

# No model of clinical education for physiotherapy students is superior to another: a systematic review

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**Question:** Which models of undergraduate/entry-level clinical education are being used internationally in allied health disciplines? What is the effect and, from the perspective of stakeholders, what are the advantages, disadvantages, and recommendations for successful implementation of different models of undergraduate/entry-level clinical education? **Design:** Systematic review with data from quantitative and qualitative studies synthesised in a narrative format. **Participants:** Undergraduates/entry-level students from five allied health disciplines undergoing clinical education. **Intervention:** Six broad models of clinical education: one-educator-to-one-student (1:1); one-educator-to-multiple-students (1:2); multiple-educators-to-one-student (2:1); multiple-educators-to-multiple-students (2:2); non-discipline-specific-educator and student-as-educator. **Outcome measures:** Models were examined for productivity; student assessment; and advantages, disadvantages, and recommendations for implementation. **Results:** The review found few experimental studies, and a large amount of descriptive research and opinion pieces. The rigour of quantitative evidence was low, however qualitative was higher. Evidence supporting one model over another was largely deficient with few comparative studies available for analysis. Each model proffered strengths and weaknesses, which were unique to the model. **Conclusion:** There is currently no 'gold standard' model of clinical education. The perception that one model is superior to any other is based on anecdotes and historical precedents, rather than on meaningful, robust, comparative studies. [Lekkas P, Larsen T, Kumar S, Karen K, Nyland L, Chipchase L, Jull G, Buttrum P, Carr L, Finch J (2007) No model of clinical education for physiotherapy students is superior to another: a systematic review. *Australian Journal of Physiotherapy* 52: 19–28]

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## Introduction

Clinical education is a principal component of undergraduate/entry-level allied health curricula (Hobbs et al 2000), and it is perceived as essential to the development of clinical skills and attitudes (Higgs 1992, Strohschein et al 2002). Lindquist et al (2004) noted that graduates prize learning from participation in clinical contexts and there is wide recognition that professional skills are crystallised through an integration of theory and practice within a workplace (Ende 1997, Richardson 1999). The term clinical education refers to the supervised acquisition of professional skills, and it is especially appropriate to courses which utilise clinical settings as teaching forums. The purpose of clinical education is to provide clinical opportunities for students to attain competence at the level of a beginning practitioner by integrating their knowledge and skills at progressively higher levels of performance and responsibility whilst under the guidance of qualified practitioners (The University of Sydney 2005).

It is widely accepted internationally that clinical education is integral to physiotherapy curricula as evidenced by statements from The Australian Council of Physiotherapy Regulating Authorities (ACOPRA 2004), The Commission on Accreditation in Physical Therapy Education (CAPTE 2004), the Canadian Physiotherapy Association (CPA 2002), the Chartered Society of Physiotherapists (CSP

2002a), and the World Confederation for Physical Therapy (WCPT 2004). However, the manner in which clinical education is conceptualised and delivered varies. Previously, clinical education programs have been formulated on experience, anecdotes and/or intuition (Chipchase 2004). Increasingly, however, the influence of external factors (such as workforce constraints, costs of training, and patient availability) is promoting a climate in which the method of clinical education delivery is being questioned. From an Australian perspective, there is a growing sense of unease regarding the sustainability of historical models of clinical education, due to funding restrictions in the education and healthcare sectors, an exponential growth in universities providing physiotherapy programs, and a decreasing source of patients in clinical placements (Dalton et al 2004, Hobbs et al 2000).

Usually, models of clinical education supervision are based on the principle of a single educator working face-to-face with one, or a small number of students, instructing them in the management of a wide range of health conditions. The restrictive nature of how clinical education is defined or what it encompasses is evidenced by the stance adopted by governing bodies such as the Chartered Society of Physiotherapists (CSP 2002a, p 29) who assert that 'students should spend the maximum time possible during periods of practice-based learning in direct contact with patients' ('practice-based learning' is used in preference to clinical

**Table 1.** Key search terms and electronic resources.

<b>Key search terms</b>		
<i>Student level</i>	<i>Learning model</i>	<i>Allied health discipline</i>
Entry-level (Masters) student(s)	Clinical education	Allied health
Undergraduate	Clinical placement	Language therapy
	Directed learning	Occupational therapy
	Experiential learning	Physical therapy
	Field placement	Physiotherapy
	Fieldwork	Podiatry
	Mentorship	Social work
	Practical experience	Speech therapy
	Practice-based learning	
	Practicum	
	Supervision	
<b>Databases</b>		
AMED (Allied & Complementary Medicine)		
Australian education index		
CINAHL (Cumulative Index to Nursing & Allied Health Literature)		
Current contents connect		
Cochrane library		
ERIC (Educational Resources Information Center)		
Medline		
ProQuest Digital Dissertations		
PsycINFO (American Psychological Association database)		
Science citation index expanded		
<b>Search engines</b>		
Google		
Metacrawler		

education within the CSP framework). This statement reinforces the dichotomy between instructive (class-room based) and clinical components of curricula.

