The role of Interprofessional Education within the medical undergraduate palliative care curriculum: *A systematic review.*

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ABSTRACT

INTRODUCTION:

In the near future, population changes will impact on palliative care provision. We have to evolve to meet patients' changing needs. Part of this evolution is to develop the role of the multidisciplinary team to provide patient-centred care. This highlights a learning need within medical education which can be achieved through the development of collaboration skills. Interprofessional education (IPE) has been utilised as a pedagogic tool by health professions in order to enhancing such skills.

OBJECTIVES:

To identify and synthesis evidence on the use of IPE as a method of delivering palliative care teaching to undergraduate medical students.

METHOD:

Primary studies were identified by searching bibliographic databases; MEDLINE, EMBASE, AMED, CINAHL, ERIC, BEI, BNI, PsychINFO, CENTRAL and the index of thesis and dissertations (UK) from January 1993 to February 2015. This was augmented by searching references from the preliminary search and key conference proceedings. Studies were included if the educational initiative was attended by two or more professions, including undergraduate medical students. A narrative synthesis of identified studies was performed with Kirkpatrick's hierachy of evaluation as a framework to assess learning outcomes. Data-driven thematic analysis was performed and a thematic schema created to illustrate the factors underpinning IPE.

RESULTS:

Eleven studies were identified. Significant variability in study quality was observed. Overall IPE was generally well received by students and facilitators. A positive response to educational initiatives was influenced by the perceived relevance and benefit of content to later clinical practice. Recruitment and educational setting were found to influence student satisfaction and motivation. Barriers to the implementation of IPE included; cultural differences and participant background. The consideration of learning outcomes in accordance with kirkpatrick's hierachy highlighted a paucity of data relating to societal and patient impact, with a lack of longterm follow-up.

CONCLUSION:

There is potential value in the use of IPE within the medical undergraduate palliative care curriculum, however there is need for more robust research with longterm follow-up.

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CATALOGUE OF ABBREVIATIONS

AIHC	The American Interprofessional Health Collaboration
AIPPEN	The Australasian Interprofessional Practice and Education Network
AMEE	An International Association for Medical Education
ASME	Association for the Study of Medical Education
AHPQ	Attitudes to Health Professions Questionnaire
BEME	Best Evidence in Medical and Health Care Education
BI	Bias Index
CAIPE	Centre for the Advancement of Interprofessional Education
CDSR	Cochrane Database of Systematic Reviews
CIHC	Canadian Interprofessional Health Collaborative
CIPW	Creating an Interprofessional Workforce
CRD	Centre for Reviews and Dissemination
DARE	Database of Abstracts of Reviews of Effects
DfES	Department for Education and Skills Development
DH	Department of Health for England
EAPC	European Association for Palliative Care
EOL	End of Life
GMC	General Medical Council
IEPS	The Interdisciplinary Education Perception Score
IPE	Interprofessional Education
IPP	Interprofessional Practice Placement
PBL	Problem Based Learning
PI	Prevalence Index
RCN	The Royal college of Nursing
RIPLS	Readiness for Interprofessional Learning Scale
SCIE	The Social Care Institute for Excellence
SCOPME	The Standing Committee on Postgraduate Medical and Dental Education
UK	United Kingdom
US	United States

VLE	Virtual Learning environment
WHO	World Health Organisation
ZPD	Zone of Proximal Development

ACKNOWLEDGEMENTS

DECLARATION

I confirm that this work is original and that if any passage(s) or diagram(s) have been copied from academic papers, books, the internet or any other sources these are clearly identified by the use of quotation marks and the reference(s) is fully cited. I certify that, other than where indicated, this is my own work and does not breach the regulations of HYMS, the University of Hull or the University of York regarding plagiarism or academic conduct in examinations. I have read the HYMS Code of Practice on Academic Misconduct, and state that this piece of work is my own and does not contain any unacknowledged work from any other sources.

1.0. INTRODUCTION

"Tell me and I forget, teach me and I may remember, involve me and I learn."

Benjamin Franklin

1.1. The Political and Educational Setting of Interprofessional Education

Interprofessional Education (IPE) as a paradigm is not a new concept. It has been utilised as a pedagogic tool by allied health professions and, private sector organisations for several years in order to enhance the development of collaborative skills such as; teamwork, professional role development, communication skills, critical reflection, and professional socialisation (Clark, 1997) (Ruiz Ulloa & Adams, 2004) (Burton et al., 2010). The use of IPE within medical education has been sporadic however, recent years have witnessed a surge in interest from; educators, researchers, healthcare commissioners, and professional bodies. The reason for this drive relates to an escalating population which is skewed towards older age with increasingly complex medical needs (Department of Health(DH), 2001) (Burton et al., 2010). It is these changing care needs which have facilitated a move towards 'patient-centred' services in the hope of providing holistic and high quality patient care (DH, 2001).

The World Health Organisation (WHO) emphasised the importance of teamwork, through the Declaration of Alma-Ata (WHO, 1978) which, in addition to acknowledging the importance of the 'health team' also called upon all healthcare organisations, and governments to protect, and promote the health of all people. A later document titled; 'Learning together to work together' was published by the WHO with the intention of further describing the role of IPE (originally termed 'multiprofessional education') as a strategy to address both present, and future global healthcare needs (WHO, 1988). The WHO suggested that team-work was necessary in order to achieve coordinated delivery of healthcare, and contribute towards the overarching goal of 'health for all' (a concept previously addressed by the declaration of Alma-Ata).

A further precipitator for an increasing interest in IPE, came in the form of an action framework later published by the WHO in 2010. This framework was produced in order to guide interprofessional education, and collaborative practice. Within the framework IPE is championed, with the statement;

> *"Interprofessional education…is an opportunity to not only change the way that we think about educating future health workers, but is an opportunity to step back and reconsider the traditional means of health-care delivery."*
>
> *(Burton et al., 2010, p. 6)*

Predating this document the Department of Health for England (DH) also recognised the importance of IPE in relation to lifelong learning and development, which are described as; "key to delivering the Government's vision of patient-centred care in the NHS" (DH, 2001, p. vii). The move towards patient-focused as opposed to institute-driven healthcare is a theme which was introduced through the UK government white paper; 'The New NHS' (DH, 1997). This was to be achieved through the collaboration of health and social care with the goal of integrating services. The DH states that;

> *"Integrated care for patients will rely on models of training and education that give staff a clear understanding of how their own roles fit with those of others within both the health and social care professions."*
>
> *(DH, 1997, p. 55)*

The Royal college of Nursing (RCN) has advocated the importance of IPE following a systematic review into its role within primary care, and acknowledged its necessity in underpinning patient-centred care, and evolution of healthcare practices (Clifton et al., 2006)

The Social Care Institute for Excellence (SCIE) also investigated the role of IPE in qualifying social work education, in order to promote interprofessional collaboration (Sharland et al., 2007). The results from this systematic review were mixed, and highlighted the problems many researchers have encountered when evaluating IPE.

