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How can experience in clinical and community settings contribute to early medical education? A BEME systematic review[#]

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ABSTRACT **Review date:** *Review period January 1992–December 2001. Final analysis July 2004–January 2005.*

Background and review context: *There has been no rigorous systematic review of the outcomes of early exposure to clinical and community settings in medical education.*

Objectives of review:

(1) *Identify published empirical evidence of the effects of early experience in medical education, analyse it, and synthesize conclusions from it.*
(2) *Identify the strengths and limitations of the research effort to date, and identify objectives for future research.*

Search strategy:
Ovid search of: BEI, ERIC, Medline, CINAHL and EMBASE
Additional electronic searches of: Psychinfo, Timelit, EBM reviews, SIGLE, and the Cochrane databases.
Hand-searches of: Medical Education, Medical Teacher, Academic Medicine, Teaching and Learning in Medicine, Advances in Health Sciences Education, Journal of Educational Psychology.

Criteria:
Definitions:

- *Experience: Authentic (real as opposed to simulated) human contact in a social or clinical context that enhances learning of health, illness and/or disease, and the role of the health professional.*
- *Early: What would traditionally have been regarded as the preclinical phase, usually the first 2 years.*

Inclusions: All empirical studies (verifiable, observational data) of early experience in the basic education of health professionals, whatever their design or methodology, including papers not in English. Evidence from other health care professions that could be applied to medicine was included.
Exclusions: Not empirical; not early; post-basic; simulated rather than 'authentic' experience.

Data collection: *Careful validation of selection processes. Coding by two reviewers onto an extensively modified version of the standard BEME coding sheet. Accumulation into an Access database. Secondary coding and synthesis of an interpretation.*

Headline results: *A total of 73 studies met the selection criteria and yielded 277 educational outcomes; 116 of those outcomes (from 38 studies) were rated strong and important enough to include in a narrative synthesis of results; 76% of those outcomes were from descriptive studies and 24% from comparative studies. Early experience motivated and satisfied students of the health professions and helped them acclimatize to clinical environments, develop professionally, interact with patients with more confidence and less stress, develop self-reflection and appraisal skill, and develop a professional identity. It strengthened their learning and made it more real and relevant to clinical practice. It helped students learn about the structure and function of the healthcare system, and about preventive care and the role of health professionals. It supported the learning of both biomedical and behavioural/social sciences and helped students acquire communication and basic clinical skills. There were outcomes for beneficiaries other than students, including teachers, patients, populations, organizations and specialties. Early experience increased recruitment to primary care/rural medical practice, though mainly in US studies which introduced it for that specific purpose as part of a complex intervention.*

Conclusions: *Early experience helps medical students socialize to their chosen profession. It helps them acquire a range of subject matter and makes their learning more real and relevant. It has potential benefits for other stakeholders, notably teachers and patients. It can influence career choices.*

Introduction

A preclinical/clinical divide was firmly established as the norm in medical education a century ago at a time when biomedical science was proving its ability to explain disease and provide a theoretical basis for treatment (Dornan, 2005). Now, medical schools in many parts of the world are 'vertically integrating' various types of practical experience

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into the early, traditionally theory years. The UK General Medical Council (GMC), for example, advocates vertical integration, and yet it is strikingly vague on what learning outcomes early experience should support. (General Medical Council, 1993, 1999, 2002).

A recently published consensus survey suggested that early experience might orientate medical curricula towards the social context of practice, ease students' transition to the clinical environment, motivate them, make them more confident to approach patients, and make them more aware of themselves and others (Dornan & Bundy, 2004). In addition, the survey suggested it might make their theoretical knowledge stronger, deeper and more contextualized, and strengthen their learning of behavioural and social sciences, and of the organization of healthcare and the role of professionals within it (Dornan & Bundy, 2004).

Vertical integration is not a new idea, but there has been no rigorous systematic review of empirical research in the field. Such a review is needed because vertical integration is in vogue and an evidence-based set of learning outcomes could influence the goals and methods of basic health professions training worldwide. It seemed wrong to restrict the search to early 'clinical' experience (because 'lay' experience could be every bit as important or more so). Moreover, health professions other than medicine might provide relevant evidence so the review question was framed quite broadly.

Review question

How can experience in clinical and community settings contribute to early medical education?

Objectives

(1) Identify the published empirical evidence of the effects of early experience in medical education, analyse it and synthesize conclusions from it.
(2) Identify the strengths and limitations of the research effort to date, and directions for future research.

Review methodology

Topic review group

An international group of people who were actively involved in innovative clinical curricula, represented both community and hospital perspectives, had expertise in vertical and horizontal integrative education (including early experience) and had expertise in evidence-based practice was convened. One member of the team was a medical student, though she has since qualified.

Relationship between TRG and BEME steering group

Having registered the topic with BEME in February 2002, the group adhered to BEME guidance and worked in close collaboration with the Steering Group but, in accordance with BEME practice, framed its methodology and carried out its work independently up to the point of submitting this report for review.

Selection criteria

Inclusions

All empirical studies of early experience in early medical education (or the education of other health professionals), whatever their design or methodology, including papers not in English. The terms used in these inclusion criteria are defined in the glossary.

Exclusions

In framing our question and methods, it was reasoned that context and affective impact are features that distinguish *experience* from other stimuli to learn, so *simulation* studies were excluded. No studies were excluded from initial consideration on the grounds of methodological weakness because, to achieve objective 2 (above), the whole evidence base had to be characterized. Therefore, the only exclusion criteria were: not empirical; not early; simulation, rather than authentic experience.

Outcome variables

No outcome variables were predefined because this was an exploratory, rather than hypothesis-testing, review.