The need to inform policy development and practice in education with sound evidence is confronting not just those affiliated with the development and provision of training within the field of physiotherapy (Chipchase et al 2004). It is also an acknowledged imperative in other allied health disciplines where the costs of clinical education and the limited availability of opportunities for clinical education are driving reconsideration of historical models (Lincoln and McCabe 2005, Morris and Parker 1998, Paterson 1997, Tysome 1994, Wrightson and Cross 2004). Thus the research questions for this systematic review were:

1. Which models of undergraduate/entry-level clinical education are being used internationally in allied health disciplines (physiotherapy, occupational therapy, speech and language therapy, social work, and podiatry)?
2. What is the effect and, from the perspective of stakeholders, what are the advantages, disadvantages and recommendations for successful implementation of different models of undergraduate/entry-level clinical education?

## Method

**Identification and selection of studies:** The search terms for this review were framed by operational definitions of clinical education obtained (by email contact) from respected clinical physiotherapy educational institutions, including ACPRA, WCPT, CPA, CSP, and the American Physical Therapy Association (APTA). The search terms were debated and agreed by the research team and a reference group convened to ensure the clinical utility of the review (see Appendix 1 on the eAddenda for the complete search strategy). The application of the search strategy occurred in three stages: Stage 1 applied comprehensive search terms (using all possible words and phrases which described the population, intervention and comparators) to a range of electronic databases (Table 1). Databases targeted were selected on their respective potential incorporation of research relevant to educational activities for the nominated allied health disciplines as per advice received from a professional librarian. All citations identified were checked independently by the research team and the reference group for relevance to the review, using the citation's title, abstract and descriptor terms. Also in Stage 1, hand searching occurred of three journals: *Journal of Allied Health* (1992 v21.1 to 2005 v34.1), *Internet Journal of Allied Health*

**Table 2.** Hierarchy of evidence (Phillips et al 2001).

Level	Study type
1a	Systematic review (with homogeneity) of randomised controlled trials
1b	Individual randomised controlled trial (with narrow confidence interval)
1c	All or none
2a	Systematic review (with homogeneity) of cohort studies
2b	Individual cohort study (including low quality randomised controlled trial)
2c	'Outcomes' research; ecological studies
3a	Systematic review (with homogeneity) of case-control studies
3b	Individual case-control study
4	Case-series (and poor quality cohort and case-control studies)
5	Expert opinion without explicit critical appraisal, or based on physiology, bench research or 'first principles'

*Sciences and Practice* (2003 v1.1 to 2005 v3.2) and *Focus on Health Professional Education—a multidisciplinary journal* (1999 v1.1 to 2005 v6.3). Stage 2 involved a secondary search using any newly-identified key words and index terms from the citations highlighted in Stage 1, through the same electronic databases to ensure that no relevant literature had been missed. Stage 3 involved scrutinising the reference lists and bibliographies of all retrieved and pertinent literature for additional studies with potential relevance assessed initially via the study title alone. Content experts were also approached in this stage to identify additional sources of relevant literature.

Studies were included if they encompassed undergraduate/entry-level tertiary students within the disciplines of physiotherapy, occupational therapy, speech and language therapy, social work, and podiatry and explored any model(s) of supervision provided during the process of clinical education. 'Supervision' encompasses issues such as the ratio of supervisors to students, and type of supervisor eg, preceptor, facilitator, practice partner, mentor; clinical educator or academic instructor. Comparative studies analysing either applied historical models with control periods and/or contemporary models were sought. Owing to the potential breadth of impact of clinical education, at least one of the following outcomes had to be reported: knowledge acquisition, clinical competence, stakeholder satisfaction and perceptions, resource utilisation or placement provision capacity. Stakeholders were deemed to include students, clinical educators, academic facilitators, host facility administrators, and academic institution administrators.