These problems relate to heterogeneity of methodologies, and outcomes in addition to the use of varying terminologies. Despite this the potential benefits of IPE were acknowledged with a call for further robust research.

The endorsement of IPE from government and healthcare organisations has fuelled the increased interest in IPE within healthcare (DH, 1997, 2001) (Clifton et al., 2006). In addition to the utilisation of IPE at a post-qualification level, there has been growing support for its use within the undergraduate population (Sharland et al., 2007) (Barr et al., 2014) (Darlow et al., 2015). The General Medical Council (GMC) in 1993 produced the document; 'Tomorrow's Doctors', as a foundation from which to build the medical undergraduate curriculum (GMC, 1993). The 2009 update emphasises the importance of being able to participate within a multi-professional team. The document describes the desired outcomes for medical graduates, and in relation to multi-professional practice states;

> *"The graduate will be able to… understand and respect the roles and expertise of health and social care professionals in the context of working and learning as a multi-professional team… **[and]** …understand the contribution that effective interdisciplinary team working makes to the delivery of safe and high-quality care"*
>
> *(GMC, 2009, p. 29)*

These qualities are echoed in the later GMC document; 'Good Medical Practice' which outlines the expectations of all registered doctors within the UK (GMC, 2013). The guidance describes the need to; "…work collaboratively with colleagues to maintain or improve patient care" (GMC, 2013, p. 14).

The DH further advocated the use of IPE within the undergraduate curriculum stating that;

> *"Core skills, undertaken on a shared basis with other professions, should be included from the earliest stages in professional preparation in both theory and practice settings"*
>
> *(DH, 2001, p. 5)*

The potential benefits of IPE have been acknowledged at a global, as well as national level. The US Institute of Medicine for example, acknowledges a gap in education due to a failure to respond to the changing healthcare needs of the population (Greiner & Knebel, 2003). In order to engage in collaborative practice the Institute of Medicine identifies that; "All health professionals should be educated to deliver patient-centred care as part of an interdisciplinary team" (Greiner & Knebel, 2003, p. 3). In response to growing interest in IPE, The Canadian Interprofessional Health Collaborative (CIHC) was established with the belief that;

> *"Interprofessional education and collaborative patient-centred practice are key to building effective health care teams and improving the experience and outcomes of patients"*
>
> *(CIHC, 2007, p. 2)*

Introducing IPE at the undergraduate level may reduce the risk of the later development of tribalism and negative stereotypes cultivated by separate undergraduate programmes (Atkins, 1998) (Norman, 2005). These barriers have been attributed to failures in collaborative practice (Barnsteiner et al., 2007) (Curran et al., 2008).

To summarise, the interest in IPE within healthcare and medical education has been motivated by several policies and guidelines originating from government, educational and healthcare bodies. The practical application of IPE will be discussed, however in

order to understand the subject in its entirety a clear definition of terminology needs to be considered.

1.2. Terminology

The increasing interest in IPE as a pedagogic tool with the associated influx of research has led to inconsistencies in terminology. Due to the nature of IPE and its multiprofessional influences, different descriptions have been developed using suffixes such as; 'professional', 'disciplinary' or 'departmental'. These have been used interchangeably with prefixes including; 'multi', 'trans' and 'intra' (McCallin, 2001) (Sharland et al., 2007). Terms such as; 'common learning', 'shared learning' and 'multiprofessional education' also appear in literature describing IPE (McCallin, 2001) (Freeth, 2010). Inconsistent terminology has been a recurring problem observed by researchers within the field (McCallin, 2001) (Oandasan & Reeves, 2005) (Clifton et al., 2006). According to The Centre for the Advancement of Interprofessional Education (CAIPE) IPE is said to occur;

> *"...when two or more professions learn with, from and about each other to improve collaboration and the quality of care"*

> *(CAIPE, 2002)*

This definition of IPE has been widely accepted within medical education and subsequent research (Clifton et al., 2006) (Hammick et al., 2007) (Burton et al., 2010). The CAIPE description focuses the concept of IPE to four main points;

1. Two or more professions need to be involved for the learning to be considered IPE.

2. IPE is an active process whereby professions learn 'with, from and about each other'. There is therefore interaction between individuals in order to learn. This contrasts with the solitary process of 'multiprofessional education' whereby; "two or more professions learn alongside one another" (Hammick et al., 2007, p. 7).

3. Inclusion is implied by the lack of distinction between pre-professional and professional groups.

4. The aim of IPE is to encourage collaboration and improve quality of patient care.

The reference to interactive learning is an important element of IPE and has been emphasised by several researchers as a means of distinguishing this form of intervention from 'multiprofessional education' (Freeth, 2011) (Thistlethwaite, 2012).

CAIPE expands on their definition by adding that IPE incorporates;

> *"...all such learning in academic and work-based settings before and after qualification adopting an inclusive view of 'professional'..."*

> *(CAIPE, 2002)*

This leads on to the main values of IPE developed by CAIPE, which describe a need for learning to; focus on the requirements of 'individuals, families and communities' to improve overall quality of health care, foster equality and diversity between professions, sustain professional identity and instil interprofessional values (Barr & Low, 2011b). Thus promoting a sense of team unity and collaboration.

For the purpose of this review and to encourage clarity of vocabulary, the CAIPE definition of IPE will be used as the author feels this encapsulates the ethos of IPE and its ambition to strengthen collaborative practice.

