative instrument for one-to-one tutorials in 2005.

Table 1

Index of fit of the confirmatory factor analysis (CFA). The table shows the degree of freedom (df) of the computed CFA and the resulting goodness of fit indices for the four content parts of the questionnaire. A fit on the combined fit index is considered good when CFI (Comparative Fit Index) >0.90 and SRMR (Standardized Root Mean Square Residual) <0.09 (see text for further explanation).

Index of Fit			
Contents	df	CFI	SRMR
Knowledge and practical skills	153	.917	.060
Social und communicative skills	55	.951	.062
Tutor	36	.908	.060
Patients	36	.951	.059

Questionnaire

The questions of the final questionnaire covered four areas: skills and acquisition of knowledge, social and communicative competence, the tutors and the patients. A seven-stage verbally embedded rating scale is used for each area (1 = absolutely not true, 7 = absolutely true). The seven-stage scale allows a differential assessment of each aspect of the personal one-to-one tutorials and adequately reflects the students' ability of discernment. In addition, there was an abstain category (0 = could not be carried out during my tuition), to label irrelevant items.

Item analysis

Confirmatory factor analysis (CFA) is a statistical tool to assess the correspondence of a presupposed dimensional structure underlying multiple variables with the data obtained in empirical measurements of these variables. The term dimensional structure refers to the aggregation of items with similar empirical content into theoretical dimensions, such as "Communicative competency" or "Empathy towards patients", as used in the one-on-one tutorial. In the case of the item analysis presented here, CFA was computed on the evaluation sample from 2005 and aimed to validate the dimensional structure derived from exploratory factor analysis of the test sample data collected with the first version of the questionnaire in 2004. As outlined before, the original version was revised after thorough item analysis including the above-mentioned exploratory factor analysis by deleting items with unsatisfactory statistical properties and adding new items that were assumed to fit in well with the scales compiled during the prior exploratory factor analysis. Hence, CFA was employed to validate a dimensional structure that partly stemmed from prior exploratory factor analysis, and moreover from theoretical reasoning done by the developers of the questionnaire.

The key outcome statistics of CFA are goodness of fit indices that represent the match between the assumed dimensional structure and the empirical data. Fit indices are usually evaluated against cutoff criteria, which, when met, indicate a reasonably good fit between theory and data. A multitude of fit indices are proposed in the literature [9, for an overview], all of which carry certain statistically beneficial features as well as undesirable properties. These properties include the robustness against violations of distribution assumptions such as the assumption of multivariate normality of sample data, or their error rates when sample sizes are small. Hu and Bentler (1999) therefore recommend the simultaneous evaluation of multiple fit indices, all of which need to meet their cutoff criteria in order for the fit to be considered acceptable [10]. For small sample sizes as in the evaluation samples analysed here (N ≤250), the authors opt to examine both the Comparative Fit Index (CFI) and the Standardised Root Mean Square Residual (SRMR). The combined examination results in a convenient trade-off in the ratios of Type I and Type II errors. It is moreover robust against violations of assumption of normally distributed sample data. A combined fit of CFI and SRMR is considered good if CFI >0.90 und SRMR <0.09. As shown in table 1, the goodness of fit between our sample data and the postulated dimensional structure of the questionnaire is confirmed in all four content parts of the questionnaire. The cut-off criteria for all parts are met with both CFI >0.90 and SRMR <0.09.

Internal consistency, calculated as Cronbach-α, served as a test for the reliability of the defined scales. Scales which only comprise two items were checked for consistency by means of the Product-Moment-Correlation coefficient. Internal consistency is measured at Cronbach-α ≥ .75 for 13 of the 14 scales, only the scale "knowledge of drugs" falls slightly short with a Cronbach-α ≥.70 (table 2).

For evaluation, we used data from 236 students in their current third and fourth academic year in 2005, seven years after introduction of the tutorials in 1997. All students received the revised questionnaire to complete during a compulsory teaching session. The questionnaires for the final evaluation were distributed in a lecture hall and were answered anonymously. The questionnaires were then collected and analysed by external experts.

In a separate external evaluation, one-on-one tutorials' ratings obtained from the students were compared to the ratings achieved by other classes of the medical faculty.

Results

233 students completed the questionnaire, 125 (54%) in their 3rd academic year, and 108 (46%) in the 4th academic year. Response rate was 98%. The students were distributed to three tutorial categories as follows: 163 (70.3%) to general practitioners, 33 (14.2%) to specialists in practice (incl. paediatrics), and 36 (15.5%) to tutors from teaching hospitals. 270 general practitioner tutors participate in the programme, most having done so since 1997. Their practices are located in town and the surrounding 50 km area.

Duration and number of one-on-one tutorials

3rd year students spent on average 13.2 half days in their tutors' practices (11 were expected). 4th year students spent 17.8 half days in-practice (15 were expected). While three hours' presence was expected per tutorial half-day, the students worked four hours or more. In addition, 75% of the students had to spend up to an hour travelling to their places of tutorial. 10% of the students needed two hours for transportation. The additional preparation time and assessment of their experiences in practice amounted on average to 45 minutes a half-day, 22% of the students spent 60–90 minutes on this per half-day. Taken together, the students spent far more time in one-to-one tutorials than they needed to.

