Effect of a short skills training course on competence and performance in general practice

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Objectives Evaluation of the efficacy of a short course of technical clinical skills to change performance in general practice.

Design Subjects were self-selected general practitioners ($n = 59$) who were unaware of the study design. They were assigned to the intervention group ($n = 31$) or control group ($n = 28$) according to their preference for course date. The course covered four different technical clinical skills (shoulder injection technique, PAP-smear, laboratory examination of vaginal discharge, ophthalmoscopic control in diabetes mellitus). Main outcome measures used were pre- and post-training scores on a knowledge test of skills (60 multiple choice items), and pre- and post-training performance of procedures in practice using a log-diary covering 20 days.

Setting **University of Maastricht, The Netherlands.**

Subjects **Self-selected general practitioners.**

Results Competence, as measured by the knowledge test of skills, improved significantly as a result of the training and skills test scores were satisfactory after training. A significant effect on performance in practice was found for PAP-smear and shoulder injection technique, whereas no effect could be demonstrated for examination of vaginal discharge and ophthalmoscopic control in diabetes mellitus.

Conclusions A good degree of competence is a necessary but not always sufficient condition for a physician to change his performance in practice. While some skills training seems adequate to bring about desired changes, for other skills more complex interventions are probably needed.

Keywords ***Education, medical, graduate; family practice, *education; Netherlands; professional competence.**

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Introduction

Physicians in general practice perform many different diagnostic and therapeutic procedures,[1,2] amounting in the Netherlands to more than 4000 performed procedures per 1000 patients per year.[3] Together with counselling and prescribing, technical clinical skills constitute the core of the work of general practitioners (GPs). While the importance of competence in technical skills of GPs is acknowledged, surveys have indicated that undergraduate and graduate training programmes are not covering all relevant skills;[2,4,5] consequently, GPs entering practice may not always be sufficiently prepared to perform these skills. Moreover, skills acquired may deteriorate because of insufficient practice or innovations in general practice requiring the acquisition of new techniques.[6] All these factors may contribute to deficiencies of competence in technical clinical skills of practising physicians. Research evaluating the competence of practising GPs has indeed provided evidence of existing deficiencies in skills such as clinical breast examination,[7] resuscitation,[8] ophthalmoscopy,[9] examination of shoulder[10] and otoscopic examination.[11] These deficiencies in skills may affect the quality of care provided because of missed diagnosis, inadequate treatment or unnecessary referral.[7–9,11,12]

One way to remedy these deficiencies is with continuing medical education (CME). The efficacy of CME has been evaluated extensively.[13–17] From these evaluations it is evident that in general CME works well in improving physician competence and generally less well in changing practice performance. Apparently improved competence does not necessarily result in changes of performance, because practical problems and organizational or social barriers may limit the application of what was learned.[18,19]

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Other interventions aimed at changing performance in practice, such as audit and feedback programmes, are more effective.[16] More complex strategies, using combinations of methods, result in more consistent and substantial effects.[13,15,17] However, the disadvantages of these complex strategies are often high cost and sophisticated organizational requirements, limiting feasibility beyond research settings. Unfortunately, little is still known about precisely what elements work and why.[20]

Short focused training sessions of technical clinical skills for GPs have been introduced into the Netherlands,[10] developed according to educational principles as outlined by Stein.[21] The courses are short interactive training sessions, in small groups, with hands-on practising of skills. They are popular among GPs, but little is known about their effects. In this study we assessed the efficacy of such short courses of technical clinical skills aimed at changing performance in general practice.

Method

Subjects

GPs from the south-eastern region of the Netherlands (n = 800) were sent an invitation through the mail to participate in an interactive hands-on training course on four different technical clinical skills as part of an experiment investigating transfer of skills from training to the practice environment. Those who agreed to participate knew they were participating in an experiment, but were not informed about the design of the study. Acceptance was determined by order of registration to a maximum of 32 participants per course. Participants were divided into two groups, according to their preference for the timing of the course, with group A (intervention) receiving the course 3 months earlier than group B (control).