1.3. Collaborative Practice

The overarching aim of IPE is to enhance 'mutual understanding' and 'collaborative practice' (Hammick et al., 2007) (Burton et al., 2010). These skills are attributed to improved effectiveness, efficacy and overall quality of patient care (WHO, 1988)

(Clifton et al., 2006) (Burton et al., 2010). Collaborative practice is said to happen when;

> *"...multiple health workers from different professional backgrounds work together with patients, families, cares and communities to deliver the highest quality of care. It allows health workers to engage any individual whose skills can help achieve local health goals"*

> *(Burton et al., 2010, p. 7)*

A progressive relationship has been proposed between IPE, and collaborative practice whereby a 'collaborative practice-ready workforce' is developed in order to achieve the end target of optimised healthcare delivery (Figure 1). The 'collaborative practice-ready' health worker is described as; "someone who has learned how to work in an interprofessional team and is competent to do so" (Burton et al., 2010, p. 7). IPE is viewed as an integral step in this process. The early introduction of IPE has been proposed, as a means of developing the skills needed for undergraduates to be ready for collaborative practice on qualification (Clifton et al., 2006) (Burton et al., 2010). The concept of a collaborative ready workforce reflects a global change in health care needs. IPE has been proposed as a means of delivering the skills healthcare professionals require to address these needs (Greiner & Knebel, 2003) (Burton et al., 2010) (Interprofessional Education Collaborative Expert Panel, 2011).

Developing a 'collaborative relationship' is said to be necessary to developing a 'collaborative culture' (CIPW, 2007). Instilling skills for collaborative practice therefore has wider implications for the healthcare community. Failures in collaborative practice between healthcare professionals, have been highlighted by several public enquiries relating to medical negligence, and child harm or neglect (Laming, 2003) (Kennedy, 2001). One such example is the response by the DH, following the public inquiry into children's heart surgery at the Bristol Royal Infirmary with the acknowledgement;

"there should be more opportunities for different health care professions to share learning and that more emphasis should be placed upon the non-clinical aspects of care, such as communication skills, in the education, training and development of those working within the NHS"

<div align="right">(DH, 2002, p. 10)</div>

Figure 1. Relationship between interprofessional education and collaborative practice
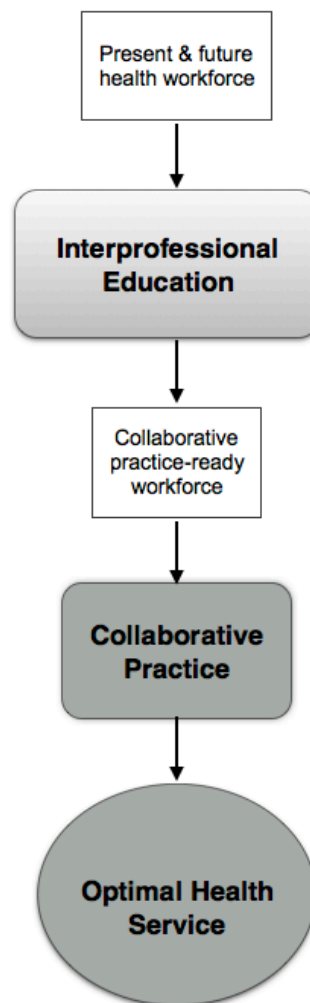
<div align="right">Adapted from Burton et al. (2010)</div>

A green paper produced by the Department for Education and Skills Development (DfES) echoed this need for improved education, and co-ordination between professionals (DfES, 2003).

The WHO describes a crisis within healthcare, with demand outstripping resources. This provoked the 2010 document; 'Framework for Action on Interprofessional Education & Collaborative Practice' whereby, interprofessional collaboration in education was said to be; "an innovative strategy that will play an important role in mitigating the global health workforce crisis" (Burton et al., 2010, p. 7). IPE has been said to reduce fragmentation and improve the consistency and standard of patient care (DH, 2002) (Clifton et al., 2006) (Burton et al., 2010). The purpose of this review is not to promote IPE as a panacea for collaborative practice but to pursue the suggestion that it may form part of the solution to improve patient care.

> *"The skills to collaborate as part of an interprofessional health care team are only as useful as a health professional's willingness to use them".*
>
> *(Hoffman et al., 2008, p. 655)*

1.4. Theoretical Background

The theoretical background of IPE is confused by the influence of different professions with an abundance of theories. This has lead to a fractionation of theory within the IPE field, with favouritism from researchers towards their own disciplines and theoretical backgrounds. There is however no one theory which is capable of explaining all aspects of this learning model. Educationalists have attempted to identify key learning theories underpinning IPE (Oandasan & Reeves, 2005) (Hean et al., 2009) (Sargeant, 2009) (Hean et al., 2012). For example Hean at al. (2009) conducted a systematic review with the aim of providing a framework summarising key learning theories. The distinction was made between behaviourist and constructivist approaches.

The focus of behaviourist learning theory is said to relate to the outcomes of learning as expressed by behaviour (Hean et al., 2009). This theoretical model is more commonly linked to the evaluation of IPE programmes though measurable outcomes. Kirkpatrick's hierarchy of evaluation for example, has been utilised as a means of measuring educational learning outcomes for IPE (Barr et al., 2000) (McNair et al., 2001). Kirkpatrick (1967) proposed a hierarchy of levels evaluating the outcome of educational interventions. The hierarchy consists of four levels (as depicted in Figure 2), with the highest being the societal impact of the intervention. The term hierarchy has been considered by some as inappropriate particularly in consideration of IPE, as the levels are not progressive, and studies concentrating on lower level outcomes such as, student satisfaction should not be considered inferior (Hammick et al., 2007) (Hean et al., 2009). Kirkpatrick's model was adapted by Barr et al. (2000), with the subdivision of levels 2 and 4 for the purpose of a review investigating the evaluation of IPE within the UK (Table 1).