Search strategies

Scoping search

To evaluate the availability of evidence and develop a potential search strategy, Alex Haig (BEME information scientist) ran a scoping search in April 2002. It covered the period January 2001 to April 2002, and was run across Medline, EMBASE, Psychlit, CINAHL, Premedline, and the EBM review databases. The search syntax was:

(1) exp students, medical/
(2) 'medical student$'.mp. [mp = ti, ab, tx, ct, sh, it, rw, hw, ty, id]
(3) exp education, medical, undergraduate/
(4) undergraduate.mp. [mp = ti, ab, tx, ct, sh, it, rw, hw, ty, id]
(5) exp clinical clerkship/
(6) (clinic$ adj2 clerk$).mp. [mp = ti, ab, tx, ct, sh, it, rw, hw, ty, id]
(7) exp PRECEPTORSHIP/or preceptorship.mp.
(8) exp clinical competence/
(9) (clinic$ adj3 competenc$).mp. [mp = ti, ab, tx, ct, sh, it, rw, hw, ty, id]
(10) (skills adj (lab or labs or laborator$)).mp. [mp = ti, ab, tx, ct, sh, it, rw, hw, ty, id]
(11) exp patient simulation/
(12) (patient$ adj3 simulat$).mp. [mp = ti, ab, tx, ct, sh, it, rw, hw, ty, id]
(13) 'standardi#ed patient$'.mp. [mp = ti, ab, tx, ct, sh, it, rw, hw, ty, id]
(14) (clinic$ adj skill$).mp. [mp = ti, ab, tx, ct, sh, it, rw, hw, ty, id]
(15) 1 or 2 or 3 or 4
(16) 10 or 11 or 12 or 13 or 14
(17) 15 and 16
(18) 15 and (8 or 9)
(19) 5 or 6 or 7 or 18

At this stage, the first of several validation exercises, to be described in detail elsewhere, was carried out. Briefly, the two lead reviewers reviewed the titles and abstracts of 1003 articles identified by the search. The reviewer who was responsible for selecting informative articles out of that large number of 'hits' had a balance of sensitivity and specificity for relevant evidence that was good, and could not be improved by second-screening. Therefore, it was decided appropriate for this researcher alone to select articles for further consideration from the main search.

Main search

The 10-year period 1992–2001 was chosen because it was expected to produce a manageable amount of relatively recent literature, and because secondary screening of selected papers should lead to relevant older publications. Searches were run across BEI, ERIC, Medline, CINAHL and EMBASE using OVID software, initially using the same search strategy as the scoping search, but later switching to a more sensitive strategy:

Refined Medline Search Strategy

(1) exp Students, Medical/
(2) (''students of medicine'' or medical student$).ab,kf,tw,ti,jn,jw,kw.
(3) exp Education, Medical, Undergraduate/
(4) ed.fs.
(5) exp education/
(6) undergraduate.ab,kf,au,tw,jn,jw,kw.
(7) (4 or 5) and 6
(8) 1 or 2 or 3 or 7
(9) exp clinical clerkship/
(10) (clinic$ adj3 clerk$).ab,kf,ot,tw,ti,jw,kw.
(11) exp PRECEPTORSHIP/ or preceptorship.mp.
(12) 9 or 10 or 11
(13) (skills adj (lab or labs or laborator$)).ab,ot,tw,ti,jw,kw.
(14) exp Patient Simulation/
(15) (patient$ adj3 simulat$).ab,ot,tw,ti,jn,jw,kw.
(16) "standardi#ed patient$".ab,kf,ot,tw,ti,jn,jw,kw.
(17) (clinic$ adj skill$).ab,kf,ot,tw,ti,jn,jw,kw.
(18) 13 or 14 or 15 or 16 or 17
(19) exp Clinical Competence/or clinical competence.mp.
(20) (clinic$ adj3 competenc$).ab,kf,tw,ti,jw.
(21) 19 or 20
(22) 8 and 18
(23) 8 and 21
(24) 9 or 10 or 11 or 22 or 23
(25) limit 24 to yr = 1991–2002

Because of the way it handles educational terms, EMBASE yielded 97,000 citations. The search syntax, as shown below, was refined to improve its specificity. All citations were imported into bibliographic software, and duplicates eliminated.

EMBASE Search Strategy

(1) exp students, medical/
(2) (students of medicine or medical student$).af.
(3) medical education/ or exp medical school/ or exp residency education/
(4) undergraduate.mp. [mp = title, abstract, subject headings, drug trade name, original title, device manufacturer, drug manufacturer name, device trade name]
(5) 3 and 4
(6) 1 or 2 or 5
(7) exp Clinical Education/
(8) (clinic$ adj3 clerk$).ab,jw,ot,tw,hw,ti.
(9) preceptorship.mp.
(10) 7 or 8 or 9
(11) (skills adj (lab or labs or laborator$)).ab,jn,jw,ot,tw,hw,ti.
(12) exp patient simulation/
(13) (patient$ adj3 simulat$).ab,ot,tw,hw,ti.
(14) standardi#ed patient$.ab,ot,tw,hw,ti.
(15) (clinic$ adj skill$).ab,ot,sh,tw,hw,ti.
(16) 11 or 12 or 13 or 14 or 15
(17) exp Competence/or clinical competence.mp.
(18) (clinic$ adj3 competence).ab,ot,tw,hw,ti.
(19) 17 or 18
(20) 6 and 16
(21) 6 and 18
(22) 6 and 7
(23) 6 and 19
(24) 8 or 9 or 20 or 21 or 22 or 23
(25) limit 24 to yr = 1991–2002

There were 8488 hits, 4627 from Medline, 629 from ERIC, 7 from BEI, 1009 from CINAHL and 2216 from EMBASE. Deletion of 1507 duplicates left 6981 citations.

Hand-searching

Individual members of the TRG hand-searched: *Medical Education, Medical Teacher, Academic Medicine, Teaching and Learning in Medicine, Advances in Health Sciences Education*, and the *Journal of Educational Psychology*. This yielded 21 articles that had not been identified by the main search.

Other databases

Psychinfo: This was searched using an adapted version of the Medline and BEI search.

Timelit: Because this database is not indexed, it was searched on simple key words.