Whilst randomised controlled trials were of particular interest, a preliminary literature search indicated that they were rarely used to evaluate clinical education models. Therefore, studies reporting other research designs were also included in the review. Qualitative research was included owing to its capacity to describe the appropriateness of interventions and how various stakeholders may experience them. Opinion pieces, editorial comments, and unstructured literature reviews were included to ensure data saturation and the attainment of views related to the types of models perceived as imperative (or otherwise). Due to the transformation of the Australian tertiary education sector in the 1980s under the Dawkins reforms (Dawkins 1988), only studies published after 1980 were retrieved, and because of limited resources, study inclusion was restricted to English language publications.

Studies were excluded if they:

- Did not assess or discuss clinical education models of supervision or failed to clearly delineate the model of supervision being investigated or to discriminate between competing models of supervision during data analysis.
- Focused on the partnerships between academic institutions, health care facilities, professional bodies.
- Explored the philosophical role and relevance of clinical education within settings (traditional hospital facilities, contemporary settings, rural vs urban placements) as well as the mode of delivery (discipline-specific compared with multidisciplinary).
- Pertained to the formal curricula clinical arrangements (timing and staging of clinical education with programs, length of clinical education experiences).
- Explored strategies designed to link the theoretical and practical parts of the course and examined/explored teaching/learning strategies or exercises relevant to clinical education (teaching/learning strategies or exercises, clinical reasoning, observational learning, peer-assisted learning, or simulated learning).
- Focused on the attributes/styles of clinical educators which may serve to foster a greater learning experience.
- Discussed reward systems for clinicians who act as clinical supervisors or practice partners.
- Were in the form of a letter (invited commentary concerning a publication, letters responding to featured publications or response letters from authors).
- Were accessible only as an abstract or as a conference proceeding.

**Description of studies:** Quantitative studies included in the review were categorised hierarchically (Table 2) according to the Oxford Centre for Evidence-based Medicine Levels of Evidence (Phillips et al 2001). This hierarchy incorporates expert opinion as an evidence-level. Assignment to hierarchy level by the two key researchers (PL, TL) was conducted independently with disagreements discussed and resolved by consensus. No attempt was made to rank qualitative studies hierarchically.

Methodological quality was assessed using the appropriate

**Table 3.** Critical appraisal checklists (Law et al 1998 a & b)

Score (pts)	Quantitative publications	Qualitative publications
0 or 1	Study purpose stated clearly	Study purpose stated clearly
0 or 1	Relevant literature reviewed	Relevant literature reviewed
0 or 1	Sample described in detail	Theoretical perspective identified
0 or 1	Sample size justified	Purposeful sample selection described
0 or 1	Outcome measures reliable	Sampling until redundancy in data reached
0 or 1	Outcome measures valid	Informed consent obtained
0 or 1	Intervention described in detail	Procedural rigour used in data collection
0 or 1	Contamination avoided	Analytical preciseness
0 or 1	Co intervention avoided	Findings consistent with and reflective of data
0 or 1	Results reported in terms of statistical significance	Auditability (decision trail developed and rules reported)
0 or 1	Analysis methods appropriate	Transformation of data described
0 or 1	Educational importance reported	Theoretical connections described
0 or 1	Drop outs reported	Trustworthiness (triangulation reported for methods)
0 or 1	Conclusions appropriate	Conclusions appropriate

qualitative or quantitative appraisal tool produced by the McMaster University Occupational Therapy Evidence-Based Practice Research Group (Law et al 1998a, 1998b). These tools, which have demonstrable inter-rater reliability (Law et al 1998c), have previously been utilised in tandem within a systematic review exploring the effectiveness of an occupational therapy intervention (Barras 2005). Formal guidance for completion and interpretation of the appraisal process accompanies the tools (Law et al 1998d, 1998e); however, in their original format dichotomous responses to criterion questions are elicited with no numerical summation. To overcome this, a scoring system was applied to the questions in these instruments. A score of one point was awarded if a critical appraisal criterion was addressed adequately, and zero points if the criterion was not reported, or insufficiently addressed. Using this approach, the maximum possible score was 14 points for either quantitative or qualitative publications (Table 3). To ensure consistency, the two key researchers (PL, TL) critically appraised the methodological quality of ten studies retrieved during Stage 3. All subsequently retrieved literature was appraised by either of the two reviewers on the understanding that both reviewers would apply the critical appraisal criteria in a consistent manner with collaborative discussion ensuing where doubt existed. Where it was inappropriate to critically appraise the literature (editorials or opinion pieces), the literature was analysed using the qualitative principles of induction and data-building to ascertain key themes and concepts (Rice and Ezzy 1999).