Figure 2. Kirkpatrick's model of evaluation
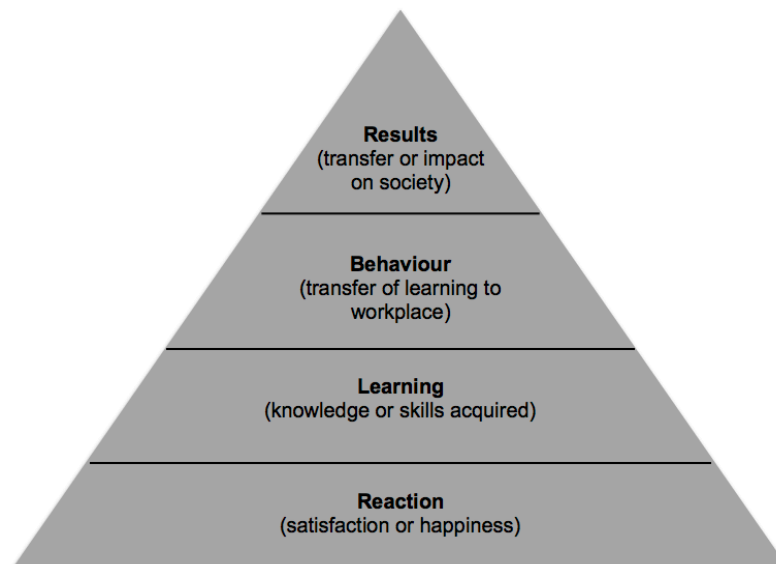
Kirkpatrick, (1967)

Table 1. Modified hierarchy of interprofessional outcomes

Level 1: Reaction	Learner's views on the learning experience, its organisation and content.
Level 2a: Modification of attitudes/ perceptions	Changes in reciprocal attitudes or perceptions between participant groups, towards patients/clients and their condition, circumstances, care and treatment.
Level 2b: Acquisition of knowledge/skills	Acquisition of concepts, procedures and principles of interprofessional collaboration.
Level 3: Behavioural change	Transfer of interprofessional skills and learning to workplace.
Level 4a: Change in organisational practice	Changes in the organisation/delivery of care attributed to an education programme
Level 4b: Benefits to patients/ clients	Improvements in the health and well being of patients/clients as a direct result of an education programme.

Barr et al., (2000)

This adaptation has been utilised in later reviews concerning the evaluation of IPE (Hammick et al., 2007) (Gillan et al., 2011) (Reeves et al., 2014). Rather than an improvement of the original evaluation model, the introduction of further sub-levels may overcomplicate the evaluation of IPE (Yardley & Dornan, 2012). For the purpose of this review the original Kirkpatrick's model will be utilised. The limitations of this model are acknowledged in terms of reliance on outcome-based measures for evaluation, and the potential restrictions of using a framework. Additional methods including; narrative review and critical appraisal, will be performed for all studies fulfilling the inclusion criteria, with the aim of avoiding loss of subtle findings (unintended outcomes) which would negatively effect the critical assessment of IPE.

As highlighted by Hean et al. (2009) behaviourism has a role to play in IPE particularly in consideration of curriculum design and evaluation. There are however risks of an exclusive positivist approach, with the view that only measured outcomes

indicate learning. Limitations include the over reliance on outcome measures, with participants focusing on assessments and achieving objectives. The development of outcome-based curricula incorporates 'operant conditioning' (Skinner, 1953) whereby participants receive positive enforcement for 'good' performance (e.g. assessment results) and negative reinforcement for 'undesirable' behaviour (e.g. poor facilitator feedback). IPE as a concept requires more than this in terms of active engagement, and continued reflection by participants to enable a deeper level of understanding, and perceptual change (Clark, 2006) (Buring et al., 2009) (Burton et al., 2010).

Constructivism can be broken down further in to the concepts of cognitive constructivism, and social constructivism (Hean et al., 2009). Cognitive constructivism refers to the concept that knowledge is constructed through experience (Knowles et al., 1998). Important components of cognitive constructivism are said to be self-directed learning, and the contextualisation of learning (Hean et al., 2009, 2012). Problem-based learning and transformative learning have also been considered under the heading of cognitive constructivism, and implemented in the theoretical basis of IPE (Hean et al., 2009). The interaction between prior knowledge and acquisition of new knowledge within the concept of cognitive constructivism, has been said to contribute to the perceived effectiveness of IPE (Hean et al., 2009) (Craddock et al., 2013). This raises questions relating to the timing of an IPE intervention (year of study), and potential conflict due to the establishment of professional socialisation, and tribalism in later years of study (Clark, 1997) (Atkins, 1998). Adult learning Theory (Knowles, 1980) can also be considered under the umbrella of social constructivism, and has been repeatedly linked to IPE (Hammick et al., 2007) however it has been argued that this reflects a group of concepts rather than a single pedagogical theory (Hean et al., 2012) (Craddock et al., 2013). Cognitive constructivism has also been linked to experiential learning (Hean et al., 2009). Kolb (1984) describes experiential learning as;

"...the process which links education, work and personal development"

(Kolb, 1984, p. 4)

The experiential learning model is depicted in Figure 3. Experiential learning theory considers learning as a continuous process based on experience, an IPE intervention should therefore be based on realistic clinical situations in order to foster collaborative practice (D'Eon, 2005) (Clark, 2006) (Hean et al., 2009). There is also an associated need for reflection in order to focus, and contextualise the experienced learning (Kolb, 1984) (D'Eon, 2005) (Clark, 2006).

Figure 3. The experiential learning model
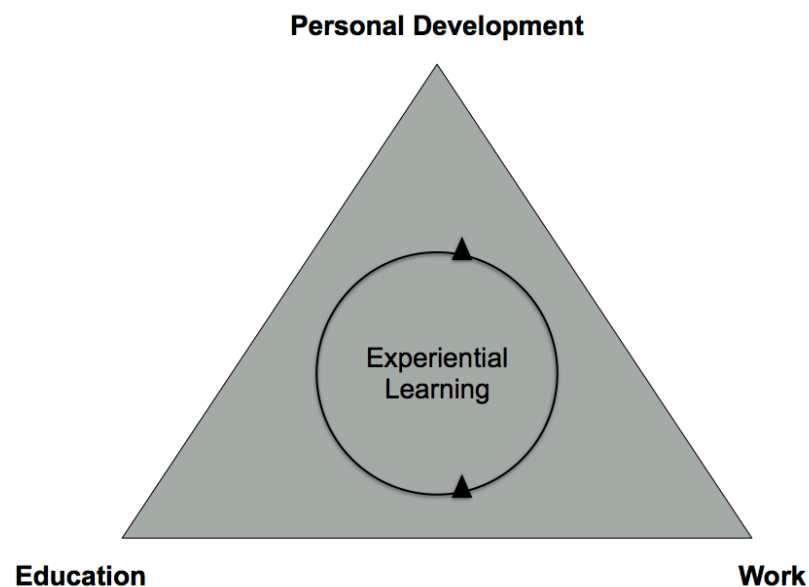
Kolb, (1984)

Social constructivism incorporates the view that learning is influenced by social encounters (Hean et al., 2009). This approach relates to Vygotsky's social learning theory (1978) and the Zone of Proximal Development (ZPD). The ZPD is said to be the difference between the level of development achieved in isolation, and that achieved through collaboration (Hean et al., 2009). McIlwaine et al., (2007) incorporated the concepts of social constructivism to create a three step process of learning in IPE;

- Level 1: PERSONAL
- Level 2: UNIPROFESSIONAL
- Level3: INTERPROFESSIONAL

The three levels represent a progressive process culminating in the learner identifying their own professional role, and responsibilities in addition to those of other professionals (McIlwaine et al., 2007).