Materials

The course covered four different skills: injection technique of the shoulder, ophthalmoscopic control in diabetes, PAP-smear and laboratory examination of vaginal discharge. These skills were selected because competence in the procedures was known to be amenable to improvement.[9,22–24]

For each skill the training was given in small groups (4–8 people) by two trainers experienced in the area concerned. The content of the training was based on national guidelines for general practice,[25,26] with supervised hands-on practice of skills forming the core of each training session. Total training time was 3 h, with 1 h for injection technique of the shoulder and ophthalmoscopy, and 0·5 h for PAP-smear and laboratory examination of vaginal discharge. We tried to optimize the learning effect with an objective structured clinical examination (OSCE).[27]

To evaluate the effect of the training a multiple choice test (with 15 items for each skill) was used to measure relevant knowledge of skills. The content of the multiple choice test was developed according to national guidelines. The effect of the training on performance in practice was measured with a log diary, which allowed registration of quantitative and some qualitative criteria of the four different procedures. The criteria were chosen because they were considered sensitive to changes in performance and their registration was feasible. A small incentive (£75) was provided for completing both registration periods. As an illustration examples of the formats are given in Table 1.

Study design

The knowledge test of skills was administered to all participants at the start, serving as a baseline measurement. All participants received personal written feedback on their scores, comparing results with that of their peers, and received an educational handout concerning the four skills, including step-by-step guidelines for procedures. They were subsequently requested to record how often they performed the four different procedures (shoulder injection, ophthalmoscopic control of diabetes mellitus, PAP-smear and laboratory examination of vaginal discharge) in a log diary covering 20 days. This registration time was considered to be feasible and adequate for detecting group effects in performance, based on group size and frequency of presentation of relevant clinical problems in general practice.[3] Three months after baseline measurement group A received the training including assessment of skills after the training. Both groups A and B were assessed on knowledge. Again, all participants received personal feedback on their scores. One month after the course all participants were requested to record performance of procedures in practice covering a second period of 20 days (Table 2).

Data management and analysis

Scores on the test formats were converted to percentage of maximum score; t-tests were used to compare mean scores between groups, and paired t-tests between different periods within groups. Chi-square (or Fisher's exact test) was used to analyse differences in characteristics and performance between both groups.

Table 1 Examples of items on knowledge test of skills and log diary for shoulder injection technique

A. Knowledge test of skills

item 16	Pain in the shoulder with radiation into the hand is more frequently caused by a problem in the neck rather than the shoulder	(true/false/don't know)
item 17	Inflammation of the shoulder joint capsule causes disturbances *both* in active and passive examination of shoulder movements	(true/false/don't know)
item 18	Restriction of the passive horizontal adduction of the arm during physical examination of the shoulder is an indication of osteoarthritis of the acromio-clavicular joint	(true/false/don't know)
item 29	A correct insertion point for injection of the glenoid cavity is about 4 cm below the angle between spina scapulae and acromion	(true/false/don't know)
item 30	During injection of the glenoid cavity from behind the correct direction of the needle is towards the top of the coracoid process	(true/false/don't know)

B. Log diary technical skills

Patient code □□□□ GP code □□□□
Date of birth □□□□□□ Date □□□□□□
□ **male** □ **female**

□ **Injection shoulder**
- □ **acromio-clavicular joint**
- □ **subacromial bursa**
- □ **glenohumeral joint**
- □ **other**

□ **1st injection**
□ **repeated injection**

One-way analysis of variance (with Student–Neuman–Keuls as *post-hoc* multiple comparison method) was used to evaluate the influence of nominal and ordinal characteristics on scores.

Results

Only participants who completed log diaries in both registration periods were included in the study. Results for analysis were available from 31 participants of group A and from 28 participants of group B. On personal and background characteristics, no statistically significant differences were found between group A and group B (Table 3). One participant of group B failed to complete the knowledge test of skills at 3 months.

Table 2 Design of study

	Group A (n = 31)	Group B (n = 28)
0	knowledge test of skills*	knowledge test of skills*
	educational handout	educational handout
1–2 months	first registration of performance in practice with log diary covering 20 days	
3 months	short course	
	knowledge test of skills*	knowledge test of skills*
4–5 months	second registration of performance in practice with log diary covering 20 days	

* Personal feedback was provided on results after each test.

