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**Title: Clinical educators' skills and qualities in allied health: A systematic review**

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## **Abstract**

**Background:** The skills and qualities of effective clinical educators are linked to improved student learning and ultimately patient care, however within allied health these have not yet been systematically summarised in the literature.

**Aims:** To identify and synthesise the skills and qualities of clinical educators in allied health and their effect on student learning and patient care.

**Method:** A systematic search of the literature was conducted across five electronic databases in November 2017. Study identification, data extraction and quality appraisal were performed in duplicate. Qualitative and quantitative data were extracted separately but analysed together using a thematic analysis approach whereby items used in quantitative surveys and themes from qualitative approaches were interpreted together.

**Results:** Data revealed seven educator skills and qualities: (i) Intrinsic and personal attributes of clinical educators (ii) Provision of skilful feedback (iii) Teaching skills (iv) Fostering collaborative learning (v) Understanding expectations (vi) Organisation and planning (vii) Clinical educators in their professional role. Across all themes was the concept of taking time to perform the clinical educator role. No studies used objective measurements as to how these skills and qualities affect learning or patient care.

**Discussion and conclusion:** Despite much primary evidence of clinical educator skills and qualities, this review presents the first synthesis of this evidence in allied health. There is a need to examine clinical education from new perspectives to develop deeper understanding of how clinical educator qualities and skills influence student learning and patient care.

## **Introduction**

Clinical education is a fundamental part of preparing and developing the health workforce. Working closely with students in authentic learning environments, clinical educators (CEs) provide guidance, feedback and assessment. As such they play a valuable role for student competency development in demanding workplace contexts. While the qualities of effective CEs in medicine have been synthesised (1-3), the skills and qualities of effective allied health clinical educators (CEs) have not been systematically explored. Expanding this knowledge to allied health is necessary to ensure we are preparing an effective interprofessional healthcare workforce. In medicine, the relationship between trainee and educator has been described as the most important factor for supervisory effectiveness (3). A comprehensive systematic review in medicine identified a range of skills and personal attributes of good CEs. Study results were commonly based on student and CE survey

results or author opinions rather than objective outcomes of the CE attributes such as student learning or patient health outcomes (1). The role of effective CE in improving patient outcomes remains unknown.

While similarities may exist between medicine and allied health in terms of CE skills, qualities and behaviours, there is a need to identify if these hold true in allied health CE practice, and how these qualities might influence learning and patient care. Universities and teaching hospitals invest significant time and resources into CE support and training, with the belief that improving CE supervision skills will translate into improved student learning and subsequently good patient care. Understanding the depth and breadth of these skills and attributes, and if in fact student learning and patient care are enhanced, is imperative to justify these investments.

Allied health is a relatively new professional field compared with medicine and nursing having, emerged in the last century and consists of a range of disciplines (4). While there is no universally regarded classification, allied health consists of a diverse range of professions which are often grouped together in organisational structures. Allied health professions include audiology, dietetics, occupational therapy, pharmacy, radiography, physiotherapy, psychology, podiatry and social work amongst many others (5, 6). The professional groups vary in size, evidence base and length of time since being established, and they range from practical therapies such as physiotherapy, to counselling and social support by social workers. Allied health professions are typically much smaller than medicine and nursing and often rely on unification to advocate for their services. Although the allied health professions are diverse with their own specialised services, allied health clinicians share general and specialised skills involving interpersonal communication, patient assessment, management, education, discharge planning, working within multidisciplinary teams, advocacy, employing evidence-based practice and integrating the science of their fields in their clinical decision-making. They work across a range of settings from primary to tertiary care as well as preventative health with a strong emphasis on interprofessional collaboration. They often rotate through various clinics, wards and work settings, adapting to varying organisational structures (7). As a professional group, allied health sits uniquely apart from medicine and nursing in healthcare organisational structures and has distinctive challenges in being recognised in organisational hierarchy, and by medical and nursing staff (8). Clinical education in allied health uses a range of student supervision models and assessment processes, and contrasting with medicine and nursing, many programs have short placement times of less than 12 weeks, involve more intensive student supervision with lower student:CE ratios (9). Thus, the uniqueness of allied health clinical education warrants its own investigation, and the strong interprofessional nature of these professions may provide insights for medicine and nursing education.

This study aims to identify and synthesise the skills and qualities of clinical educators in allied health and their effect on student learning and patient care.

## **Methods**

A systematic review of the literature was conducted to answer the research question.

### ***Search strategy***

The systematic review was registered with PROSPERO (registration CRD42016037149). The Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) framework was utilised to report the number of studies identified and screened, and the criteria used to determine eligibility for inclusion (10). A systematic search of the literature in MEDLINE (Ovid), the Cumulative Index to Nursing and Allied Health Literature (CINAHL Plus, EBSCO), PsycINFO (Ovid), Allied and Complementary Medicine Database (AMED, Ovid), and the Informit Education and Health Collections (Informit) was conducted on 28 November, 2017. Search results were limited to English language studies with no date restrictions applied. Full-text peer-reviewed papers and doctoral theses were eligible. The full MEDLINE search strategy is included in Appendix 1.

The search was structured in accordance with the PICO framework (population, intervention, comparator, outcome) and comprised an extensive range of search terms relating to “allied health” and “clinical education” and “learning”. Allied Health terms included those relating to professions of audiology, dietetics and nutrition, occupational therapy, radiography, pharmacy, physiotherapy, podiatry, psychology, social work and speech pathology. Search results were exported into EndNote X8 software (X8.0.1, ©Wintertree Software Inc.) for screening and duplicate removal. Screening was performed independently by two researchers using the Covidence platform (© Covidence 2018). Reference lists of selected studies were searched to identify additional relevant studies.

### ***Study selection and data extraction***

Titles and abstracts were screened in duplicate for inclusion by at least two authors, with disagreements being resolved between these two authors. Full publications were then screened in duplicate for inclusion. Conflicts were resolved by discussion between three authors (SG, JP, CP). Studies included involved allied health students, all fieldwork learning concerning patients, the outcome of clinical education, peer- or and inter- professional learning where clinical education was evaluated. Studies were excluded if they focussed on medicine or nursing, were simulated placement learning, or involved post-registration training. Fieldwork placement that did not involve patients and studies that did not involve primary data collection were also excluded. Data from

included papers were extracted in duplicate by three authors (SG and JP or CP) including methods (study design, location, method of data collection), participants (sample size, characteristics), intervention (location, timeframe, length of placement) and outcomes (cultural competence, career choice, other). Studies were categorised by their primary methodology: qualitative or quantitative.

### ***Quality appraisal***

Each quantitative study was assessed independently and in duplicate using the Medical Education Research Study Quality Instrument (11) due to its purpose of appraising the quality of studies across a range of designs and established criterion validity. Parameters assessed included study design, sampling methods, type of data collected, validity of evaluation instrument, data analysis and outcomes. Qualitative studies were also appraised independently and in duplicate using the Critical Appraisal Skills Programme tool (12). Consensus was reached regarding its interpretation.