The successful development of specified skills or knowledge is enhanced by the use of 'scaffolding' a term used to describe the use of facilitators or more experienced peers to support learning (Hean et al., 2009, 2012). The concept of scaffolding has been applied as a progressive framework in the practical delivery of IPE (D'Eon, 2005).

Clark (2006) suggested that a theory of IPE should be able to;

1. Identify and describe major concepts to guide the development of course and program structures and processes.

2. Help specify learning objectives and effective methods for achieving them.

3. Suggest appropriate roles for students and faculty in the educational process.

4. Aid in measuring program impacts and outcomes.

Following the consideration of different learning theories linked to IPE it is apparent that no one theory is able to encompass all aspects of IPE. There are also limitations within current research relating to IPE and educational theory. Studies often fail to discuss explicit theory, and therefore require secondary interpretation to extrapolate the theoretical background (Hean et al., 2009, 2012). In consideration of the evolution of IPE, the question arises as to whether we should be attempting to condense the theoretical foundations in to one restrictive paradigm, rather we should embrace the

true eclectic nature of this field, and accept that we can only really understand the framework by encompassing educational/learning theories from different disciplines.

The purpose of this section is to outline the main educational learning theories identified within IPE research. It is acknowledged that there is considerable overlap between theories. Unfortunately it is beyond the scope of this review to consider all learning theories in relation to IPE development and implementation.

1.5. Interprofessional Education in Practice

IPE has been considered within the context of large scale systematic reviews, and guidelines produced by educational and healthcare bodies (Barr et al., 2000) (Clifton et al., 2006) (Hammick et al., 2007) (Burton et al., 2010). The growing interest in IPE has lead to the formation of multiple national and global organisations including; The American Interprofessional Health Collaboration (AHIC), The Australasian Interprofessional Practice and Education Network (AIPPEN), The Canadian Interprofessional Health Collaborative (CIHC) and The Centre for the Advancement of Interprofessional Education (CAIPE). The formalisation of IPE has allowed the publication of guidelines for the development, and delivery of educational interventions (Barr et al., 2000) (Barr & Low, 2012, 2013). The components of IPE will be considered further within this section.

1.51. Method of IPE Delivery

The overarching aim of IPE is to encourage collaborative practice (Burton et al., 2010) (Barr & Low 2012, 2013). Teaching methods used to deliver IPE in order to achieve this aim are varied (Freeth, 2010) (Barr & Low, 2013). Methods which have commonly been applied include;

- Observation- based learning

     e.g. joint home visits, reciprocated shadowing

- Simulation-based learning

  e.g. role play, clinical simulations (supported by technology or simulated patients)

- Case-based and problem-based learning

  e.g. discussion of clinical cases/scenarios

- Clinical-based learning

  e.g. interprofessional student team providing care under supervision

Narrative-based learning was utilised by a qualitative study to support an IPE based palliative care course (Campion-Smith et al., 2011). This involved participants sharing professional experiences in small-group, in order to facilitate discussion. Overall the results were positive, with participants reporting a change in professional behaviour. The use of virtual learning environments, and online learning modules have also been described in the delivery of IPE (Blue et al., 2010) (Hall et al., 2011). The concept of patient safety, was introduced by one study through the use of an online interprofessional course (Blue et al., 2010). The course was composed of thematic modules, with online learning materials, and assignments including an interprofessional group project. Students and facilitators responded with positive feedback on evaluation of the course. The use of technology to stimulate IPE, was further reviewed within a qualitative study interviewing emergency medicine professionals (Riley et al., 2014). Unfortunately the results were not encouraging, with the identification of several barriers within this population. The use of online resources as a method of delivering IPE should be carefully reviewed, as benefit may only be observed in certain participant populations.

Hammick et al., (2007) categorised IPE encounters as; 'formal' (planned IPE), 'informal' (IPE occurs as part of another planned pedagogical event) or 'serendipitous' (improvised encounters providing opportunity for interprofessional learning).

Systematic reviews to date have incorporated studies of both categories (Barr et al., 2005). There has been a recent drive for more formalised IPE learning, with the generation of guidelines for the development of IPE curricula, and recommendations for programme delivery (Barr & Low, 2012, 2013). Barr et al., (2000) also classified research designs utilised in IPE research as; Action research studies, Before and after studies (with or without control groups). Case studies, Interrupted time series studies. Longitudinal studies. Post-intervention studies and Randomised control trials. These classifications will be used in consideration of studies discussed within this review.

In conclusion the delivery of IPE may take many forms. The common element of these methods is active learning, which is emphasised by the CAIPE definition of IPE (CAIPE, 2002).

1.52. IPE Setting and Duration

The setting for IPE varies across studies, and is often linked to curriculum objectives (Barr & Low, 2012, 2013). Environmental settings for IPE interventions have included; hospice, clinical setting, and university (classroom-based). The CAIPE guideline; 'Introducing Interprofessional Education' states that;

> *"Every student would benefit from at least one dedicated interprofessional placement with a group of students drawn from a number of professions in a community or hospital setting."*

> *(Barr & Low, 2013, p. 9)*

The setting of IPE has not been shown to alter students perceptions however, this may reflect a lack of research comparing settings directly (Hammick et al., 2007) (Sharland et al., 2007). There are negative implications associated with the use of multiple sites in terms of logistics, and availability of resources (Cadell et al., 2007) (Fairchild et al., 2012). Discrepancies may also occur between IPE within the artificial (classroom) setting and clinical placements (Thistlethwaite, 2012). The importance of a safe

environment in which to discuss experiences, reflect, and learn has been emphasised by students taking part in IPE interventions (Wee et al., 2001) (Dando et al., 2011).