EBM reviews: This was searched using, again, an adapted version of the Medline search:

(1) exp medical students/
(2) (students$ adj medic$).mp. [mp = ti, ab, tx, kw, ct, ot, sh, hw]
(3) (medic$ adj student$).mp. [mp = ti, ab, tx, kw, ct, ot, sh, hw]
(4) exp medical education/
(5) exp education/
(6) undergraduate.ot,ab,hw,sh,ti,in,jn,jw.
(7) health/
(8) exp physicians/
(9) 9 medic$.mp. [mp = ti, ab, tx, kw, ct, ot, sh, hw]
(10) undergraduate education/
(11) (7 or 8 or 9) and (5 and 6)
(12) 1 or 2 or 3 or 4 or 11
(13) clinical methods training.mp. [mp = ti, ot, ab, tx, kw, ct, sh, hw]

(14) (clinic$ adj3 clerk$).mp. [mp = ti, ab, tx, kw, ct, ot, sh, hw]
(15) preceptorship$.mp. [mp = ti, ab, tx, kw, ct, ot, sh, hw]
(16) (skill$ adj (lab or labs or laborator$)).mp. [mp = ti, ab, tx, kw, ct, ot, sh, hw]
(17) ((lab or labs or laborator$) adj skill$).mp. [mp = ti, ab, tx, kw, ct, ot, sh, hw]
(18) (patient$ adj3 simulat$).mp. [mp = ti, ab, tx, kw, ct, ot, sh, hw]
(19) standardi#ed patient$.mp. [mp = ti, ab, tx, kw, ct, ot, sh, hw]
(20) (clinic$ adj2 skill$).mp. [mp = ti, ab, tx, kw, ct, ot, sh, hw]
(21) exp COMPETENCE/
(22) exp professional standards/
(23) peer evaluation/
(24) (clinic$ adj3 competenc$).mp. [mp = ti, ab, tx, kw, ct, ot, sh, hw]
(25) 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24
(26) 12 and 25
(27) limit 26 to yr = 1991–2001 [Limit not valid in: DARE; records were retained]

This yielded 185 citations, of which 62 were automatically deleted as duplicates.

SIGLE: This database of grey literature produced five further citations.

Cochrane databases: No additional citations.

Theses: Three theses were obtained in microfilm, but found not to fulfil the inclusion criteria; a further thesis that seemed potentially relevant by title could not be obtained.

The numbers of articles identified from the various sources, and their contribution to the first dataset, are listed in Table 1. Only 8% of the final set of articles assembled before manual elimination of duplicates came from additional screening, suggesting that the main search had acceptable sensitivity.

Secondary screening

The bibliographies of all articles that fulfilled the inclusion criteria were screened to identify other articles within the review period that fulfilled the inclusion criteria. None were found.

Table 1. Bibliographic sources of included citations.

	Citations found (*n*)	Duplicates or articles outside time frame of study (*n*)	New citations (*n*)
Main search	6981		6981
EBM Reviews	185	62	123
Psychinfo	475	53	422
Timelit	49	33	16
SIGLE	5	2	3
Handsearch	16	10	6
After manual elimination of further duplicates			6832

Handling of search results

All search results were entered into Endnote (Endnote Version 5.0.2 Research Soft Berkeley, California, USA). Citations from the Ovid databases were saved in a 'Reprint/Medlars' format then imported through the 'Medline Ovid' import filter. Duplicates were discarded, first automatically, then by manual elimination. A first researcher reviewed each of the 6832 articles by title/abstract. She excluded publications that were clearly irrelevant, but retained them in the bibliographic file for future reference. Full text copies were obtained of any article she deemed possibly relevant by title/abstract. She forwarded all articles that fulfilled the selection criteria for coding by one other TRG member and either herself or her co-lead researcher. Where possible, disagreements were resolved by consensus between the two coders. If a disagreement could not be resolved, the whole TRG reviewed the article.

Two further exercises were carried out at this stage to validate the process of article selection, as will be described in more detail elsewhere. In brief:

(1) A 10% stratified random sample of the results of the main search (699 titles/abstracts) was reviewed by the two lead researchers. The first researcher, who was doing the screening alone, identified every article identified by the second researcher with better specificity. Therefore, she continued to select articles single-handed.
(2) A validation set of 124 articles was developed. This included 14 articles on which the two lead researchers had disagreed, a small number of articles they agreed were relevant, and an opportunity sample of irrelevant articles. Any article judged relevant by any researcher was retrieved in full text, and the TRG together agreed on a set of articles for inclusion in the review. Throughout this exercise, the lead researcher who was responsible for article selection had a much better balance of sensitivity and specificity for relevant evidence than any other TRG member. This, again, confirmed that single-screening, up to the point of coding, was acceptable.

All this took place before the evidence itself was coded, at which stage a final coding was always arrived at by consensus between two independent coders, with opinions from other TRG members if there was a substantial disagreement.

Data management techniques

Extracting and coding data

In the early stages, the standard BEME coding sheet was used. During the subsequent validation stages, the coding sheet was modified progressively and 'tailored' to the review. (The final version is included on the BEME Collaboration website: http://www.bemecollaboration.org). Fields included:

- Research methods
  - Research design
  - Data collected in the study
- Aims/Intended Learning Outcomes of Early Experience

- The intervention
  - Description
  - Description of the control condition
  - Location of the study
  - Stage of the curriculum at which early experience was offered
  - Supervision of students
  - Whether it was compulsory or voluntary
- The learners
  - Number of intervention subjects
  - Number of control subjects
  - The health profession in which the study was conducted
- Outcomes
  - Each outcome of the study, its 'impact level', according to Kirkpatrick's hierarchy, and an evaluation of its methodological strength.