### ***Synthesis of results***

Data from qualitative studies were extracted and analysed as a whole using qualitative thematic analysis (13). Two researchers (SG & CP) conducted independent coding of extracted data and theme development, coming together regularly throughout the process for clarification. The extracted data coded using an inductive approach. The codes were then grouped into categories which formed the coding structure and used to inform the development to themes. The findings of quantitative studies were analysed separately. As all quantitative papers required participants to rank or rate clinical educator skills based on what the researchers had already identified as key clinical educator skills, these skills and attributes listed in the surveys were extracted from the quantitative studies. All the skills and attributes were then coded with codes grouped into the coding structure developed from the qualitative studies. Constant comparison between the skills and qualities identified from each individual study and professional group was applied to explore similarities and differences between professional groups. The coding structure and codes from quantitative and qualitative studies were analysed together with themes extracted that answered the research questions. When authors came together to discuss the emerging themes they applied a critical approach to each other's interpretation, looking for alternative explanations for the identified data, and then reaching consensus.

Except for one specialist librarian, all researchers were qualified dietitians with experience across diverse public and private healthcare settings, working in large and small interprofessional teams, as well as direct experience in clinical education and educational research.

## **Results**

The searches yielded 7375 studies after duplicates were removed (see Figure 1 for flow chart of included studies). A total of 43 studies were included with 26 studies included in the qualitative and 18 in the quantitative synthesis. One mixed methods study was included in both qualitative and quantitative synthesis (14). (Tables 1 and 2)

Studies were from USA (15-34), Australia (14, 35-43), Canada (28, 44-48), UK (49-52). South Africa (53) and Nigeria (54). Professions represented included physiotherapy (15, 19, 21, 27, 29, 31, 33, 36, 38, 45, 49-54), occupational therapy (20, 26, 28, 37, 39, 41-43, 47), dietetics (22, 34, 40, 44, 46, 48), pharmacy (23, 25, 30), psychology (32), speech and language therapy (16), social work (24), radiography (18), genetic counsellors (17) and mixed allied health groups involving diagnostic radiography, nuclear medicine, dietetics, occupational therapy, physiotherapy, radiation therapy (14, 35).

Of the qualitative papers, fourteen investigated student perceptions, four investigated those of placement educators and seven investigated both. The qualitative methods for describing behaviours and skills of effective CEs used a range of methodologies involving students, academics, program directors and CEs (Table 2). These included qualitative analysis of focus groups, open-ended survey questions, interviews of CEs, analysis of clinical teacher award nominations and student critical incidents, while one study used a case study approach.

Eighteen papers used quantitative methods for investigating effective CE behaviours with all using surveys asking participants to rate CE behaviours, usually related to perceived importance (Table 1). Five studies derived the survey question content from the literature (15, 17, 19, 22, 44), six were based on pre-existing instruments (14, 18, 20, 23, 53, 54), two were derived from the literature and student feedback (50, 51), one from student feedback (16), one from previous surveys (49) and three were derived from both the literature and pre-existing instruments (35, 36, 53).

Descriptions of effective CE skills and attributes were identified by students' and educators' perceptions. Objective learning outcomes, student success and patient care were not measured in any of the studies.

## ***Quality appraisal***

Overall quality ratings of the quantitative studies using MERSQI ranged from 4.5-12 from a maximum score of 18 (Supplementary Table 1). Study designs generally involved single group cross sectional studies. Sampling was mostly from a single institution with varying response rates and all data collected by the studies was from participants' perspectives with no objective measurements of educational outcomes. The validity of the evaluation instruments and methodologies ranged from not being reported to full explanations. The data analysis domain scored highly for most studies. Outcomes were mostly measured as participants' perceptions and student satisfaction ratings. There were no patient outcomes measured in any of the studies.

Quality appraisal for the qualitative studies found that clear research questions were defined and studies used appropriate research methods. Some studies failed to consider researcher-participant relationships (26, 31, 32, 34, 39, 42, 43, 45, 47, 48, 52), with six of these studies not reporting ethics approval. Rigour of data analysis was variable and all studies reported clear findings statements.

### ***Findings***

No objective learning outcomes, student success or patient care parameters were measured in any of the studies. Outcome measurements of the skills and qualities of clinical educators included CE and student descriptions of characteristics and attributes; how behaviours were perceived to influence learning and make students feel engaged; and perceptions of the distinguishing features of excellent CEs (Tables 1 and 2).

A range of skills behaviours and attitudes of CEs were identified as being valued by students and educators. These were refined to sets or themes: the personal attributes of CEs; provision of skilful feedback; teaching skills; fostering collaborative learning; understanding expectations; organisation and planning; the value of independent learning; and CEs in their professional role (Table 3). Some of the themes overlapped, for example a CE who has excellent interpersonal skills would likely to be reported to be more adept at nurturing a collaborative learning environment. Intrinsic personal qualities were acknowledged as difficult for individuals to acquire, but many skills identified were pragmatic behaviours such as being organised and having clear orientation and manuals. Across all the themes was the concept of time and the importance of CEs taking time to develop relationships and nurture learning. Also acknowledged within the included studies was the importance of time to prepare students for potentially stressful learning encounters, and time for reflection and discussion.

Themes identified from the qualitative and quantitative studies were similar. Personal qualities such as friendliness, patience and kindness were highly valued by students and CEs. Students particularly valued CEs who displayed respect for them as an individual and as a future colleague. This fostered a sense of professional identity and instilled confidence in students' beliefs of their own ability. A collaborative learning model, where CEs were seen to also be on a learning continuum, was particularly valued by students.

Students and CEs in nearly all of the studies highlighted the value of CE feedback skills. Feedback was regarded as effective when it was constructive, regular, prompt and not degrading. Feedback as a reciprocal relationship impressed students in that CEs were open to improving themselves and valued the input of students towards patient care.

Teaching skills were regarded as beneficial for student learning although, as stated, no learning outcomes were measured. Scaffolding learning, providing appropriate challenges for student ability and fostering a culture of independence were rated as important skills for CEs to exhibit.

Clinical educators as role models and proficient in their job was regarded as a desirable quality. This related to not only their clinical knowledge and aptitude but other professional skills such as being a leader in their field, exhibiting patient-centred care, team work and communication skills. CEs advocating for and caring about their profession was also valued.

There were few differences between the different professions. All allied groups appeared to value the skills and qualities identified in the thematic analysis.