**Data analysis:** A purpose-built form was developed to extract relevant information from each study. Information was recorded on the country of derivation, the type of study (qualitative or quantitative), its hierarchy and critical appraisal score, model(s) of clinical education, student population and sample size, clinical education setting, measures of outcome, costs of implementation, stakeholder feedback and potential confounders. Formative data extraction was conducted by the respective researchers independently and audited reciprocally for errors at the completion of the process.

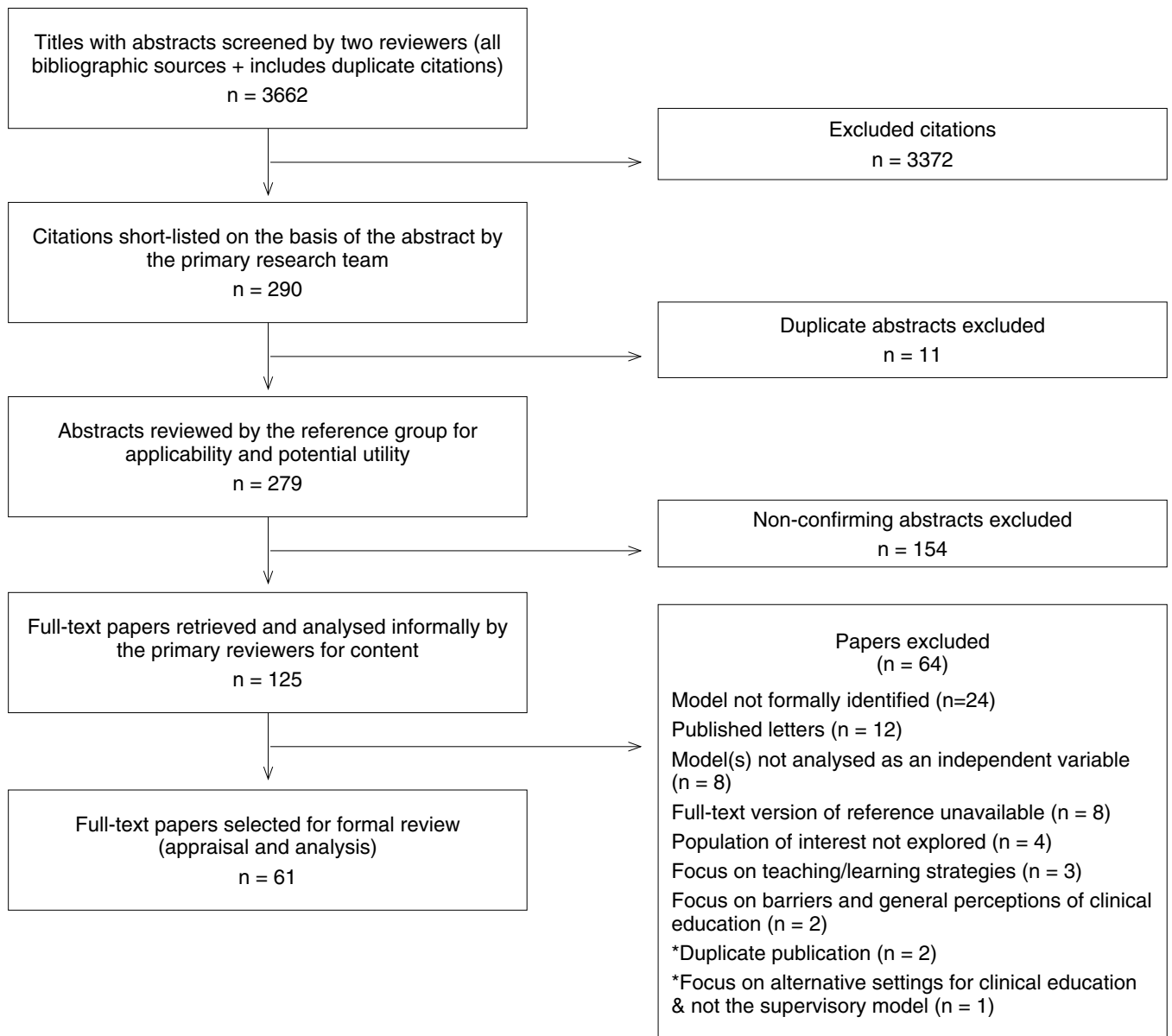
Data pooling for the purpose of conducting a meta-analysis was not an objective of the review. Data were synthesised descriptively, and the effect of different models of clinical education was analysed in a narrative format.