Use of Kirkpatrick's four-level hierarchy of the impact of educational interventions is a core BEME methodology. The levels (as defined for BEME coders) are: (1) *Participation*: Covers learners' views on the learning experience, its organization, presentation, content, teaching methods and aspects of the instructional organization, materials and quality of instruction. (2a) *Modification of attitudes/perceptions*: Outcomes here relate to changes in the reciprocal attitudes or perceptions between participant groups toward the intervention. (2b) *Modification of knowledge/skills*: For knowledge, this relates to the acquisition of concepts, procedures and principles; for skills this relates to the acquisition of thinking/problem-solving, psychomotor and social skills. (3) *Behavioural change*: Documents the transfer of learning to the workplace or willingness of learners to apply new knowledge and skills. (4a) *Change in organizational practice*: Wider changes in the organization/delivery of care, attributable to an educational programme. (4b) *Benefits to patients/clients*: Any improvement in the health and well-being of patients/clients as a direct result of an educational programme.

A first reviewer read each paper and completed the coding form. One of the two lead researchers then coded it independently and identified differences between the first and second coding. The second coder, having corrected obvious mistakes, offered a moderated coding to the first coder who could approve it, or request moderation by the whole TRG.

Data analysis

The content of all completed coding forms was transferred into a Microsoft Access database. This database served as a source of reference throughout the analysis. A spreadsheet of the entire set of outcomes, with attendant strength and Kirkpatrick level, was exported to SPSS (SPSS Inc, Chicago, USA). The lead investigator developed a hierarchical coding schema which loosely conformed to our previous inventory of early experience objectives (Dornan & Bundy, 2004). Outcomes with a strength of 1–2 (no conclusions can be drawn—ambiguous) were designated 'insignificant', and those with a Kirkpatrick level of 1 (participation) were designated 'unimportant'. In the sections that follow, 'Findings—A' refers to the complete set of 73 studies and 277 outcomes. 'Findings—B', the main results of the study, refers to the 35 studies that yielded 116 significant and important outcomes.

Synthesis into a presentation of results

Some studies were comparative, and some were descriptive. The TRG took the view that to discount descriptive data would be to discount an important means of evaluating complex educational interventions (Murray, 2002). However, comparative and descriptive methodologies answered different questions, which were respectively: (a) What learning outcomes does early experience attain, compared with a control condition? (b) What learning outcomes can early experience support? In the presentation of results the outcomes of comparative and descriptive studies were handled separately. All outcomes associated with each code in the hierarchical coding structure were extracted, together with their methodological strength and Kirkpatrick level. A narrative summary was written, conforming to the structure of the coding system. Finally, the data were restructured to minimize redundancy and the outcomes were pasted verbatim into the new structure. This new structure divided outcomes into those pertaining to students, and those pertaining to other (named) beneficiaries. A final narrative was written with reference back to the original papers to avoid any distortion that had been introduced by the intermediate stages of data handling. The wording of the narrative reflects the comparative or descriptive nature of the study from which each outcome was derived.

Findings A—Overview of the studies and their methodological quality

Studies

Seventy-three studies fulfilled the selection criteria.

Context

In total, 69% of studies were conducted in North America, 23% in Europe and 8% in other parts of the world. One study was in nursing, four in pharmacy (practice) and the remaining 68 in medicine.

Study designs (Table 2)

Seventy-four study designs were used (two in one of the 73 studies):

The three studies coded in Table 2 as 'other' were described by their coders as follows:

- Comparing two different outcomes in the same cohort of students.

Table 2. Study designs.

	Frequency
Non-comparative	46 (62%)
Comparative; non-randomized; sequential	9 (12%)
Comparative; non-randomized; parallel	14 (19%)
Comparative; randomized	2 (3%)
Other	3 (4%)

- Study examines the match between clinical experience in family practice during medical course and entry into family practice.
- Qualitative—use of learning logs and individual interviews.

Interventions

Early experience was compulsory in 53 studies (73%) and voluntary in 20 (27%). In all, 71% of experiences took place in primary care/community/family medicine and 28% in hospital, hospice or medical school. Experience was provided in year 1 in 35 curricula (48%), year 2 in 13 curricula (18%), both year 1 and year 2 in 21 curricula (29%), and as a continuous strand over several curriculum years in two curricula (2%). The remaining two curricula (2%) were non-medical, and therefore not directly comparable to medical curricula. Students were supervised in 65 (97%) curricula and unsupervised in two (it was not specified whether students were supervised in six curricula).

Fifty of the interventions (68%) were clinical placements ranging from one single half-day session to half-day clinical visits throughout two preclinical years. Six interventions consisted of clinical skills training[1], five consisted of attachments to a community, and five were attachments to a single patient or family. In seven studies, there was some other activity or the activity was not specified.

Sources of data

One hundred and fifteen sources of data were used. In order of frequency they were:

- formal evaluation by students (quantitative or rigorous qualitative)—42%;
- formal evaluation by staff (quantitative or rigorous qualitative[2])—16%;
- student assessment—15%;
- informal opinions of students—10%;
- informal opinions of staff—6%;
- student behaviour—5%;
- other—5%:
  - residency choice—2;
  - formative assessment—1;
  - patient opinion—1;
  - participant opinion—1;
  - school teacher opinion—1 (where students went out to schools);
- patient outcomes—1%.

Number of subjects

The median number of intervention subjects, specified in 64 studies, was 110; range 6–1081. The median number of control subjects in 18 studies was 56, range 20–643.

Number and direction of outcomes

Coders identified 277 outcomes: 245 (88%) positive, 23 (8%) neutral and nine (3%) adverse.

Strength and Kirkpatrick level of outcomes

Strength (Table 3)

One hundred and twenty-eight (47%) were not significant or ambiguous, 110 (39%) were suggestive, and 39 (14%) clear or unequivocal.

Kirkpatrick level (Table 4)

Sixty-six outcomes (24%) were at level 1 (participation) and the remaining 76% were at a higher level.

Cross-tabulation of strength and Kirkpatrick level

Table 5 below shows how the studies fit into a level/strength matrix. There was a slight tendency for stronger studies to be at a higher Kirkpatrick level and vice versa.

Beneficiaries of the outcomes (Table 6)

There were 248 student outcomes (90%), 11 (4%) teacher outcomes, eight (3%) specialty outcomes (i.e., a specialty

Table 3. Methodological strength of the outcomes.