## **Discussion**

This review aimed to identify and synthesise the skills and qualities of clinical educators in allied health and their effect on student learning and patient care. It found seven educator skills and qualities: (i) Intrinsic and personal attributes of clinical educators (ii) Provision of skilful feedback (iii) Teaching skills (iv) Fostering collaborative learning (v) Understanding expectations (vi) Organisation and planning (vii) Clinical educators in their professional role. The concept of taking time to perform the clinical educator role underpinned all skills and qualities. Of the published literature, no studies reported objective measurement of learning outcomes or patient care parameters. Due to the range of study methodologies and number of studies conducted within each allied health group, it was difficult to draw comparisons between different allied health disciplines.



The CE role is integral to student learning and satisfaction (55). However students have mixed experiences on placement, largely related to their interactions with their CEs. Students entering clinical placements plunge from the structured and familiar academic environment into the busy, demanding and often stressful clinical setting. Clinical placement learning is complex with relationship building with peers and staff underpinning the creation of professional identity (56). These socio-cultural elements of practice learning shape development and are essential to the advancement of clinical and professional skills. Students have reported loss of confidence and bullying while on clinical placement (57), as well as ambiguous and inconsistent evaluation and assessment (58, 59). The skills and qualities of CE identified in this review may support the selection and training of CE into the future.

The personal attributes of CEs were perceived as paramount for providing a safe learning environment. This is consistent with review findings in medicine (1). Professional skills, including self-awareness, are essential for health professional practice, including clinical education. Health professionals involved in education may lack these skills themselves and there are barriers for teaching them in the clinical environment (60). There may be a need for those involved in clinical education to examine their personal qualities and identify areas for development or for selection processes to consider these intrinsic qualities in their CEs if they wish to foster a supportive and effective learning environment.

This review identified a range of skills and attributes of CEs that were highly valued by students and CEs involved in clinical education. These included personal attributes; provision of skilful feedback; teaching skills; fostering collaborative learning; understanding expectations; organisation and planning; the value of independent learning; and their professional role. An important distinction to the findings of this review compared to that in medical education was the importance of treating students as future colleagues and supporting the development of professional identity. Allied health groups are smaller and students may lack understanding of professional roles (61) until they are on placement, so CEs play a valuable role in establishing this identity. Also related to this was the value placed on CEs caring about and advocating for their profession. There was limited evidence as to how these skills translate beyond perceptions and ratings to tangible outcomes in terms of student skill development and patient care. Allied health students are often highly motivated and resourceful learners (62) who are likely to be capable of clinical placement success regardless of the attributes of their CE. Perceived learning is different to actual learning and trainees can demonstrate high-level skill performance after complex training, even when they believe they are not learning (63). Until

further research provides concrete evidence to support a relationship between CE skills and student learning or success, definitive conclusions cannot be made.

The research question for this review could not be answered due to the notable lack of learning and patient outcomes measured in the studies identified. This requires looking beyond student, CE and faculty perceptions of individual skill importance and ratings. Current investment into CE professional development is extensive. But is this investment worthwhile when effective CE attributes have mostly been identified through student and educator opinions?

This review had a wide-ranging search strategy across multiple databases and professions, and included qualitative and quantitative studies. Limitations include English language restrictions and despite the extensive search strategy, not every allied health profession was represented. The heterogeneity of studies prevented meaningful comparisons between professions. The skills and qualities identified in the results were based on perceptions rather than objective outcomes.

This review found that since 1982, research in this area focussed on asking students and educators their opinions of what makes a good CE. Rather than continuing to invest in surveying students and educators regarding their beliefs, the development of robust measures of the true impact of CE skills and attributes on student learning is a priority area for future research.

### ***Implications for practice***

Investigating profession-specific skills will assist in targeting professional development required for CEs for individual allied health groups. Other possible outcome measures of CE skills could include student retention rates when on placement, student grades in units involving clinical placement, patient satisfaction or students' future success. Triangulating patient and student evaluations of clinicians/educators could provide further insights. Although linking CE skills and qualities to patient care outcomes is complex, further involvement of patients in evaluation processes is imperative to ensure that they remain central to the goals of clinical teaching and learning. We note that what makes a good educator may never be completely detached from subjective opinions due to the complex nature of student-CE relationships and there is a continued need to support CEs in developing these relationships to meet learner needs.

This systematic review revealed similar skills and qualities as to what makes a good CE to findings in medicine (1), but highlighted additional qualities including treating students as future colleagues and enhancing a sense of professional identity so this aspect should also be addressed when supporting CE development.

## **Conclusion**

This review found there has been much research in allied health over the past three decades investigating key stakeholders' (students and educators) perceptions of CEs skills and qualities, and this is the first time this has been systematically summarised. The key skills and qualities of effective clinical educators identified were based on perceptions, appear to be consistent across health professions and are related to intrinsic and personal attributes, provision of skilful feedback, teaching skills, ability to foster collaborative learning, understanding expectations, organisation and planning, and clinical educators in their professional role. Assisting allied health students develop a sense of professional identity was an important skill that may be unique to this group. There is a need to look at clinical education from perspectives beyond perceptions and satisfaction ratings to develop deeper understanding of how CE qualities and skills influence student learning and patient care.

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**Table 1. Summary of quantitative studies describing clinical educator qualities and behaviours included in review**

Author, date Location	Setting, Sample	Methodology	How skills/behaviours were identified	Summary of clinical educator qualities/behaviours evaluated	
Dietetics					
Nasser <sup>41</sup> 2014 Canada	750 preceptors	Online 98 item survey derived from literature. 45% respondents had 6 or more years preceptor experience	Preceptor rated importance of skills	Evaluation and assessment skills Promote learning and skill development Extensive clinical knowledge in own area Know trainees learning styles Challenge learners Provide constructive feedback Identify learner's performance problems Identify learning opportunities Establish environment that encourages learners to ask questions Help learners feel comfortable Desire to impart knowledge Allow learners to make mistakes Recognise external and internal factors influencing learner performance	Not overwhelming learners Empower learners to take control of their own learning Understand learners might be nervous Commit to learner development Consider learners as colleagues Enjoy their role as preceptor Confident in teaching Assess learner needs and adapt teaching Perceive self as teacher Derive intrinsic satisfaction from teaching Recognise mutual learning occurs when teaching
Wilson <sup>19</sup> 2002 US	265 Preceptors	Cross-sectional Survey – 70 item developed from literature ranking most important behaviours of preceptors	Preceptors beliefs of most important behaviours	Arrange useful learning experiences to accomplish tasks Assess interns prior content knowledge Identify the usefulness of self-	



				evaluation with the intern Help intern become aware of strengths and weaknesses Encourage intern to determine learning experiences to achieve objectives View intern as prospective co-worker	
<b>Genetic Counsellors</b>					
<b>Higgins<sup>14</sup></b>	Program directors and supervisors	Cross-sectional survey – online Delphi survey to determine most important standards for counselling supervisors (24 items in round 1 of the Delphi). Questions based on literature  n=75 (round 1) with 3 Program directors and 62 Supervisors  61 (round 2) survey based on Standards for Counselling Supervisors (Dye and Borders 1990) where participants rated behaviours. Then interpretive content analysis and developed concepts	Program directors and supervisors ratings of the importance of skills required for clinical placement supervisors	Student Evaluation -Goal Setting, evaluation, feedback, remediation Student Centered Supervision Personal Traits and Characteristics Relationship Building and Maintenance Guidance and Monitoring of Patient Care	
<b>2013 US</b>					
<b>Occupational Therapy</b>					
<b>Koski<sup>17</sup></b>	37 OT students:	Cross sectional study. Survey	Ranked order of importance of	Administration – organised,	