## Results

**Identification and selection of studies:** There were 64 publications excluded from the review of which the highest proportion reflected correspondence in various guises. Reasons for exclusion are provided in Figure 1 (see Appendix 2 on the eAddenda for excluded publications). Sixty-one publications were retained for analysis within this review.

### Description of studies

**Quality:** Among the forty-four publications classified within a quantitative paradigm there were no systematic reviews observed, although there were several unstructured literature reviews and guideline papers which were classified as Level 5 evidence due to their lack of demonstrable transparency and rigour (Baldry-Currens 2003, CSP 2002b, CSP 2002c, Ladyshevsky 2000, Lincoln and McAllister 1993, Strohschein et al 2002). The majority of the quantitative publications (n = 40) provided Level 4 or Level 5 evidence. There was a paucity of research involving randomisation, and those articles which did report this approach (Ladyshevsky 2004, Ladyshevsky 2002, Perkins et al 2002, Solomon and Sanford 1993) had methodological inadequacies (namely absence of a power analysis, failure to control for co-interventions or contamination, and outcome measures with unknown psychometrics) which constrained their classification to a level 2b publication. Overall, all quantitative publications exhibited methodological shortcomings with the main areas of concern being those cited (the median quality score for Level 2b and Level 4 research was 7 points, range 4–11 points). There was no attempt to rank hierarchically the remaining 17 publications which were classified as principally representing qualitative research. The median quality score for this body of evidence was 11 points (range 6–13 points).



**Figure 1.** Flow of papers through the review.

**Participants:** Of the five allied health professions investigated in this review, approximately 53% of the identified literature examined clinical education within the discipline of physiotherapy. No citations were retrieved for the field of podiatry. All but three of the eligible articles were derived from four countries: United Kingdom (UK) (n = 17), the United States of America (n = 16), Australia (n = 14) and Canada (n = 11).

**Intervention:** Six broad models of clinical education were identified: one-educator-to-one-student (1:1); one-educator-to-multiple-students (1:2); multiple-educators-to-one-student (2:1); multiple-educators-to-multiple-students (2:2); non-discipline-specific-educator and student-as-educator. The total number of reports of clinical education models exceeds the number of papers in this review because some papers reported more than one model; we found that one-educator-to-multiple-students model was the most commonly reported (n = 33).

**Outcome measures:** The outcome measures extracted from the research on the respective clinical education models were grouped into: productivity; student assessment; and stakeholder views regarding advantages, disadvantages, and recommendations for implementation.

A narrative synopsis of the body of evidence applicable to the six broad clinical education models is summarised below (see also Tables 4–8 on the eAddenda for a summary of the included studies).

**One-educator-to-one-student model (Synonyms: traditional, apprenticeship, mentorship or 1:1)**

These papers described models where one educator supervises one student. The majority were within the discipline of physiotherapy. Generalisability to Australian settings however was constrained with only five papers emanating from Australia. The majority of publications

involved student physiotherapists in the latter years of their respective programs, and this use of narrow student populations and limited field settings further constrained generalisability. The overall quantitative findings were conflicting, with the exception of the Level 5 citations which generally advocated alternative models of clinical education in preference to the one-educator-to-one-student model. Productivity was the main type of outcome measure employed in the empirical research and was examined using measures such as hours worked, number of patients treated, number of patient attendances, and indirect service provision. Compared with time periods when students were absent (no clinical supervision), productivity either increased (Coulson et al 1991, Holland 1997, Ladyshevsky et al 1998) or remained unchanged (MacDonald et al 2002) when the overall period during which students were present in a clinical facility for the purposes of clinical education was analysed. Factors cited as concomitantly influencing productivity were the service area/practice setting, size of the clinical department, and the length of time students were present. The few applicable qualitative publications appraised were methodologically sound; however, within these studies the identified advantages and disadvantages of this model necessarily reflected the divergent views of opposing stakeholder groups. Of note, there was no evidence in the literature that this model was a gold standard for clinical supervision, thus evaluation of alternative models in comparison to the one-educator-to-one-student model should be interpreted in this light.