The duration of the IPE intervention has also been shown to vary widely, from a limited number of days or weeks to months (Clifton et al., 2006) (Hammick et al., 2007). The nature of the intervention whether integrated or stand-alone is often not clear from study methodologies, and again has not been shown to have a clear impact on the effectiveness of IPE (Clifton et al., 2006) (Sharland et al., 2007). There is a lack of longterm evaluation of IPE (> 6 months) within literature, with many studies reporting pilot interventions or new programmes (Clifton et al., 2006) (Thistlethwaite, 2012).

1.53. Participant Characteristics

Systematic reviews investigating IPE have found that sample sizes vary widely between studies, and often the exact composition of participants (number of each profession represented) is not always reported (Hammick et al., 2007) (Sharland et al., 2007). A difference has been shown in students willingness to engage in IPE according to professional background (Latimer et al., 1999) (Dando et al., 2011). Lack of engagement has been linked to expectations, and in particular perceived absence of profession-specific teaching in some courses (Cadell et al., 2007) (Dando et al., 2011). Examples of stand alone IPE interventions often rely on self-selected participants (Hammick et al.,2007). Volunteer participants are often recruited due to difficulties negotiating scheduling and resources, leading to interventions taking place out with term times (Cadell et al., 2007) (Hammick et al., 2007). Participants have been noted to be more positive towards IPE when attendance is voluntary, due to the potential interest in a topic or self-identified learning needs (Pahor & Rasmussen, 2009). Gender has also been found to influence participation, with a tendency for more female students to enrol via self-selection (Hall et al., 2011). Female students have also been found to respond more positively to teamwork and collaboration (Hammick et al., 2007) (Wilhelmsson et al., 2011). It is worth noting however that there tends to

be more women within allied healthcare roles, as reflected by their higher levels of representation within IPE studies.

Prior experience has been linked exponentially to improved engagement and outcome measures (Fineberg et al., 2004) (Olson & Bialocerkowski, 2014). Many studies however fail to report participants' baseline demographics including; age and year of study (Clifton et al., 2006) (Olson & Bialocerkowski, 2014).

1.54. Curriculum Content

Curriculum content is an important aspect of IPE (Barr & Low, 2012, 2013). Table 2 outlines the classification of IPE course content proposed by Barr et al. (2000). Curriculum content is driven by policy and healthcare agendas at a national and global level (Barr & Low, 2012) (Thistlethwaite, 2012). Student evaluation and levels of satisfaction have been found to influence curriculum content (Carell et al., 2007) (Sharland et al., 2007). The majority of studies reporting IPE interventions describe a combination of common, and comparative course content (Barr et al., 2000) (Clifton et al., 2006) (Sharland et al., 2007).

Table 2. Classification of interprofessional course content

Course Content	
Common	where programme participants learn the same content
Comparative	where participants learn about one another
Mixed	a combination of both common and comparative content

Barr et al. (2000)

A further distinction has been made concerning drivers for IPE. When discussing motivators for curriculum design two categories have been proposed; 'top-down'

approach (driven by government or educational policy) and 'bottom-up' (driven by clinical need) (Hammick et al., 2007) (Craddock et al., 2013).

1.55. Learning Outcomes

CAIPE outlines the following outcomes for IPE (Barr & Low, 2011a);

- Engenders interprofessional capability

- Enhances practice within each profession

- Informs joint action to improve services and instigate change

- Improves outcomes for individuals, families and communities

- Disseminates experience

- Subjects development to systematic evaluation and research

These outcomes have been acknowledged in guidelines for curriculum design, and delivery (Barr & Low, 2012, 2013). Measured learning outcomes for IPE include; student satisfaction, change in attitudes and behaviour, change in knowledge, and patient benefit. These outcomes in part are dependent on the objectives of the intervention. The heterogeneity of learning outcomes often acts as a barrier for comparison of studies (Clifton et al., 2006) (Hammick et al., 2007). Methods of measuring learning outcomes are often poorly described, and unvalidated (Hammick et al., 2007) (Sharland et al., 2007). Validated tools have been developed in order to measure changes in perceptions and attitudes, these include; the Attitudes to Health Professions Questionnaire (AHPQ), and the Interdisciplinary Education Perception Score (IEPS) (Lindqvist et al., 2005) (McFadyen et al., 2007). There are however persisting difficulties measuring learning outcome within IPE, particularly in consideration of patient, and societal benefit. The lack of longitudinal data relating to IPE effectiveness, and maintenance is a result of this finding.

1.6. Population Statistics

The UK population is estimated to increase by 4.3 million over the next 7 years (63.7 million in 2012 to 68.0 million in 2022). This increase continues with the population rising to 73.3 million by 2037 according to the Office National Statistics (ONS, 2012). Population projections estimate an average rise in age from 39.7 years in 2012 to 40.6 years in 2022 and 42.8 by 2037 (ONS, 2012). This swelling of the elderly population is expected to result in an increase of people aged 80 and over in the UK, by more than double current figures by 2037 (ONS, 2012). The number of those aged 90 or over is projected to more than triple, and the number of centenarians is estimated to rise more than eightfold by 2037 (Figure 4). This increase in the number of older people means that by mid-2037, 1 in 12 of the population is estimated to be aged 80 and over.

Figure 4. Estimated and projected population aged 70 and over, United Kingdom, 2012 and 2037.