<b>2011 US</b>	85 fieldwork educators with 65.9% having over 5 years supervision experience	ranking behaviours of effective educators Questionnaire developed based on Self Assessment Tool for Fieldwork Educator Competency (SAFECON). Importance of each item ranked total 27 items	skills	schedules, manuals, policies Evaluation – expectations, assessment, facilitates student reflection Supervision and education – scaffolds learning, collaborative, feedback, sensitive to learning styles Professional practice – skilled in field, client-centred, teamwork	
<b>Pharmacy</b>					
<b>Young<sup>20</sup> 2014 US</b>	2,639 student evaluations	Retrospective audit of completed student placement evaluations over 2009-2012 14 items relating to rating of preceptor performance	Student rating of preceptor performance	This preceptor is interested in teaching this rotation. This preceptor related to me as an individual. This preceptor encouraged students to actively participate in discussions and problem-solving exercises. Students were encouraged to use resource materials. The preceptor described their approach to thinking about therapeutic problems This preceptor was readily available to answer questions and concerns Good direction and feedback were provided. The preceptor is knowledgeable in their response to questions or their approach to therapy	This preceptor evaluated me at the mid-point and the end of the rotation This preceptor evaluated me at the end of the rotation in a manner which was helpful to me This preceptor served as a role model for a pharmacist practicing in this practice setting The goals and objectives of the rotation were outlined and/or explained at the beginning of the rotation Rotation activities were well-organized and structured. The preceptor discussed patient care and/or practice-related issues with me

Physiotherapy					
<b>Bennett<sup>46</sup></b> <b>2003</b> <b>UK</b>	Hospital, community & outpatient clinical educators	Cross-sectional survey Survey asking top 4 most important clinical educators' abilities/qualities	Clinical educator perceptions of top clinical educator qualities	Approachable Enthusiastic Desire to facilitate learning	Good communicator Share knowledge with learner
<b>Cross<sup>47</sup></b> <b>1995</b> <b>UK</b>	Setting not specified; students, clinical educators and academic tutors	Observational study Rank order of 12 descriptors derived from literature and student feedback	Stakeholder perceptions of what makes an ideal clinical educator	Approachable; Good communicator; Good role model; Knowledgeable Competent	Self-aware Enthusiastic Self-confident Organised Concerned about patient care
<b>Emery<sup>12</sup></b> <b>1984</b> <b>USA</b>	102 PT students	Survey questions derived from literature asking students to score importance of clinical instructor behaviours and frequency they observed behaviour in practice using 4 point interval scale	Student perceived importance of instructor behaviours	Communication – listens, feedback skills Interpersonal relations – positively regards student Professional skills Teaching behaviours	
<b>Ernstzen<sup>50</sup></b> <b>2009</b> <b>South Africa</b>	70 students 23 clinical teachers	Cross-sectional survey based on literature and pre-existing instruments	Student and CE views of valued clinical teaching and learning opportunities	Appropriate levels of autonomy High-quality/good clinical teaching skills Approach to teaching/personal factors Professional role	
<b>Jarski<sup>16</sup></b> <b>1989</b> <b>US</b>	Setting not specified; Physical therapists in 8 programs and physician assistants in 10 different US states	Observational study; Rank from list of 58 effective or ineffective teaching behaviours adapted from literature	Perceived most helpful teaching behaviours	Explains and answers questions Provides constructive feedback Is willingly accessible to students Shares knowledge and experience Creates practice opportunities for students Asks questions that stimulate problem solving Demonstrates skills for students Genuine interest in the student Enthusiasm for teaching	

				Friendly and outgoing Sensitive to patient needs Well prepared Actively promotes discussions Emphasises problem solving approaches rather than solutions
<b>Milanese<sup>33</sup></b> <b>2013</b> <b>Australia</b>	48 final year PT students	Cross sectional, non-experimental survey based on (Ernstzen 2009) questionnaire asked students to rate how much they learnt during placement from a list of teaching/learning opportunities	Student reported learning ratings	Patient-centred activities for learning Opportunities for student to present knowledge and learning Feedback Student assessment by range of stakeholders Give student responsibilities and collaborates
<b>Oyeyemi<sup>51</sup></b> <b>2013</b> <b>Nigeria</b>	Clinicians and academic faculty in five universities and affiliating teaching hospitals	Survey using McGill CTE validated tool measuring effective clinical teaching – rated importance of attributes of effective clinical teaching	Clinical instructor ratings of skill importance	Inspire confidence Open communication Encouraging questions Enthusiastic, interested in students Friendly to students and colleagues Encourage problem solving Dependable Present divergent viewpoints for discussion Encourage student-led learning Emphasis concepts rather than factual recall
<b>Onuoha<sup>48</sup></b> <b>1994</b> <b>UK</b>	85 students 75 clinical supervisors 55 teachers	Survey derived from student feedback and the literature asked participants to rate importance of clinical educator behaviours	Stakeholders ratings of importance of behaviours	Clinically competent Good time management Leader Good explanations Enthusiastic about clinical education Role model Clear expectations Provides experiences suited to ability Allows a measure of independence Available

				Accurate documentation of evaluation Constructive criticism Treats student collegially Attentive to student views Feedback Non-threatening
<b>Ozga<sup>18</sup></b> <b>2016</b> <b>US</b>	103 students	Cross-sectional survey based on pre-existing survey asking participants to rate how important 43 observable clinical instructor skills were	Students rating of importance of behaviours	Communication – feedback (honest, private, timely, useful), clear, open, active listener Interpersonal relations – cares about patients, treats student as person, professional, supportive, empathetic Professional skills – competent, team player, role model, good at explaining interventions and problem solving, leadership Teaching – available, provides teachable moments, scaffolds learning, is accurate and objective in documenting student performance evaluation, relates academic knowledge to clinical practice, manages the student's time constructively, is consistent with the academic program, observes performance in a discretely, schedules regular meetings, plans ahead and organised
<b>Radiotherapy</b>				
<b>Ingrassia<sup>15</sup></b> <b>2011</b> <b>US</b>	Setting not described	Observational study, questionnaire based on pre-existing instruments from other disciplines administered via electronic survey tool	Ranked importance of behavioural characteristics of CEs	Professional competence Teaching ability Evaluation skills Interpersonal relationship skills
<b>Speech language therapy</b>				
<b>Fitzgerald<sup>13</sup></b> <b>2009</b> <b>US</b>	Distance and traditional educational delivery model speech	Observational study; Self-assessment surveys and rating scales	Top supervisory aspects indicative of student and educator needs	Top supervisory aspects across all groups: Talking in times of difficulty, constructive criticism, assistance with specific treatment ideas, resources for evidence-based practice, encouraging critical thinking, allowing creativity, collegial interactions, exercising