	Frequency
Not significant	38 (14%)
Ambiguous, but trend	90 (33%)
Suggestive	110 (40%)
Clear	37 (13%)
Unequivocal	2 (1%)

Table 4. Kirkpatrick level of the outcomes.

	Frequency
Participation (1)	66 (24%)
Subjective competence (2a)	84 (30%)
Objective competence (2b)	93 (34%)
Behaviour (3)	25 (9%)
Organizational practice (4a)	6 (2%)
Benefit to patients (4b)	3 (1%)

Table 5. Cross-tabulation of strength and Kirkpatrick level.

	Kirkpatrick level	
	Participation	All higher levels
Strength: weak or insignificant	34 (12%)	94 (34%)
Strength: significant	32 (12%)	117 (42%)

Table 6. Beneficiaries of early experience.

	Frequency
Students themselves	248 (90%)
Teachers (including senior student)	11 (4%)
Specialties or specialty groups (inc rural practice)	8 (3%)
Organizations	6 (2%)
Populations	2 (1%)
Individual patients	2 (1%)

rather than a person benefited from early experience), six (2%) institutional/organizational outcomes, two population outcomes, and two individual patient outcomes.

Findings B—Main results

The numbers of outcomes from comparative vs. non-comparative studies, positive vs. neutral/adverse, and insignificant vs. significant, are shown in Table 7. Each significant outcome is identified by a citation to the study from which it came.

Effect on career choice

Six outcomes came from five long-term, comparative US cohort studies in which the career choices of students who had primary care experience in their first year (sometimes backed up by primary care experience and training at other stages of the course) were compared with the career choices of students who did not have primary care experience [6–10]. A major aim of early experience in these studies was to increase recruitment to primary care in underserved areas. No study was randomized, and participants were more or less self-selected. Controls were either students who had applied and not been selected, or students who had not applied. Participants were more likely to choose primary care/family practice residencies, and had more positive attitudes towards rural practice. Four descriptive studies found a positive impact of early experience on students' attitudes towards primary care/rural practice [1–4]. For example, over 90% of students viewed a first-year rural attachment as relevant to their future careers as physicians in an underserved population [4]. Conclusions about the impact of early experience on career choice are limited by self-selection in the comparative studies, and confounding between early experience and other influences on students' choice of residency. In one study, for example, students who had early experience in primary care were helped to locate primary care residencies, so it is unsurprising more of them chose primary care [9]. In another, family doctors' participation in early clinical education was a stronger influence than early experience per se on students' residency choice [10]. A qualitative study found that there were many more influences on students' career choices than the specialties they were exposed to in the early years [5]. Early experience in primary care, it seems, is an important component of curriculum initiatives that have been effective in recruiting for primary care, but it would be unsafe to conclude that early experience is a sufficient condition in itself.

Effect on students' learning

Effect on students' affects (attitudes)

Attitudes towards others

Two descriptive studies, one in hospital and one in the community, found that early experience helped students develop empathic reactions towards ill people [11, 12]; in one, the effect persisted several years beyond graduation [11].

Professional socialization & attitudes towards practice

A number of outcomes concerned students' socialization to their role as clinical learners and future physicians. The two comparative studies had neutral results. One divided students retrospectively according to their amount of early experience, and found no difference in their self-rated development of cynicism [15]. In a pre–post design, early training in medical interviewing did not affect students' attitudes towards psychosocial aspects of patient care [16]. In contrast, student participants in a descriptive study regarded the awareness of patients' living conditions they had developed during early experience as relevant to their future delivery of good healthcare [4]. During early experiences, teachers observed students becoming more mature in their dealings with patients [14]. Students viewed early experience as an opportunity to begin their professional development, and to acclimatize to professional settings [5]. They valued early exposure to different physician role models [13], and early experience gave medical schools a vehicle to expose students to appropriate role models early [1]. After qualification, physicians felt early experience had reduced the stress they experienced during patient interactions in clerkships, and had made a lasting contribution to their development as physicians [11].

Self-awareness

Students who were asked to write about their affective reactions to early experience described how it helped them recognize and respond to feelings of uncertainty and inadequacy, and emotional reactions towards patients [12].

Attitudes towards studies

Satisfaction

First-year students in a US curriculum who chose to have more experience were more satisfied with their medical education than peers who had less experience [15]. Students regarded interviewing patients with chronic disease in the community and their homes as a good learning experience that gave them insight into social and psychological aspects of disease and the lives of 'real people' [17]. There were many other studies reporting a positive impact of early experience on students' satisfaction with their studies that were too weak to be included in this report.

Confidence

Two comparative and seven descriptive studies showed how early experience could increase students' comfort in meeting and interviewing people [1, 2, 14, 16–21], including old people and children [20, 21].

Table 7. (a) Main results—impact on students.