The main question was whether the tutorials' objectives were attained. They were attained, as explained in what follows (see fig. 1).

Knowledge and practical skills

The students agreed they had increased their palpatory and auscultatory skills, and their ability to judge the severity of the disease. They also reported a reading-based increase in knowledge. Far less approval was forthcoming in regard to acquisition of knowledge regarding drugs, laboratory diagnosis and ECG techniques. In these areas the variance in evaluations was far greater, meaning that students' individual experience was far more heterogeneous.

Social und communicative skills

The students acquired conversational competency during their personal one-on-one tutorials. Similarly, they became sensitised to the patient´s social environment and had learnt to be empathetic and trustworthy in their dealings with patients. The association between communicative competency and empathy can be seen in the significant correlation between these dimensions (r = .56 p <.001). The correlation shows that students with a higher communicative competency also had a higher empathy towards patients.

Patients

Students stated they encountered a varied patient population with a large number of different diseases during their one-on-one tutorials. They clearly report cooperative relationships with patients and consider themselves able to explain medical conditions to them.

Tutor

The students declared that their personal relationships with the tutor were good. Furthermore, the supervisory behaviour, feedback and instructions from their tutors were considered by the students to be clearly above average.

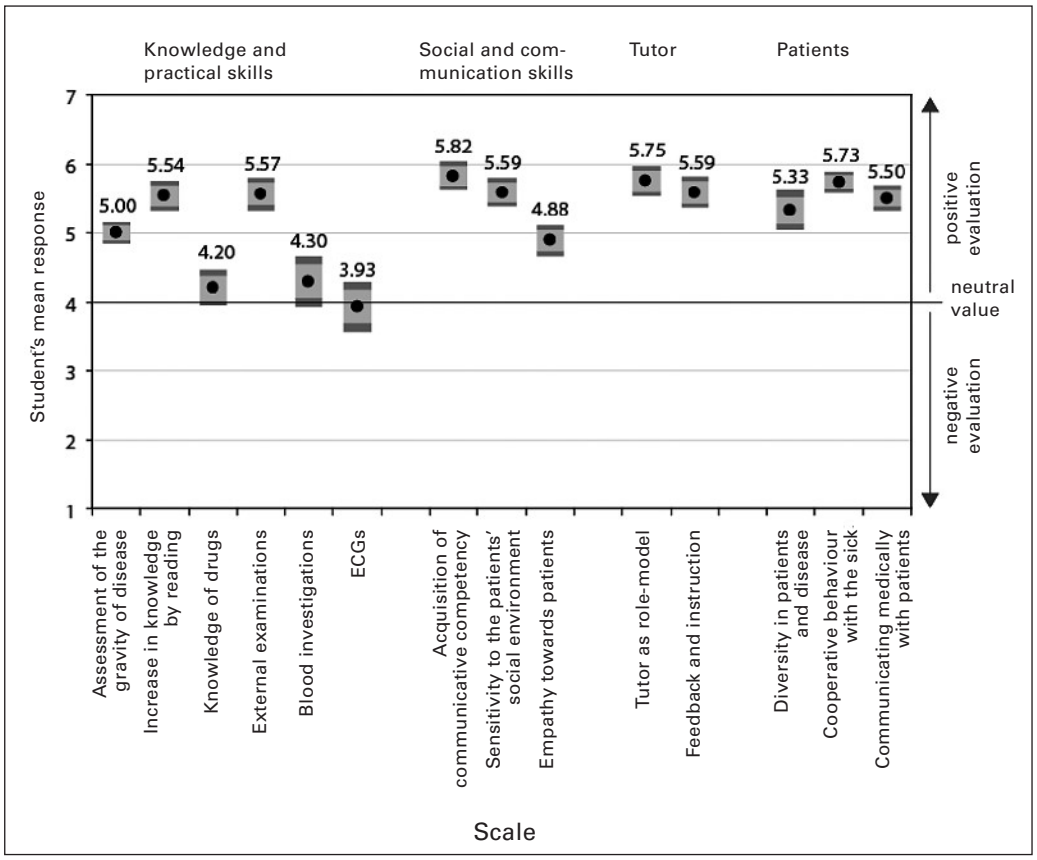

Figure 1

Responses on all scales comprised over all content areas. Displayed are mean values obtained from averaging all responses from each of the two academic years (black dots). The grey shaded area around the neutral scale value of 4 indicates the 95% confidence interval of the mean (light grey area), and the 99% confidence interval respectively (dark grey area).
A seven-stage verbally embedded rating scale is used: 1 = absolutely not true, 2 = generally not true, 3 = mainly not true, 4 = partly true, 5 = quite true, 6 = generally true, 7 = absolutely true.
The seven-stage scale allows differential assessment of each aspect of the personal one-to-one tutorials and adequately reflects the discerning ability of the students.
The average, or neutral, assessment is defined as the middle of the scale, above average assessments lie significantly above this and thus prove a high degree of approval. Below average assessments deviate from the neutral category towards the lower end of the scale and suggest rejection.