	pathologists (numbers not reported)			independent judgements, observation of supervisor-delivered services.
<b>Multiprofessional</b>				
<b>Francis<sup>32</sup> 2016 Australia</b>	551 practice educators from diagnostic radiography, nuclear medicine, nutrition and dietetics, occupational therapy, physiotherapy and radiation therapy	Prospective, cross-sectional descriptive survey design; survey based on literature and pre-existing instrument asking participants to rank characteristics in order of importance	CE perceptions ranking of most important practice educator characteristics	Feedback skills Being non-judgemental Professionalism Clear Listening skills Enthusiasm Sincerity Clinically competent Organised Role model Available Well prepared Respects student autonomy Scholarly activity
<b>Perram<sup>11</sup> 2016 Australia</b>	1495 students from diagnostic radiography, nuclear medicine, nutrition and dietetics, occupational therapy, physiotherapy, radiation therapy	Cross-sectional anonymous survey derived from existing survey.  Students asked to rate importance of practice educator characteristics	Students ratings and rankings of most important qualities of practice educators	Non-judgemental, clarity, feedback skills, awareness, professionalism, sincerity, enthusiasm, clinical competence, availability, listening skills, well prepared, organisational skills, respects student autonomy, practices evidence based practice, role model, scholarly activity

**Table 2. Summary of qualitative studies describing clinical educator qualities and behaviours included in review**

Author, date Location	Profession Setting Sample	Methodology	How skills/behaviours were identified	Summary of clinical educator qualities/behaviours evaluated
<b>Dietetics</b>				
<b>MacLellan<sup>43</sup> 2008 Canada</b>	Setting not specified 284 dietetic interns	Qualitative study using methodological hermeneutics analysing interns and students' answers to open-ended survey questions	Student perceptions of CE role and effect on student stress	Treat interns as equals Recognise power imbalance between students and staff Spend time with trainees Flexible Encourage open learning experiences
<b>Maier<sup>37</sup> 2015 Australia</b>	Hospitals 26 graduates recently completed clinical placement	Thematic analysis using descriptive and interpretive analysis of semi-structured interviews	Recent graduate perceptions of CEs and behaviours that contributed to competency development	Creating welcoming and friendly environment, eg. having lunch with students enhanced students sense of belonging to the team Creating sense of belonging to profession Providing opportunities to contribute clinical opinions which were valued and respected Provide opportunities for autonomy Independence and responsibility provided which was relevant to growing ability Constructive criticism Trust Friendly and approachable Interest in teaching and student learning Younger and more relaxed Also outlined negative practices
<b>Nasser<sup>45</sup> 2011 Canada</b>	Clinical, community, food service, research, business and industry 49 experienced	Qualitative analysis of open-ended survey questions	Experienced preceptors descriptions of the knowledge, skills, and attitudes that dietitian preceptors must possess.	SKILLS assessing, coaching, communicating (particularly through active listening), resolving conflict, evaluating, planning, researching, teaching/facilitating, and managing time. ATTITUDES Attitudes toward learners: Accepts different backgrounds, styles, approaches; Commits to the success of the learner; Is empathic about learners' learning needs; Enjoys student contact; personal interest in students; Has realistic expectations of the learner; Supports the learner in developing her or his own approach to dietetic practice; Views interns/students as colleagues; Attitudes toward the profession: Views precepting as part of professional responsibility; Is

preceptors

passionate and positive about dietetics and the profession; Attitudes toward teaching; Allows students to make mistakes and learn from them; Is open to new ideas/ways of doing things; Has a love of teaching and learning and wants to teach learners; Attitudes toward training: Commits to the teaching and learning of learners; Views training as mutual learning for the learner and the preceptor; Views the training of learners as valuable  
Demonstrate empathy. open and honest, nonjudgmental, positive, role modelling

**Weitzenfeld<sup>31</sup>**  
**1982**  
**US**

Clinical  
setting and  
classroom  
26 students

Descriptive survey  
approach of 156 critical  
incident interviews  
about clinical  
instructors by 26  
students

Students perceptions of  
effective and ineffective  
supervision

#### TEACHING TECHNIQUES AND METHODS-

Knows subject matter

Gives accurate answers to questions

Uses methods of teaching other than lecture

Arranges chairs in a circle to facilitate discussions

Uses visual aids

Demonstrates how she would have given a diet instruction or handled a situation

Demonstrates the use of all equipment, audio-visuals etc.

Allows time for student to practice what has been demonstrated

Orients students to each new rotation

Situations are made realistic

Mediates discussion

#### INTERACTION-

Points out good aspects of a diet instruction given by the student

Ask for student opinions and feelings

Listens to problems and clarified the situation

Comforts student by expressing an understanding for doing something the first time

Makes student feel relaxed and at ease

Does not make student feel stupid or out of place

Allows student to explain how she would handle a situation

Spends time discussing an issue

Introduces student to her patients

Spends time answering questions

#### EVALUATION:

Explains evaluation measures



Points out strengths & Points out weaknesses  
 Gives alternate suggestions for improvement  
 Gives constructive criticism  
 Gives examples of how to strengthen weaknesses  
 Gives direct feedback on practice videotapes

## Occupational therapy

<b>Christie<sup>23</sup> 1985 USA</b>	Hospitals 188 therapists and 127 students	Results of open ended questionnaires were analysed.	Student and therapists views of distinguishing factors of effective supervisors	Interpersonal and communication skills, active listening, openness and honesty, attitudes, feedback (timely, constructive, consistent, and growth-promoting), adaptable supervisory approach, structured, individualised, flexible, open-minded, available, competent as a clinician and as an educator, role model, organized, supportive, empathetic, non-defensive, concern for the students' growth, commitment to the supervisory role, sensitivity to students' needs, patience, objectivity and enthusiasm
<b>Copley<sup>34</sup> 2011 Australia</b>	Children's occupational therapy clinic 9 students and 2 practice educators	Qualitative phenomenological approach involving interviews	Student and CE perceptions of CE approaches to help student learning	Modelling of practice Debriefing and performance-specific feedback Structuring learning, observation, and reporting Opportunity for practice
<b>Grenier<sup>25</sup> 2015 Canada &amp; US</b>	Fieldwork placements 29 students	Online open survey analysed using inductive grounded theory approach to content analysis	Student perceptions of the characteristics of their CEs and their teaching behaviours and their effects on learning	Well-developed interpersonal skills, demonstrated qualities of professionalism, realistic expectations of students, created positive learning spaces for students, took consideration into individual knowledge and skills, gave responsibility, were approachable, created safe environment, passion for profession/highly motivated, encouraged active student participation in treatment sessions, rounds and team meetings, provided regular constructive feedback to allow students to understand strengths and weaknesses, provided relevant tasks, gave independence, established clear objectives and expectations, encouraged frequent discussions, took advantage of teachable moments, adapt to students different learning styles and tailor fieldwork experience, mentor vs supervisor.
<b>Hummell<sup>36</sup></b>	Fieldwork	Qualitative analysis of	Student perceptions of	Approachable