			Positive		Neutral/adverse	
Outcomes	Type of study		Insignificant ± unimportant	Significant	Insignificant ± unimportant	Significant
Career/specialty choice	Non-comparative		***4***	***5*** [1] [2] [3] [4]	***2***	***1*** [5]
	Comparative		***3***	***6*** [6] [7] [8] [9] [10]	***0***	***0***
Affective outcomes						
Attitudes towards others	Non-comparative		***2***	***2*** [11] [12]	***0***	***0***
	Comparative		***1***	***0***	***0***	***0***
Professional socialization and attitudes towards practice	Non-comparative		***10***	***8*** [1] [13] [11] [14] [5] [4]	***0***	***0***
	Comparative		***1***	***0***	***0***	***2*** [15] [16]
Self-awareness	Non-comparative		***1***	***1*** [12]	***2***	***0***
	Comparative		***0***	***0***	***0***	***0***
Attitudes towards studies						
Satisfaction	Non-comparative		***27***	***1*** [17]	***2***	***0***
	Comparative		***0***	***1*** [15]	***0***	***0***
Confidence	Non-comparative		***8***	***7*** [1] [18] [14] [17] [2] [19] [20]	***0***	***0***
	Comparative		***1***	***2*** [21] [16]	***0***	***0***
Motivation	Non-comparative		***8***	***7*** [14] [12] [5] [3] [19] [20]	***0***	***0***
	Comparative		***0***	***0***	***0***	***0***
Cognitive outcomes						
Application	Non-comparative		***9***	***0***	***0***	***0***
	Comparative	***0***	***0***	***0***	***0***	
Exposure	Non-comparative		***4***	***4*** [5] [2] [19]	***0***	***0***
	Comparative	***0***	***0***	***0***	***0***	
Reality	Non-comparative		***1***	***1*** [5]	***0***	***0***
	Comparative	***1***	***1*** [22]	***0***	***0***	
Cognitive skills	Non-comparative		***1***	***1*** [5]	***0***	***0***
	Comparative	***0***	***0***	***0***	***0***	
Knowledge						
Population health	Non-comparative		***8***	***6*** [23] [4] [24]	***0***	***0***
	Comparative	***0***	***0***	***0***	***0***	
Professional roles and relationships	Non-comparative		***3***	***6*** [23] [14] [12] [24]	***0***	***0***
	Comparative	***0***	***0***	***0***	***0***	
Healthcare	Non-comparative		***3***	***2*** [3] [4]	***0***	***0***
	Comparative	***0***	***1*** [25]	***0***	***0***	

Impact of disease	Non-comparative		***1***	***3*** [23] [13] [12]	***0***	***0***
	Comparative	***0***	***0***	***0***	***0***	
Biomedical sciences	Non-comparative		***2***	***1*** [14]	***0***	***0***
	Comparative	***0***	***0***	***0***	***0***	
Behavioural and social sciences	Non-comparative		***0***	***2*** [12] [17]	***0***	***0***
	Comparative	***1***	***0***	***0***	***0***	
General/unclassified	Non-comparative		***2***	***3*** [18] [11] [4]	***1***	***0***
	Comparative	***0***	***1*** [21]	***1***		***0***
Skills						
Communication skills	Non-comparative		***2***	***5*** [23] [14] [26] [17] [19]	***0***	***0***
	Comparative	***3***	***2*** [16]	***3***	***0***	
General clinical skills	Non-comparative		***1***	*7* [18] [13] [11] [27] [17] [2]	***0***	***0***
	Comparative		***6***	***4*** [28] [16] [29]	***2***	***3*** [28] [16]
Study skills	Non-comparative		***8***	***2*** [30]	***0***	***0***
	Comparative	***1***	***0***	***0***	***0***	
Performance in assessments						
	Non-comparative	***4***	***4*** [1] [31] [19]	***0***	***0***	
	Comparative	***4***	***5*** [32] [33]	***1***	***5*** [32] [33] [34] [35]	

(b) Impact on other beneficiaries

		Positive		Neutral/adverse	
Beneficiary	Type of study	Insignificant ± unimportant	Significant	Insignificant ± unimportant	Significant
Teachers	Non-comparative	***4***	***1*** [36]	***4***	***0***
	Comparative	***2***	***0***	***0***	***0***
Organizations	Non-comparative	***2***	***1*** [2]	***1***	***0***
	Comparative	***0***	***0***	***1***	***0***
Populations	Non-comparative	***1***	***1*** [37]	***0***	***0***
	Comparative	***0***	***0***	***0***	***0***
Individual patients	Non-comparative	***0***	***1*** [38]	***0***	***0***
	Comparative	***0***	***0***	***1***	***0***

Notes: Numbers of outcomes in bold italics;
Citations in square brackets (see Appendix 1 for list of citations);
"Significant" outcomes have a strength of >2 and Kirkpatrick level >1 as defined in the text; the nature of the outcomes is described in the text.

Motivation

Six studies described how early experience could motivate students by reminding them of their vocation to be a doctor and reinforcing it. Early experience showed them the practical relevance of the theory they were learning and made it easier to learn by forming associations in their minds. Interacting with patients and physician role models was motivating and gave respite from the highly structured routine of medical school [3, 5, 12, 14, 19, 20].

Cognitive outcomes

Early experience enhanced students' learning by making diseases come alive [5, 22] and giving first-hand exposure to people with a variety of diseases [2, 19]. It provided a framework for students to understand clinical practice [5], and allowed them to see clinicians at work, and see clinical interactions from a doctor's perspective [5]. It helped develop 'clinical ways of thinking' [5].

Knowledge of subject matter

Population health

Through visits to patients in their own homes, visits to social support services outside the health system and short periods of residence in rural communities, students learned about how people live, how their living conditions influence health and disease, and the need for services that are accessible to users [4, 23, 24].

Professional roles and relationships

Detailed qualitative evaluation and numerical responses to evaluation instruments showed how community visits, primary care attachments and attachments to nurses could strengthen medical students' understanding of the role and responsibilities of doctors and other health professionals, and the importance of good communication and multidisciplinary working [12, 14, 23, 24].

Healthcare

Pharmacy students who obtained clinical experience by shadowing senior students knew more about pharmacy practice than controls [25]. Medical students were able to learn about the healthcare system of underserved communities through community attachments [3, 4].

Impact of disease

Early experience helped students understand patients' experiences of health and disease, and how illness impacted on them [12, 13, 23].

Biomedical sciences

In a qualitative survey, medical students reported that early experience had helped them understand basic medical sciences [14].

Behavioural and social sciences

Early experience in hospital or community helped students understand behavioural and social sciences, and recognize the ethical dimension of patient care [12, 17].

General/Unclassified knowledge

Early placement experience made students more confident in their knowledge, and 'taught them things that could not be learned from books' [4, 11, 18, 21].