*Advantages:* Students receive individual, guided attention; departmental productivity overall is not affected adversely; clinical educators find managing a 1:1 relationship less demanding compared to other supervision models; cancellation of a placement impacts on fewer students.

*Disadvantages:* Students are dependent upon one educator for their learning requirements; passive dependence is fostered; no value is placed on peer-assisted and collaborative learning; greater direct time commitment is required per educator as opposed to other models of supervision.

*Recommendations for implementation:* Early and ongoing communication between the clinical facility and the academic institution is essential, particularly where the host facility is providing the supervisory staff. Adequate delegation of a clinician's clinical caseload is required at the commencement of the educational period to both work colleagues and the supervised student. Clinicians should seek to maximise the time available to them when students are not under direct supervision (such as performing related administrative tasks). There should be an attempt to match students' practical experience and to provide multiple opportunities for learning including variations in caseload and case-type.

***One-educator-to-multiple-students model (Synonyms: collaborative, group or multiple-placement or 1:2 model)***

These papers described models where one educator supervised two or more students. Twenty papers examined this model within the discipline of physiotherapy, and whilst six studies originated in Australia, four were descriptive/opinion pieces. There were four studies which examined model effectiveness using a range of productivity measures. However, only one explored the impact of this model on student competencies/grades, and there were none which sought to determine whether this model influenced the issue

of placement capacity. Qualitative research findings were generally congruent and favourable, although coloured by the position of respective stakeholders' viewpoint of the respective stakeholder(s) examined (students were more frequently reported as preferring this model, compared with educators and administrators). The credibility of this review's findings regarding this model is strengthened by similar conclusions reached by Baldry-Currens (2003) in a review which examined a model of one clinical educator to two or more students.

*Advantages:* Positive net effects on service delivery; increases the number of placements; boosts productivity; more desirable to students; enhances clinical competence of students; facilitates active learning; encourages clinical independence; encourages sharing, co-operation, support and ownership of the learning experience; facilitates development of team-work.

*Disadvantages:* Students fear they may not receive adequate supervision; education model may not be applicable to all clinical areas (due to physical restrictions on student numbers in areas such as intensive care); too many students may limit patient variety; problems with competitiveness and compatibility between students; increased educator stress and paperwork.

*Recommendations for implementation:* Organisation and pre-placement planning by the placement supervisor and clinical educator is essential with overarching support from both the academic institution and the host facility. This model requires facilitation of peer learning strategies by the placement supervisor and clinical educator in order to augment students' collaborative learning experience. Clinical educators need to share a majority of their caseload amongst the students and ensure that equal time is afforded to each student. Care should be taken to provide both individual and collaborative clinical experiences within the placement. An additional issue for consideration relates to the need to pre-match student pairs or groups. Whilst this was beyond the scope of this review, Baldry-Currens and Bithel (2003) and Bogo et al (2004) provide commentary on this aspect.

***Multiple-educators-to-one-student model (Synonyms: shared-responsibility, multiple-mentoring, team or split-team or 2:1)***

These papers described models where multiple clinical tutors took responsibility for educating students in clinical settings; in the split team model clinical staff from disparate departments or wards shared responsibility for supervision. The majority examined this model within the discipline of physiotherapy although only one of these originated from Australia (Stiller et al 2004). In relation to the only empirical research, Solomon and Sanford (1993), the authors observed that whilst both educators and students were highly satisfied with this model, the educators' clinical productivity diminished in comparison to a one-educator-to-multiple-students model. Observations from the qualitative research and Level 5 publications were generally congruous and favourable with the exception of the report by Stiller et al (2004) who noted that although this model was widely employed by clinical staff, it was the least preferred.

*Advantages:* Diminished responsibility for the sole provision of clinical education by any one educator; increased placement provision capacity; part-time clinicians can

be integrated into supervision; reinforces the notion that clinical education is the responsibility of all; independence and autonomy of students is facilitated; professional socialisation is promoted; students are exposed to multiple educators; as workloads are shared, absence of a staff member is not catastrophic.

*Disadvantages:* Multiple educators/supervisors can foster a sense of fragmentation amongst students; need for increased collaboration between staff for the purposes of assessment and planning; diminished departmental productivity; increased stress on clinicians secondary to duality of roles.