Office of National Statistics, (2012)
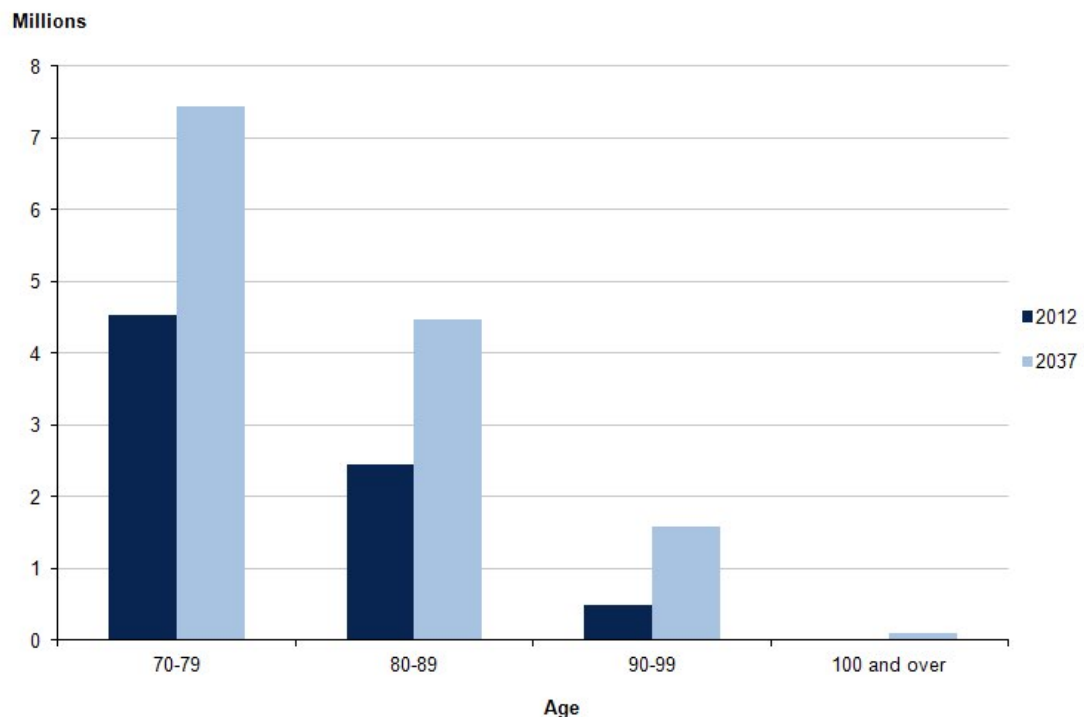
These projections are further illustrated in Figure 5, produced by the Office of National Statistics (2012) outlining the projected age structure from 2012 and 2037.

Figure 5. Estimated and projected age structure of the United Kingdom population (2012 and 2037)
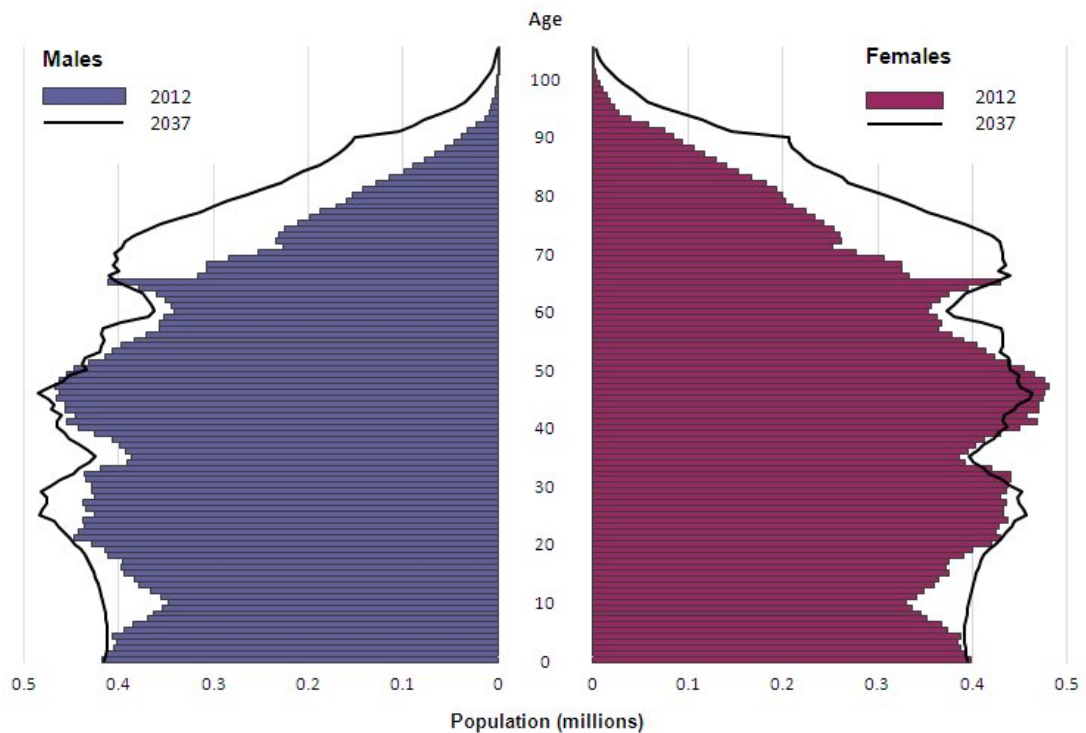
An escalating elderly population will in turn lead to increasingly complex medical problems, and a greater demand on palliative care services. It has been estimated that this may lead to an additional 90,000 people dying in institutions by 2030 (Gomes & Higginson, 2008). As a result clinicians within both primary and secondary care, will have increased contact, and involvement in the provision of palliative care. Effective education at an undergraduate level is therefore essential.

1.7. Palliative Care

Interprofessional Education (IPE) has been utilised by several medical and allied health specialities as a way of enhancing undergraduate teaching (Clark, 1997) (Howe et al., 2001). The role of IPE within the medical undergraduate curriculum has been explored in relation to effects on professional practice, healthcare outcomes, and development of professional identity (Reeves et al., 2008, 2013). It has been suggested that this method of teaching is particularly beneficial within palliative care, due to the complexity of palliative issues, and the multidisciplinary approach adopted (Latimer et al., 1999) (Fineberg et al., 2004). At present the role of IPE within palliative care particularly at an undergraduate level is imprecise. Currently there is no systematic review within this area. A systematic review will allow the collation, and synthesis of research, in order to answer the question posed regarding the use of IPE within the undergraduate palliative care curriculum.

The National Institute of Clinical Excellence (NICE) defines palliative care as "…the active holistic care of patients with advanced, progressive illness" (NICE, 2004, p. 24). NICE further defines end of life care as; "any palliative care within the last 12 months of life" (NICE, 2011, p. 1). For the purpose of this review the term palliative care will be used as it incorporates the period of end of life care.

Clark (1997) makes a case for interdisciplinary collaboration in relation to the care of older persons, due to their multiple health problems, and complex care needs. The result is a requirement for increased input, and consideration from healthcare services in order to ensure functional ability, and maintenance of quality of life. This is equally true of palliative care in which the patient population is often of an older age, and maintaining quality of life, and functionality for as long as possible is of paramount concern.