Skills

Communication skills

First-year medical students who received structured and supervised interview training with real patients, and followed up a chronically ill patient over time, showed significant increases in objective ratings of their ability to relate to simulated patients in videotaped interviews. Their self-reported ability to relate to patients and communicate empathy increased greatly [16]. First- and second-year student participants in community interviewing schemes reported improvements in their ability to communicate [19], and valued being able to explore social and psychological determinants of health and illness through contact with real patients [17]. Qualitative evaluation showed how early experience could help them understand the doctor–patient relationship [14], and the importance of listening to patients, carers and other professionals [23]. First-year students were successfully taught to educate diabetic patients in preventive foot care, and save their preceptors time in consultations [26].

General clinical skills

Through early experience, backed up by skills training, first-year medical students were able to acquire history-taking skills [13, 16, 17, 27–29]. Doing so through patient contact did not make them slower interviewers [16]. They valued learning to interview [2, 17], and found that real patient contact helped them learn note-taking [17]. Likewise, they were able to learn simple physical examination skills, including accurate blood pressure measurement; again, they valued the opportunity [2, 18, 28, 37]. In retrospect, graduates felt early experience had significantly helped them develop an ability to approach patients and interview them [11].

Study skills

Learning logs showed how early experience could provoke reflection, and uncover differences in students' capacities to engage with experience and interpret it [30].

Performance in assessments

There is evidence from parallel group, comparative studies of better performance in a variety of summative assessments but students who had early experience were at least partly self-selected [32]. Effect sizes were small, and there were also studies with neutral results [33, 34]. Students

who had early experience in the community performed comparably in assessments to students in hospital [35]. Claims of improved performance in assessments were sometimes based on sketchy data and weak study methods [1, 19, 31].

Effects on teachers

Primary care teachers in a US medical school were motivated to supervise students' early experience through their enjoyment of teaching and a wish to 'give something back to the profession'. They wanted to contribute to students' professional development and influence them towards choosing primary care specialties [36].

Effects on organizations

The curriculum of a US medical school changed to include two extra electives in Y1 as a result of providing early mentoring in family medicine [2].

Effects on populations

A field exercise in which students were first trained to measure blood pressure, then measured the blood pressure of a population in rural Oman, was of potential benefit to the population involved; medical students from the same school have delivered oral health, detected and treated trachoma, and helped manage malnutrition [37].

Effects on individual patients

Qualitative analysis of patients who had been interviewed by first-year medical students found the patients satisfied for several reasons: the interviews were satisfying, they had favourable impressions of the students and were pleased to contribute to their education [38].

Summary of findings

Methodological findings

Ninety-eight per cent of titles identified by screening came from a single search syntax applied to six electronic databases. Hand screening of six journals and five additional databases, though very time-consuming, added just 2% of the final set of titles. A single researcher had a good balance of positive and negative prediction of articles that later proved informative, which was not improved upon by duplicate review of the titles and abstracts by a second researcher. Thirty-five of the 73 articles that fulfilled the inclusion criteria reported outcomes that were too unimportant or methodologically unsound to be included in the final synthesis of results. Seventy-two per cent of informative outcomes came from descriptive studies.

Outcomes for learners

Affective outcomes: Early experience helped learners develop empathic attitudes towards ill people. Studies of its impact on professional socialization and attitudes towards practice had mixed results. The two comparative studies showed no difference but respondents in descriptive studies described how early experience had influenced their attitudes towards practice, helped them develop professionally, helped them acclimatize to professional settings and reduced their stress during early patient interactions. Early experience exposed students to role models and helped them mature. It could also influence students' self-awareness and attitudes towards their studies. Respondents described how early experience helped them recognize and respond to feelings of uncertainty and inadequacy, and become aware of their emotional reactions to patients. Students who chose to have early experience were more satisfied with their education than peers who did not. One reason for that satisfaction was insight into social and psychological aspects of disease and the lives of real people that resulted from early experience. Early experience made students more confident to meet people and helped motivate them by reminding them of their vocation, strengthening their learning of theory, giving it relevance, and providing opportunities for social contact with patients and physician role models.

Cognitive outcomes: Early experience could support students' cognitive processes by making diseases come alive, providing a context for their learning, providing a framework to understand clinical practice, showing them the clinician's perspective and helping them develop clinical ways of thinking.

Knowledge: Early experience helped students acquire a range of subject matter: knowledge of how people live, how their living conditions influence health and disease, and how clinical services must be accessible to users. It helped them learn about the roles and responsibilities of health professionals and the importance of good communication and collaboration between them, clinical practice and healthcare systems, patients' experiences of health and disease, and how illness impacts on them. Early experience supported students' learning of both the biomedical and behavioural/social sciences and taught them a type of knowledge that could not be learned from books.

Skills: Early experience helped students learn to relate to patients, interview them, communicate empathy to them and explore social and psychological determinants of health and illness. It helped them understand the doctor–patient relationship, and the importance of listening to carers and professionals. Students could learn simple clinical skills, and found it very motivating to do so.

Study skills: Early experience could bring to light differences in students' reflective capacities to engage with real experience and interpret it.

Performance in summative assessments: Early experience improved performance in summative assessments in some studies, although the evidence base was methodologically weak and inconsistent.

Career choice: Early experience increased recruitment to primary care/rural medical practice in the USA, though the studies were weakened by their non-randomized designs and confounding between early experience and other influences on students' residency choices. Early experience helped students build positive attitudes towards primary care/rural practice.

Outcomes for other beneficiaries

Early experience could be motivating to teachers and beneficial to their specialties and parent organizations. It could be personally rewarding to patients and could bring healthcare to otherwise unserved populations.

Discussion

Principal findings

There was a substantial literature bearing on the review question, amounting to 73 empirical studies published over a decade. There were also many individual and consensus views not supported by empirical data and therefore falling outside the scope of the review. Nearly half the research studies were excluded because they were methodologically weak or reported unimportant outcomes, but still there was an evidence base from which certain conclusions could emerge.