*Recommendations for implementation:* There needs to be collaborative preparatory discussion of the organisation and structure of the clinical education experience by all members of the team to delineate role, tasks, and the manner in which normal workload will be distributed at commencement. Teaching content may be combined as team-teaching to reduce overlap and duplication. Methods of communication, both informal and formal, must be agreed within the team prior to commencement with the views of all staff incorporated into student feedback and assessment processes.

***Multiple-educators-to-multiple-students and/or Non-discipline-specific-educator model (Synonyms: combined collaborative & shared and/or role-emerging)***

Models represented in these papers were either hybrids of models of supervision identified above, or involved the utilisation of 'role-emerging' placements where the respective discipline(s) do not usually have an existing presence within the training site (supervision in these instances was provided via a mix of non-discipline and discipline-specific staff). The majority examined these approaches within the discipline of OT, and were derived from international sources. No empirical research explored the impact of these models on students' clinical abilities, knowledge acquisition or competencies. Observations from the remaining body of evidence (qualitative research and Level 5 publications) were congruous and predominately favoured the models in question.

*Advantages:* Independence and autonomy of students; promotion of professional growth; fosters self-directed learning, creativity, and problem-solving; facilitates collaborative/group learning; provides experience of different and expanded roles within the profession; exposure of the profession and its role within the community; fosters communication intra- and inter-professionally; workload is shared amongst educators/staff.

*Disadvantages:* Clinicians and students perceive that a sound professional grounding is required (specifically in relation to the use of role-emerging placements); the establishment and monitoring of role-emerging placements is demanding and time-consuming; the use of multiple educators/supervisors fosters fragmentation amongst students; there is a need for increased collaboration between staff for the purposes of assessment and planning.

*Recommendations for implementation:* Collaboration amongst all stakeholders is required to establish clear expectations and objectives for the educational experience to be provided along with thorough preparation of the fieldwork setting. Stakeholders and users must be educated in the processes of group dynamics and facilitation.

***Student-as-educator model (Synonym: peer tutoring)***

These papers described models where the student was either an educator or a mentor to other students. Seven papers examined this model within the field of physiotherapy. Physiotherapy students were also included in a further three multidisciplinary studies. With the exception of Perkins et al (1999), all quantitative papers reported comparative studies. However, there was no consistency in the manner in which outcomes were measured (checklists, questionnaires, practical examinations of knowledge/skills, and personal views). Overall, acknowledging the methodological limitations of the studies, the findings largely favoured this model. It is important to consider what these studies examined, and in which settings, as there was limited evaluation (Perkins et al 2002, Perkins et al 1999) of whether educational outcomes/clinical competency were at least equivalent if tuition was received from a student peer as opposed to a qualified professional, discipline-specific educator.

*Advantages:* This model provides students with opportunities to acquire teaching support skills. It enables students to function at higher cognitive levels and transfer learning to new situations; fosters positive attitudes amongst students towards subject matter; reduces student anxiety and stress; encourages lifelong learning; is consistent with goals of clinical education programs; is compatible with characteristics of adult learners; provides safe and supportive environments for analysis of emotions that arise from clinical reflection; promotes collegial relationships between peers; and is relevant to structured and unstructured environments.

*Disadvantages:* Advanced students may dominate the learning environment; peer competition may be an overt concern; there is no regulation of provision of incorrect information.

*Recommendations for implementation:* Adequate preparation and education of those directly involved in its application as well as end-users (ie, prepare students as educators and prepare student to accept peer-educators). Preparation of students as educators should encompass an understanding of group processes such as leadership, conflict management, and decision-making, as well as the principles of adult learning. Maintain academic oversight to ensure consistency of approach and information dissemination along with a mechanism for peer-tutors to debrief and clarify queries.

## **Discussion**

The review found a range of research of variable design and methodological quality examining six broad models of undergraduate/entry-level clinical education supervision in allied health disciplines internationally, although this research failed to identify convincing evidence of effectiveness for any one model. The volume of literature indicated that the choice of the most appropriate models of clinical education for allied health, within current fiscal and workforce constraints, was an international concern. Few publications investigated physiotherapy clinical education within the Australian setting, and thus this review provides little direct guidance regarding the most appropriate model of clinical education locally.