<b>1997 Australia</b>	placements 42 students	open-ended questionnaires	the distinguishing characteristics of effective fieldwork supervisors	Easy to talk to Listened to student's opinions and ideas Interested in students Exhibiting respect for students Providing support when needed
<b>Mason<sup>38</sup> 1999 Australia</b>	Fieldwork placements 13 supervisors involved in group supervision.	Cooperative enquiry approach. Reflection- action cycle generated data	Supervisor experiences of group fieldwork supervision	Awareness and managing differing abilities and learning styles of students in the group Clear expectations of level of participation Individual feedback where required Be explicit about learning taking place – guide students to be consciously aware of learning opportunities in the fieldwork setting Relate observations to theory Promote informal opportunities for interacting with patients Prepare learning objectives pertinent to fieldwork setting Establish learning objectives early Articulating a frame of reference to guide students in recognizing what they were learning –starting with a broader perspective, relating this to functional abilities of the client and then breaking these down to smaller components. Supervisors defined a domain of concern, for example, quality-of-life issues, and then related this to the clients and the activities provided for them.
<b>Mulholland<sup>44</sup> 2006 Canada</b>	Clinical placement 103 students	Content analysis of 103 student nominations for clinical teacher awards	Student perceptions of what makes an exceptional practice educator	Creating a positive learning environment Facilitating the whole team's positive attitudes towards the students. Treating students with respect as a colleague and as a professional. The therapist paced my placement just right from observing to independence. Communication. Effective feedback - supportive, ongoing, clear and specific. Clear explanation and instruction. Challenge students' thinking and test knowledge Pushed to work outside comfort zone in order for new learning to occur Role model Exemplary knowledge, professional and interpersonal skills Dedication including taking the time to help, explain, teach or to offer advice. Friendliness, a relaxed manner, patience and a sense of humour. Role models and leaders in the profession

<b>Rodger<sup>39</sup></b> <b>2011</b> <b>Australia</b>	Practice placements 29 students, 41 practice educators, 8 university staff	Generic qualitative design using focus groups and interviews	Students', practice educators' and university staff's perspectives of CEs effects on placement quality	<p>Welcoming learning environment</p> <p>When students felt included, they were more likely to have a positive experience.</p> <p>Comprehensive, positive, welcoming orientation program modelled on processes for new employees.</p> <p>Graded program of learning experiences</p> <p>Acknowledging the impossibility for students to learn every skill and the value of reflection for compensating for this.</p> <p>Quality feedback – timely, routine, balanced, generous and without prompting. Insufficient feedback had a deleterious effect on their capacity to improve, making them feel devalued, directionless and fearful of change.</p> <p>Casual or immediate supervision, given directly after some form of student intervention, especially at placement commencement.</p> <p>Consistent approach and expectations, especially with multiple supervisors;</p> <p>Friendly, approachable and valued a student's contribution and learning.</p> <p>Personalise relationships with students.</p> <p>Self confident and open.</p> <p>Acknowledged the external pressures felt by students (work, academic requirements)</p>
<b>Rodger<sup>40</sup></b> <b>2013</b> <b>Australia</b>	Fieldwork placements 124 student nominations	Qualitative content and thematic analysis of student nominations	Student perceptions of what makes an exceptional practice educator	<p>Providing 'the just right challenge'</p> <p>Valuing the reciprocity of the supervisory relationship</p> <p>Educators embracing life-long learning</p> <p>Relate to the student as an individual</p> <p>Open to questions, approachable, non-judgemental, dedicated, patient and trusting of students.</p> <p>Create safe learning environment and encourage questions "no matter how stupid"</p> <p>Help develop student professional identity</p> <p>Recognise students as individuals, not 'just another student'.</p> <p>Work collaboratively with students to ensure that expectations were met. Collaborative relationships enabled students to discuss their ideas and concerns without fear of judgement.</p> <p>Get to know the students from placement commencement.</p> <p>Sharing stories where students felt they were being treated as equals rather than being told what to think.</p> <p>Getting the balance right, in terms of being pushed out of comfort zone and challenged in order that they developed further confidence in their abilities.</p>

Providing positive, constructive, balanced, encouraging and timely feedback  
 feedback, that was positive, constructive, balanced, encouraging, timely (often immediate),  
 provided in different ways (written, verbal, scheduled) and helpfully framed as an opportunity for  
 learning.

Using examples to show student progression. This enabled them to appreciate changes in their  
 own performance over time.

Whilst developing autonomy, excellent practice educators also encouraged students to develop  
 their own therapeutic style, allowing them to integrate the art and the science of practice.

Pharmacy				
<b>Astle<sup>22</sup></b> <b>2012</b> <b>USA</b>	Public and private institutions Students and preceptors from 119 schools of pharmacy across US	Qualitative content analysis of instruments used by students to evaluate preceptors and student responses to open-ended survey regarding qualities of preceptors	Qualities and characteristics of preceptors that assist student learning found in student evaluation instruments.	<p><i>Professionalism</i>: role model, caring, knowledgeable, competence, professional communication, enthusiasm for practice</p> <p>Instructor behaviours: orientation, organised, defines expectations, preceptor defined goals and objectives, planned activities, learning gap assessment, monitors progress, periodic formal evaluation, summative evaluation, fair evaluation, formative feedback, conveys concepts, provides explanations, answers questions, demonstrates, explains reasoning, shares experiences, preceptor guided goal attainment, dedicates time, preps students, challenges students, making connections, identification with patients, preceptor guided problem solving, prompts students, open discussion, encourages questions, relevancy, teachable moments, encourages student self-assessment, encourages student defined goals and objectives, encourages student independence, encourages student problem solving, encourages student communication, encourages student lead, provides positive learning environment, provides optimal physical environment, provides resources, promotes staff engagement, provides adequate supervision, provides opportunity to practice, provides opportunity to observe, provides opportunity for classroom application, provides opportunity for patient contact, provides opportunity for inter-professional</p> <p><i>Supportive</i> role: maintains accessibility, accommodating, willingness to help, motivates students, concern for student progress, provides positive reinforcement, respect for students, personal attributes, enthusiasm for teaching, welcomes student feedback</p> <p><i>Collaborative</i>: joint negotiation of student activities, views students as part of team, collective outcomes</p>
<b>Ignoffo<sup>27</sup></b> <b>2017</b>	Setting not specified	Delphi process	Views of experienced preceptors - achieved	Orientation should provide complete information on expectations, grading, and conduct Feedback