Competence

Knowledge test of skill scores showed no statistically significant differences between both groups at the start,

Table 3 Personal and practice characteristics*

	Group A (n = 31)	Group B (n = 28)	**
Age (SD)	41·3 (5·2)	41·7 (7·3)	NS[a]
Male	24 (80·0)	26 (86·7)	NS
Female	6 (20·0)	4 (13·3)	NS[b]
Years of experience (SD)	11·5 (6·4)	12·5 (8·3)	NS[a]
Practice characteristics			
Solo	17 (56·7)	14 (46·7)	NS
Duo	8 (26·7)	11 (36·7)	NS
Group	5 (16·6)	5 (16·6)	NS[b]
City (> 30 000 inh.)	15 (50·0)	9 (30·0)	NS
Town (5000–30 000 inh.)	8 (26·7)	12 (40·0)	NS
Rural (< 5000 inh.)	7 (23·3)	9 (30·0)	NS
Number of patients in practice (SD)	2653 (733)	2640 (661)	NS[a]

* Figures in parentheses are percentages unless stated otherwise.
** χ^2 test unless stated otherwise ([a] t-test; [b] Fisher's exact test).

Table 4 Knowledge test of skills scores* for intervention and control group (baseline measurement and after 3 months)

	Group*				Group B*				
	n	Mean	SD	Paired *t*-test	*n*	Mean	SD	Paired *t*-test	*t*-test
PAP-smear									
baseline	31	54·6	13·5		28	52·9	11·0		NS
after 3 months	31	68·6	13·0	< 0·001	27	61·5	12·5	< 0·05	< 0·01
Laboratory examination of vaginal discharge									
baseline	31	61·1	14·4		28	52·6	12·2		< 0·05
after 3 months	31	84·7	11·1	< 0·001	27	64·0	16·2	< 0·01	< 0·001
Shoulder injection									
baseline	31	70·5	16·1		28	71·9	19·2		NS
after 3 months	31	92·9	5·9	< 0·001	27	79·8	17·8	< 0·05	< 0·001
Ophthalmoscopic control in diabetes mellitus									
baseline	31	43·0	13·9		28	42·1	16·7		NS
after 3 months	31	75·5	13·2	< 0·001	27	61·5	24·2	< 0·01	< 0·01

* All entries expressed as percentage of maximum score.

except for laboratory examination of vaginal discharge, which was higher in group A (Table 4). Both groups showed improvement in scores after 3 months but improvement was significantly higher for group A (after receiving the training) in all four skills. The OSCE as part of the training showed high mean scores for shoulder injection (85%) and PAP-smear (81%), and more modest scores for ophthalmoscopic control of diabetes mellitus (73%) and laboratory examination of vaginal discharge (70%).

Performance in practice

The performance in practice of the different procedures is shown in Table 5. For PAP-smear the number of procedures performed was higher in the second registration period for both groups. The use of recommended materials for taking PAP-smears showed a significant increase in group A. The number of smears without endocervical cells showed no significant differences between periods or groups. The number of examinations of vaginal discharge was smaller in the second period in both groups. The proportion of requests for Chlamydia diagnostics did not differ between groups or between periods. Group A performed more shoulder injections after training, while in group B no difference between first and second periods was found. Both groups performed few ophthalmoscopic controls in the first and second periods.

Discussion

In this study a significant effect of a skills training including assessment was demonstrated on competence for all four topics. An effect of the training on performance in practice was found only for shoulder injection and PAP-smear, whereas no such effect could be demonstrated for ophthalmoscopic control and laboratory examination of vaginal discharge. These results support the notion that a good degree of competence is a necessary but not always sufficient condition for changing physician performance in the practice setting.