Effects on students' motivation

The increase in motivation (see fig. 2) through one-on-one tutorials is generally confirmed by all the students. Only five students report a fall in motivation, and in 40 students motivation remained unchanged.

Taken together, knowledge and practical skills, and social and communication skills improved, all obtaining 5–6 points on the 7-point scale. Satisfaction with the tutor was also high. Motivation to become a medical professional rose in 81% and remained unchanged in 17% of students.

In another external evaluation of students' assessments of all university classes of our medical faculty, the overall rating of the one-on-one tutorials was 5.3 on a 6-point scale (0 = minimum, 6 = maximum satisfaction), compared to an overall mean of 4.89 achieved by all other teaching courses offered during medical education that underwent official evaluation. The one-on-one tutorials obtained a rating that was highest of all teaching classes and significantly different from the overall mean ($t = 7.945$, $df = 7$, $p\ 0.0001$).

Discussion

The need to improve primary care aspects in teaching has been repeatedly emphasised [1, 2, 11]. Primary care tutorials improve students' practical academic teaching, experience and exposure to clinical and community settings, and thus provide more real and relevant learning [3].

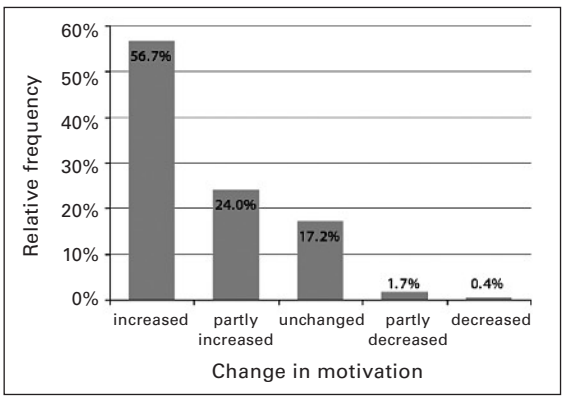

Figure 2

Self-reported change in motivation due to the one-on-one tutorials. The figure shows relative frequencies of nomination for each response category.

Primary care tutorials reported in the literature are not long-term tutorials in general practitioners' practices; they take place in medical centres, are of shorter duration or are not in a constant one-on-one student-general practitioner relation [1, 3, 5, 7, 8].

We introduced long-term one-on-one tutorials for medical students early on in their academic education and directly in general practitioner practices [12]. We present the results of an external questionnaire evaluation after the first seven years' experience.

233 medical students reported in detail via questionnaire that their practical skills, knowledge, social and communicative skills and motivation to become physicians had increased. In an external assessment the one-on-one tutorials achieved the highest rating of all medical university courses.

In 1992 Rabinowitz [3] reported on sixteen years' experience with a required six-week third-

year family medicine clerkship at one of seven residency-based family practice centres. Student evaluations rated it highest of the six required core university clerkships. In addition, over 16% of graduates have entered family medicine residency training programmes, a rate higher than that of any other school in the northeastern United States, and significantly higher than the average for all U.S. medical schools (12%). Successful clerkships require strong institutional support, a structured curriculum, an adequate number of patients, a dedicated faculty, a sufficient number of training sites, an appropriate evaluation process, and significant financial support.

With our one-on-one tutorials we met and confirmed these criteria, and show that long-term one-on-one student-general practitioner tutorials also achieve medical faculty all-class top rating. The tutorials may also motivate more students to become general practitioners.

Early one-on-one tutorials for medical students in GP practices are still rarely part of academic university teaching [1, 3]. However, because of the high reported level of success, and based on seven years' experience, they can be recommended as a way to implement primary care aspects better and earlier in medical teaching of future physicians. The personal long-term student/general-practitioner one-on-one tutorial has now become an established teaching method in our medical faculty.

In addition, the evaluation showed that the general practitioners involved cooperate and perform well. The tutor/general practitioners also form an educational network and guarantee interinstitutional contacts.

Among the limitations of this study is the relatively small number of 120 students per year with 240 one-on-one tutorials and 270 committed trained tutors in private practice. However, whether this would be feasible in a large university with hundreds of students every year is unclear.

We avoided a position of power over the students that could have influenced their evaluation. The students anonymously evaluated the tutorials given by their own tutors. These tutors were not involved in data analysis and questionnaires were analysed exclusively by independent external experts. The authors are academic primary care physicians who organise the tutorials and do not wield any relevant power over the students, since they are responsible only for a small part of all university classes and are only marginally involved in final academic examinations.

In this study we did not consider detailed questionnaire evaluations by the tutors, although this would be interesting.

Because all of our students participate in the one-on-one tutorials, we cannot compare the effects reported in the students' self-evaluation with effects of a programme without one-on-one tutorials; however, a comparison with the overall rating of other classes was possible and in favour of the one-on-one tutorials.

Finally, because there was no validated questionnaire to assess one-on-one tutorials, we developed and tested our own questionnaire in the students' spoken language.

Conclusion

To improve early practical medical academic teaching in primary care, and in the light of the good results of external and students' evaluation, we recommend personal long-term one-on-one student-general practitioner tutorials for implementation. Students may be better and earlier prepared and motivated for future work in primary care.

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