<b>US</b>	36 experienced preceptors		consensus on best practices to increase preceptor efficiency and effectiveness	Give student opportunity to think “offline”; resume discussion later Ask students to speak up when they do not understand or cannot answer so that they are not left behind
<b>Physiotherapy</b>				
<b>Cole<sup>42</sup> 2008 Canada</b>	Clinical placements 51 students	Qualitative analysis of critical incident questionnaires	Student perceptions of what made them feel most engaged or distanced (and why); what was most affirming; what was most puzzling.	Allowing the student to practice, provide feedback, explaining technique or rationale, or discussing with student; Allowing the student to interact directly with patient Assist student’s understanding: clarify and answer questions, helped to problem-solve; resolve discrepancies between student expectations and reality; provided “tips” and special learning opportunities; Prepare student: discuss patient and/or condition with the student before seeing the patient; refer student to appropriate references; allow student time to read chart and look up information; orientate student to colleagues and work environment Valued student input: listened to student suggestions re: diagnosis or treatment, “trusted” student
<b>Delany<sup>35</sup> 2009 Australia</b>	Hospitals 45 students and 19 clinical educators	Qualitative phenomenological approach involving focus groups	Student perceptions of CEs’ helpful teaching strategies	2 main themes: Dynamic knowledge development and self-confidence. Role modelling and provide time for reflection about learning; Established students’ knowledge base prior to the patient encounter; Provided opportunities for learning ‘with dignity’; Direct and immediate feedback; confidence related to quality of feedback Provide graduated supervision; Provide explanations as to how to think through a problem; Were approachable to ask questions
<b>Greenfield<sup>24</sup> 2012 US</b>	PT Inpatient and outpatient settings 6 clinical instructors	Phenomenological interviews	CE perceptions of their role as educators	Three key themes emerged: Incremental learning, Reflection in practice (support reflection on practice), Creating a caring environment with students
<b>Healey<sup>26</sup></b>	Hospitals	Qualitative analysis of	Student and selected	Effective interpersonal communication skills and teaching approaches in their clinical instructors

<b>2010, US</b>	10 students and 9 student-centred clinical instructors	individual interviews	“student-centred” CE perceptions of CE factors that promote student learning during placement	who (a) made them feel comfortable, less anxious, and provided a safe place to learn and take risks, (b) stimulated thinking and understanding by asking questions of them, and (c) provided feedback on their performance that confirmed their strengths and identified areas for improvement. Provide opportunities to interact with patients.
<b>Kelly<sup>28</sup> 2007 US</b>	Hospital Clinical instructor, co-worker and student	Observational study; case study interviews with clinical instructor, former student and coworker, and audit trail	Multi-dimensional input from former student and their “excellent” CE and a co-worker summarised to describe the instructional reasoning and teaching strategies used by an exemplary clinical instructor	Creating and maintaining an open collegial relationship Adapting the experience to the student Facilitating clinical reasoning Making time for the student Receiving environmental support
<b>Neville<sup>49</sup> 1991 UK</b>	Clinical placement 40 students	Content analysis of students’ responses to an open question	Student perceptions of how CEs contributed to good clinical placement experience?	Highly frequent, constructive feedback Time with clinical tutors for observation, questioning and the sharing of ideas. Encouraging and use a variety of learning materials Opportunities to see surgery, visit clinics and interact with other professionals Given responsibility, space, freedom and independence along with guidance and availability of help if required.
<b>Psychology</b>				
<b>McGinley<sup>29</sup> 2001 US</b>	14 students	Semi-structured interviews of 14 students analysed and themes developed	Student perceptions of effective supervisor behaviours	Supportive supervisors who helped their supervisees learn how to utilize their having countertransference in understanding their patients and themselves a supervisor who could explain theory and interventions clearly, supervisors who could give detailed feedback and specific suggestions of how to improve, and supervisors who were flexible in their theoretical orientation and were not rigid about only using process notes as the sole method of supervision. Opportunity to explore their countertransference in a deep and personal manner. Supportive and non-pathologizing supervisor, a flexible supervisor in terms of theoretical orientation and preferred method of supervision (e.g., process notes, audiotape, etc.), and a supervisor well-versed in theory who is able to give detailed feedback. Several subjects mentioned that their best experience involved having a supervisor who respected what they had to say and who treated

them in a collegial manner. In addition, several supervisees stated that they had a better experience in supervision with someone of the same gender. Helpful aspects of supervision included having a supervisor who made the student feel competent and supported, specifically when a supervisor would point out the good rather than just the bad. Subjects also wanted a collaborative flavour to their supervision. They wanted a supervisor who was curious about the supervisee's subjectivity (countertransference), who did not disclose too much and had good boundaries, and would follow the student rather than pushing their own agenda. Finally, subjects also stated that a good match in terms of personality made supervision more pleasurable. The subjects went on to list specific personality traits like a sense of humor and a good interpersonal connection.

<b>Rindflesch<sup>30</sup></b> <b>2011</b> <b>USA</b>	Clinical placement at Mayo clinic 9 students	Phenomenologic study using semi structured interviews	Student perceptions of CE behaviours make for a positive learning experience	Feedback - constructive, given at an appropriate time, and reciprocal. Taking time for students included scheduling time with the student throughout the week for questions, to review techniques, or to introduce new material. Creating a safe environment for a student to ask questions. By encouraging a student to ask about why something is done, the student is becoming more independent in his or her abilities as a future practitioner. Understanding progression of students for appropriate grading of independence. As students progress through a clinical experience, they typically need more supervision and guidance at the beginning and less at the end.
<b>Social Work</b>				
<b>Adams<sup>21</sup></b> <b>2011</b> <b>USA</b>	Social work Public and private (non-profit agencies 19 fieldwork instructors	Exploratory qualitative study using focus groups CEs	CE perceptions of the characteristics and attributes for competent fieldwork instruction	<i>Role modelling:</i> Demonstrate professional demeanour, attire and work habits, distinguish relationship boundaries between field instructor and student, assist student to distinguish between personal and professional issues in the workplace <i>Communication:</i> Honest conversations with students about their skill level, set clear and realistic goals with student, provide negative criticism and addressing conflict <i>Nurturing:</i> Demonstrate patience, understanding, and care with student, develop trusting relationship between student and field instructor, provide encouragement and mentoring to student
<b>Multi-professional</b>				
<b>Perram<sup>11</sup></b> <b>2016</b> <b>Australia</b>	Diagnostic Radiography , Nuclear	Thematic analysis of students answers to two open questions	Student perceptions of preferred CE characteristics	Respectful including being treated like an equal; inspirational including being a role model, enthusiastic about work and student training; supportive; and good teacher including feedback, interactive teaching and provided resources