For shoulder injection the practical skills training was effective in increasing the use of the procedure in practice in group A while in group B, although all the necessary information was supplied in the handout, without practical training no increased application of the procedure was observed. For PAP-smear no difference in the number of procedures was found between groups. This is perhaps not surprising, given that the screening programme for cervical cancer in the Netherlands was, at the time of the study, organized by public health authorities and not dependent on the initiative of the GP. However, there was substantial improvement in the use of recommended material for collection of PAP-smear after training. It is remarkable that demonstration of and practising with recommended material was sufficient to generate such a change in the use of materials, without having additional support. No statistically significant improvement

Table 5 Performance in practice (log diary entries in 20 days)

		Group A*		Group B*		
		Sum-score	Difference within A**	Sum-score within B**	Difference	Difference between A and B**
PAP-smear						
procedures	first period	349		371		NS
use of recommended	second period	434	< 0·01	443	< 0·05	NS
collection materials	first period	244 (70·0)		238 (64·3)		NS
smears of poor quality	second period	389 (89·7)	< 0·01	328 (74·1)	NS	< 0·01
	first period	25 (7·2)		23 (6·2)	NS	
	second period	23 (5·3)	NS	34 (7·7)	NS	NS
Laboratory examination of vaginal discharge						
procedures	first period	93		91		NS
	second period	67	< 0·05	66	< 0·05	NS
requests for chlamydia-	first period	32 (34·4)		26 (28·5)	NS	
diagnostics	second period	22 (32·8)	NS	17 (25·8)	NS	NS
Shoulder injection						
procedures	first period	80		90		NS
	second period	120	< 0·01	72	NS	< 0·001
Ophthalmoscopic control in diabetes mellitus						
procedures	first period	29		17		NS
	second period	17	NS	8	NS	NS

Sum-score adjusted to 30 members for both groups to allow comparison (proportions between brackets). **χ^2.

of quality of PAP-smears could be demonstrated (although there was a clear tendency), as the quality was already very high and numbers were too small. The training in examination of vaginal discharge, also highlighting clues to request Chlamydia diagnostics, failed to result in increased use of the procedure. Training time may have been too short. Moreover, the procedure requires considerable time – which is scarce during surgery hours – and adequate organization of equipment and materials. So organizational obstacles may hinder application of this procedure. Training in ophthalmoscopic control of diabetes mellitus also failed to result in increased application in daily practice. Others have indeed demonstrated that ophthalmology skills require extensive training.[9]

Some methodological aspects in this study have to be taken into consideration for the interpretation of the results. Knowledge test of skills scores were used as an indicator of competence, whereas skills test scores would perhaps have been more appropriate. We decided to include the skills test in the intervention rather than in the evaluation, because of the potentially strong educational impact of test formats.[28,29] Due to limited resources it was not possible to organize a pre- and post-training skills test. Knowledge tests are the dominant format in the assessment of clinical competence.[30] While correlations between knowledge test scores and skills test scores varied for separate skills, at group level knowledge test and skills test scores showed good concurrent validity.[10] We therefore believe that the changes in scores on the knowledge test of skills reflect changes in competence and not mere knowledge.

The validity of self-reported performance may be questioned, due to over- or underreporting. We did not check log diary entries systematically but all registrations required retraceable patient codes, and on occasional checks no indications were found of reporting a procedure which had not been performed. There is some indication of underreporting in the second period, as the number of performances decreased in both the experimental and control group for vaginal discharge and ophthalmoscopy, so small changes may have been missed.

Further, it is clear that quantity of performance as the sole endpoint does not necessarily give an indication of quality of performance in practice. Conclusions on quality of performance must therefore be drawn with some caution, although skills test results were reassuring after training. Hypothetically it is possible that quality in performance improved while quantity

decreased and vice versa. Increase of shoulder injections does not necessarily mean improvement in quality of care provided, but may solely reflect increased (misplaced) confidence. The selection of quantitative and some qualitative endpoints to evaluate the effect of the course was for logistical and financial reasons, but adequate to evaluate an effect of the course on performance in practice. The relevance of observed changes for quality of care, while ultimately of great importance, remains unclear but was beyond the scope of the study. Direct observation of procedures in practice or more detailed information on outcome could provide answers with respect to quality of care, but require substantial resources.

In conclusion, for some skills short focused training seems adequate to bring about change. For other skills perhaps more complex (and costly) interventions are needed. CME needs to consider which interventions work and which do not for each topic separately.

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