The research was predominately quantitative and positioned

in the lower hierarchical levels, with no Level 1 or Level 2a research identified. Analysis indicated that the higher quality publications presented mostly equivocal findings, whilst lower quality publications unanimously supported the models they explored. This is consistent with the findings of other systematic reviews and highlights the correlation between methodological rigour and defensible, robust observations (Ioannidis 2005, Sackett et al 2000). The evidence supporting the effectiveness of one clinical education model over another was inconclusive. The lack of randomised controlled trials underpins the lack of conclusive evidence, as this design is advocated widely as the benchmark mechanism through which the efficacy of an intervention is determined (Gilgun 2005).

Due to issues of external generalisability and the inductive/exploratory nature of qualitative research, those publications reviewed, while methodologically robust, were limited in their ability to inform effectiveness questions. What they do offer is an insight into stakeholders' perspectives of the respective models; however, the manner in which espoused advantages and disadvantages of the models might be weighted is not addressed in the literature, particularly when opposing stakeholder groups express divergent views as exemplified in the research work of Baldry-Currens and Bithell (2000), Huddleston (1999a), Huddleston (1999b), and Moore et al (2003). More rudimentary is a lack of guidance on how perceptions of utility from a singular stakeholder group might be considered. As an example, emergent themes from the work of Martin et al (2004), who interviewed a small group of OT educators, were that whilst the one-educator-to-one-student model afforded time between an educator and a student, it was perceived to foster dependence concurrently. Which effect of the model is of significance cannot, however, be ascertained empirically from the associated research.

Additional observations of concern were first that, despite commonly expressing the need to develop models capable of improving placement capacity as one of the primary reasons for the instigation of their research, the majority of authors whose research is examined in this review failed to adequately identify the actual impact of any trialled model on placement provision. Second, the use of multiple synonyms in the literature for all models highlighted the obvious need to standardise definitions so that future research can reflect clearly understood and agreed interventions.

The following conclusions are drawn from this review. There is currently no gold standard model of clinical education. The perception that one model is superior to any other is based on anecdotes and historical precedents, rather than meaningful, robust, comparative studies. The applicability of identified models to the myriad scenarios which exist within physiotherapy clinical education cannot be determined. There is a paucity of research investigating these alternative models, scarcity of comparative studies, and methodological limitations to the research. The precise nature of the impact of student placements within facilities on Departmental or clinical productivity remains unclear. Furthermore, the tendency of researchers to focus on ascertaining the average overall impact at the end of a given placement fails to inform stakeholders adequately of resource implications across the varying stages of placement. Positive observations derived from research utilising the one-educator-to-one-student model may not be generalisable across distinct placements and are seemingly not consistent across models. The assertion, commonly observed in anecdotal reports, that

additional demands are placed on clinicians in the field who provide clinical education concurrent to their normal duties was not an issue readily explored in higher order quantitative publications. The emergent perspective from the qualitative research was that benefits and efficiencies may occur during the clinical education process, which may offset any perceived burden. Whilst recommendations for the implementation of highlighted models of clinical education were identified, directions are broad rather than explicit. The use of adjunct teaching/learning strategies and varying assessment procedures within respective models needs to be investigated to inform recommendations about implementation of models; however this was beyond the scope of this review. As highlighted in the qualitative research examined, the planning and preparation of clinical education is perceived as critical irrespective of the model of education employed.

Recommendations regarding uptake of any clinical education model involve judgments about the consistency, generalisability, applicability, and clinical impact of evidence (Harbour and Miller 2001). Evidence-based philosophy encourages the integration of the best available evidence with the clinical experience of those who seek to utilise the information (Guyatt et al 2004, Sackett et al 2000). The decision regarding which clinical education model(s) to implement rests, therefore, on the careful consideration and interpretation of evidence by stakeholders. The structured examination of evidence for models of clinical education supervision for physiotherapy, however, represents only one approach when moving towards the establishment of best-practice guidelines for clinical education within physiotherapy.

**eAddenda:** Tables 4–8, Appendix 1 and 2, available at [www.physiotherapy.asn.au/AJP](http://www.physiotherapy.asn.au/AJP)

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## Statement regarding registration of clinical trials from the Editorial Board of *Australian Journal of Physiotherapy*

This journal is moving towards requiring that clinical trials whose results are submitted for publication in *Australian Journal of Physiotherapy* are registered. From January 2008, all clinical trials submitted to the journal must have been registered prospectively in a publicly-accessible trials register. We will accept any register that satisfies the International Committee of Medical Journal Editors requirements. Authors must provide the name and address of the register and the trial registration number on submission.