Medicine, asking 3 most and 3  
Nutrition And least preferred CE  
Dietetics, characteristics  
OT, RT &  
PT  
Clinical  
placement  
1495  
students

OT=Occupational Therapy PT=Physiotherapy; RT=Radiation Therapy



**Table 3. Results of thematic analysis of skills and qualities of clinical educators**

Theme	Descriptor
Intrinsic and personal attributes of clinical educators	Friendliness
	Kindness
	Patience
	Relaxed
	Welcoming
	Honest
	Nurturing
	Trusting
	Willing to help
	Interpersonal skills
	Approachable
	Flexible
	Empathic
	Self confident
	Outgoing
	Makes student feel comfortable
	Sincere
	Enjoys their role
	Self aware
	Passionate
	Sense of humour
	RESPECT
	Treat as equal: respect as an individual and future colleague
	<ul style="list-style-type: none"> <li>▪ Enhanced confidence and belief in student's own ability</li> <li>▪ Sense of professional identity developed</li> <li>▪ Improved motivation</li> </ul>
Provision of skilful feedback	Constructive
	Prompt
	Regular
	Not degrading
	Balanced
	Open to reciprocal feedback

Use student feedback to implement patient care

Takes time for feedback

Plans time for feedback

Allows time for feedback

Prepares students for feedback

Allows student to explain

Scaffolding learning

Providing appropriate challenges for student ability

Adequate orientation – to placement, to tasks

Planned activities

Assesses and responds to learning gaps

Fair evaluator

Demonstrates

Makes connections between theory and practice

Guided goal setting and attainment

Provides resources

Supports independent learning

Provides opportunities to practice and observe

Encourages student participation

Explains techniques

Gives students opportunities to think “offline”

Relevant teaching

Be explicit about learning taking place

Monitors progress

Accessible

Adapt to different learning needs

Allows mistakes

Identifies learner’s performance problems

Recognises internal and external factors affecting learner performance

Perceives self as teacher

Provides opportunities for student to present knowledge and learning

Provides patient-centred opportunities

Views student as future colleague

Fostering collaborative learning

Understanding expectations

Organisation and planning

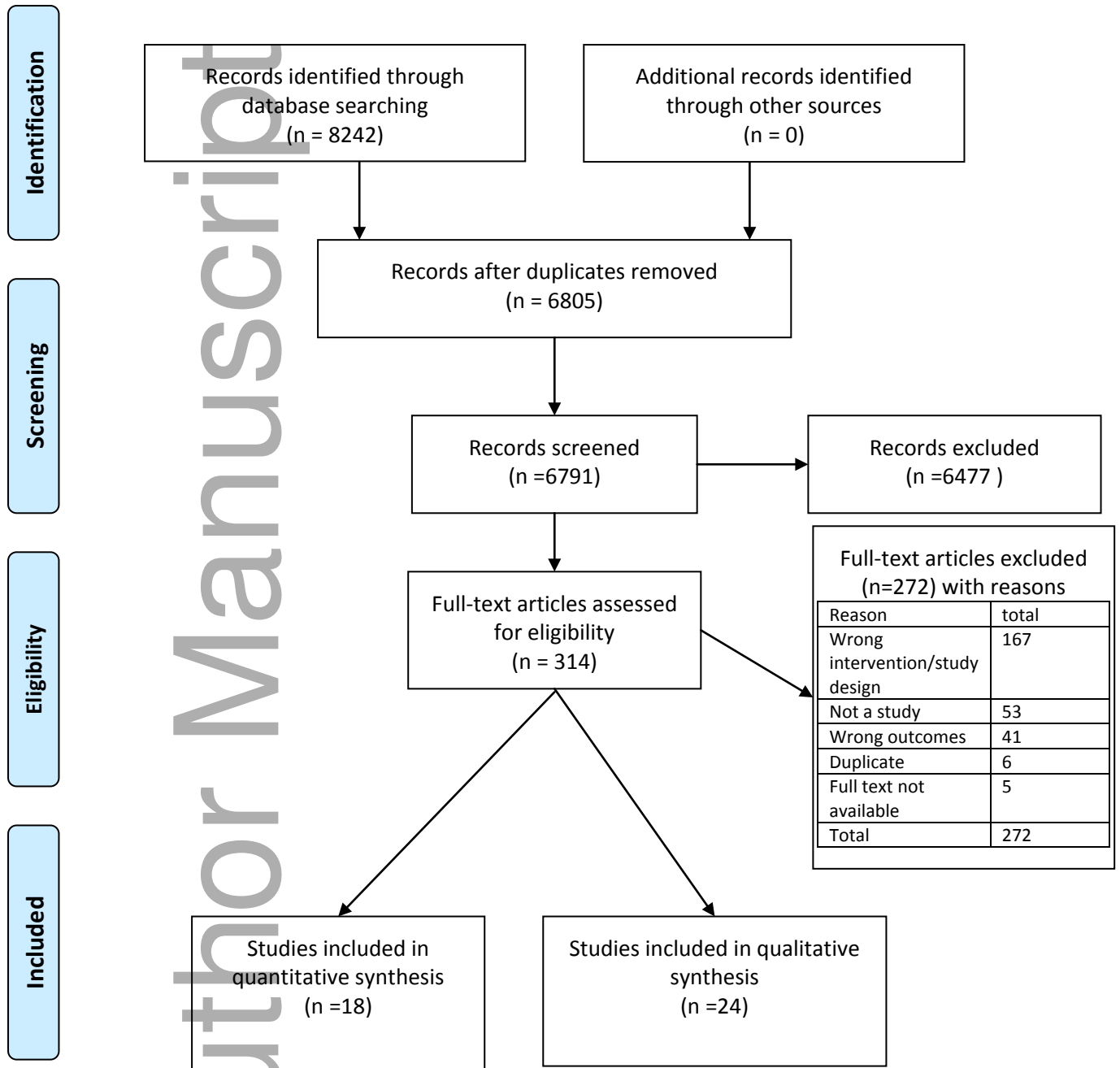
Clinical educators in their professional role

Promotes staff engagement  
Interprofessional opportunities  
Joint negotiation of student activities  
Views student as part of the team  
Collective outcomes  
Values student input  
Listens to student  
Create collaborative environment – eg staff  
have lunch with students  
Curious about student's opinions  
Facilitates team's positive attitude towards  
students  
Values reciprocity of student-educator  
relationship  
Take time to get to know students at beginning  
of placement  
Share stories  
Acknowledge students cannot learn every skill  
Understands outside pressures (eg work, other  
study)  
Understands assessment and evaluation  
expectations  
Provides schedules, manuals and policies  
Information provided ahead of time  
Structured rotations  
Role model  
Clinically competent  
Good leader  
Cares about patients  
Cares about profession  
Advocates (for profession, patients and  
students)  
Scholarly activity

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## PRISMA 2009 Flow Diagram



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097



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