Early experience was usually compulsory, in the community, and either in the first or first and second years of the curriculum. It usually consisted of a supervised clinical placement, though sometimes it gave students direct exposure to people, their families and the communities they were part of. The effects of early experience were usually evaluated by students, but sometimes by staff. Some studies had quantitative endpoints including career choice and performance in summative assessments. Some studies measured the impact on teachers, their parent organizations or specialties, and on individual patients or populations. Some of the most informative studies were qualitative, so analysis of the results entailed looking for patterns in the data, as much as critically appraising individual quantitative studies.

The most commonly stated reason for offering early experience was to recruit clinicians to primary care specialties in rural/underserved areas. As part of a complex curriculum intervention (Murray, 2002) it helped do so. Early experience was not proved to be a sufficient—or even necessary—condition for recruitment, but education research is a complex business (Murray, 2002) and it has been argued cogently that the randomized controlled trial which would give the definitive answer would be an artefact of little real-world value (Norman, 2003). We conclude that early experience in community settings and all that such experience entails can have a lasting influence on students' learning which influences their subsequent career choices.

The other results of the review amount to an inventory of learning outcomes that can be supported or enhanced by early experience. Many of the individual pieces of evidence could be deconstructed but current trends in educational practice suggest that early experience is here to stay, so it would be more fruitful to identify the learning outcomes that are most likely to benefit from it. Most fall under the broad heading of 'professionalism' (Irvine, 1999; Medical Professionalism Project, 2002): developing appropriate attitudes towards oneself, towards other people, and towards one's studies; being able to communicate well and see other people's points of view; and socializing to the position of practitioner-in-waiting.

There was also a weight of evidence that early experience could motivate students by showing them the light at the end of the theory tunnel, and equip them with confidence to meet patients. There were cognitive benefits, chiefly strengthening students' learning of theory by giving it context and making it come alive. Early experience could strengthen students' learning of the subject matter of the curriculum, and here again the professionalism theme emerged. It could teach them about clinicians' roles, responsibilities and position in society; about public health and how the healthcare system can improve it; and about the impact of disease on patients. There was surprisingly little evidence of the impact of early experience on the foundation clinical sciences, though what evidence existed was positive. Finally, there was evidence that early experience could do more good than harm to beneficiaries other than students.

Strengths and limitations

Only 2% of studies were randomized so, if the evidence base for early experience were examined under a strictly positivist lens, there would be almost none. However, the evidence movement has been criticized for being 'statistical rather than scientific', because it ''excludes or relegates to inferior status the role of implicit or unquantifiable factors'' (Charlton & Miles, 1998). Although that criticism was levelled against evidence-based *medicine*, the same arguments apply to education, arguably even more strongly. Education entails complex interventions, within a system that is open, non-linear, organic, historical and social, and is best evaluated with mixed methodologies (Murray, 2002; Kelly, 2003). To admit qualitative evidence is not to abandon rigour, because rigour is not the preserve of quantitative research. Indeed, a striking feature of this review was how rigorous qualitative studies could provide important and strong information concerning the impact of early experience on students' learning. Qualitative research seeks to explain rather than enumerate, and is well suited to the complex cognitive and affective conditions of professional education (Murray, 2002).

The danger of being liberal in the inclusion criteria for a review was that it would increase the positive publication bias. Our hurdle for admissibility of evidence was set at a level that should exclude weak and unimportant studies and admit all informative ones, allowing for the subjective judgements that had to be made regarding strength and importance. Debate and consensus within the TRG was used to make those judgements, and selection process and analysis were conducted very rigorously, including the application of qualitative techniques to the assembly of the results narrative. Neutral studies were pooled with negative ones. Nevertheless, we have to recognize the possibility of positive publication bias in the results of the review. It would have been very informative to evaluate how different types of intervention achieved different outcomes but the interventions were rarely described well enough to make such an analysis possible.

Directions for future research

Considering the social and political pressures to offer early experience, the quality of the research effort to date has been disappointing, with the striking exception of the rigorous quantitative evaluation of the impact of early experience on residency choice in the USA. In contrast, the massive US Interdisciplinary Generalist Curriculum project, which was funded to change the curricula of 10 US medical schools,

contributed just five publications, over half of whose outcomes were too weak and/or unimportant to qualify for inclusion. Qualitative research can help explain the changes that experience brings about, and explore the link between specific interventions and outcomes. However, there is a pressing need to develop valid and reliable quantitative curriculum outcomes, other than performance in summative assessments, which can be used both to evaluate and cost the curriculum interventions that are being driven by current social, theoretical and pedagogic change and the professionalism movement.

Conclusions

Early experience in primary care was a component of curriculum initiatives that have been effective in recruiting for primary care but early experience, in itself, has not been proved to be a *sufficient* condition for recruitment. It can help learners attain a number of affective outcomes, including empathy towards patients and positive attitudes towards practice. It can help build self-awareness, and make students more satisfied with their curriculum and confident to meet patients. It can help motivate them and reduce the stress of meeting patients. It provides exposure to clinician role models and gives insight into social and psychological aspects of disease in real people. It strengthens and contextualizes students' learning and helps them learn about people, how they live, and how clinicians and the healthcare system can look after them. It can strengthen learning of both the biomedical and behavioural/social sciences and teaches knowledge that cannot be learned from books. It helps students acquire communication and basic clinical skills, which they find rewarding at this early stage in their studies. It can help identify students who have difficulty learning reflectively. It may have an effect on performance in summative assessments although the evidence is inconsistent and methodologically weak. Early experience can also benefit teachers, healthcare organizations, individual patients and populations.

References and bibliography of results

In addition to the 38 articles whose findings were significant enough to be cited in 'Results' the TRG reviewed 35 other articles (see Appendix 1 for full list of citations).

Notes

[1] These were studies of clinical skills training in authentic contexts, as defined before, since simulation training would not have been eligible to be included in the review.

[2] See, for example, http://bmj.bmjjournals.com/advice/checklists.shtml for criteria for rigour in qualitative research.

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Conflicts of interest

Beyond the authors' personal involvements in medical education and early experience, they have no conflicts of interest to declare.

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Appendix 1: List of Citations

Citations that were important and strong enough to be informative (numbers in square brackets in Table 7)

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