The General Medical Council (GMC) document 'Tomorrow's Doctors' states that doctors should; "Contribute to the care of patients and their families at the end of life" (GMC, 2009, p. 21). There is therefore a need to ensure a robust undergraduate curriculum in order to address the complex, and challenging issues relating to palliative care. In response there has been various suggested curricula for undergraduate palliative care teaching (Billings & Block, 1997) (Gibbins et al., 2009). This includes a white paper produced by the European Association for Palliative Care (EAPC), which outlines 10 core inter-disciplinary competencies in palliative care (Gamondi et al., 2013). There is however, a lack of evidence to suggest the most effective way of achieving these competencies. The question arises as to whether IPE would be of benefit within this area of the taught medical curriculum. At present this question has not been answered, despite there being evidence of benefit for its use in students from allied health specialities (Howe et al., 2001) (Burton et al, 2010).

The predicted changes in population demographics, and impact on palliative care provision mean that as a profession we have to evolve to ensure our patient's changing medical needs are met. Part of this evolution is to develop the role of the multidisciplinary team in order to provide holistic, and tailored care for our patients. This highlights a learning need within medical students' education which will only be achieved through the development of collaboration, and communication skills. IPE may help to address this learning need through the development of these skills.

1.8. Summary of Review Rationale

Predicted changes in population demographics, and the consequent impact on palliative care provision, highlight a learning need within undergraduate medical students for the development of collaborative practice. IPE may help address this learning need through the acquisition of skills promoting collaboration. Literature has shown a benefit of IPE within the undergraduate medical curriculum. At present there is limited research investigating this learning model in relation to undergraduate palliative care. There is currently no review investigating this particular topic.

2.0. AIMS AND OBJECTIVES

AIMS

The aim of this review is to critically assess the use of IPE, within the medical undergraduate palliative care curriculum. Kirkpatrick's levels of evaluation (Kirkpatrick, 1997) will be used as a framework to answer the following questions;

1. What is the contribution of IPE to the development of knowledge and key skills (including communication and collaborative skills) in medical students for palliative care practice?

2. What factors influence medical students' perceptions of IPE?

3. What contribution does IPE make to patient care in the palliative setting (level 4 of Kirkpatrick's model of evaluation)?

OBJECTIVES

The objectives of this review are to identify and synthesis evidence on the;

1. Positive and negative factors, which influence students' perceptions of IPE, and determine a hierarchy of importance (evaluation of reaction).

2. Outcomes of IPE in relation to knowledge, and key skills development (evaluation of learning) in order to identify the impact of IPE on student learning.

3. Use of IPE as a method of delivering palliative care teaching to medical students (evaluation of behaviour).

4. Impact of IPE on patient care both direct and indirect (evaluation of results).

3.0. METHODOLOGY

To achieve the aims and objectives outlined, a systematic review was performed. For the purpose of this review the Cochrane Collaboration definition of a systematic review was considered, which explains;

> *"A systematic review is a high-level overview of primary research on a particular research question that tries to identify, select, synthesise and appraise all high quality research evidence relevant to that question in-order to answer it."*

> *(The Cochrane collaboration, 2014, p.1)*

The Centre for Reviews and Dissemination (CRD) states that the aim of a systematic review is to;

> *"...identify, evaluate and summarise the findings of all relevant individual studies, thereby making the available evidence more accessible to decision-makers."*

> *(CRD, 2009, p.V)*

In an evolving healthcare environment the demand for best research evidence in a concise format is increasing. This is where the systematic review earns its place as a valued research methodology in ascertaining best practice both, within the educational and clinical landscape. The advantages of a systematic review include the limitation of bias. This is largely dependent on the quality of systematic review reporting in terms of transparency, and the utilisation of a robust, reproducible strategy for both the identification, and management of articles (Fathalla & Fathalla, 2004) (CRD, 2009) (Shamseer et al., 2015).

Combining results from multiple studies has the potential to provide a more reliable interpretation of an intervention, with a reciprocal increase in generalisability (CRD, 2009) (Kastner et al., 2012) (Gopalakrishnan & Ganeshkumar, 2013). Systematic reviews are not immune to the quality of included studies, and may highlight gaps in knowledge, or failings within current research (Haig & Dozier, 2003) (Gopalakrishnan & Ganeshkumar, 2013).

In terms of limitations systematic reviews can be susceptible to publication bias whereby, studies with a positive, or significant result are easier to source (Gopalakrishnan & Ganeshkumar, 2013). Language bias may also occur, as mainstream databases are often heavily skewed towards articles published in the English language (Fathalla & Fathalla, 2004) (CRD, 2009). These limitations can in part be minimised by a rigorous review methodology (Fathalla & Fathalla, 2004) (CRD, 2009) (Shamseer et al., 2015).

The following sections outline the processes involved in the development, and execution of the systematic review.

3.1. Pre-search Preparation

In preparation for undertaking a systematic review different resources were considered. The three main resources utilised included;

- The World Health Organisation (WHO); 'A Practical Guide for Health Researchers' (Fathalla & Fathalla, 2004)

- The Best Evidence Medical and Health Professional Education (BEME) Guide Number 3; 'Systematic searching for evidence in medical education' (Haig & Dozier, 2003)

- Centre for Reviews and Dissemination (CRD); 'Guidance For Undertaking Reviews In Healthcare' (CRD, 2009)

These resources were consulted due to their relevance specifically to medical education research, and evidence synthesis. Each guideline is of high quality, and produced in accordance with best evidence currently available at both a national, and global level.

Haig and Dozier's guidance for the systematic searching of evidence in medical education, suggests three phases for constructing searches (Haig & Dozier, 2003);

1. Defining and writing the issue in the form of a question/hypothesis

2. Identifying and expanding essential concepts

3. Setting out the scope of the search query

This approach was used to guide the development of the search strategy. Defining the search query in the form of a question allowed objectivity, and an improved understanding of the topic. At this stage it was important to be explicit about the research question, in order to ensure that the search strategy would be able to adequately answer the query posed. Figure 6, outlines a breakdown of the research question.

Figure 6. Breakdown of search question components.

Question Components	Topic
Participants	Undergraduate medical students
Educational aspects	Interprofessional education
Outcomes	Patient and student benefit

The WHO practical guideline for conducting health research (Fathalla & Fathalla, 2004) offered further advice regarding the formation, and refinement of the research question. As a consequence the research question was reviewed, and sharpened in order to reduce ambiguity, and definitions of terminology were further considered. This led on to the formulation of a research protocol. The aim of a protocol "… forces the investigators to clarify their thoughts and to think about all aspects of the study" (Fathalla & Fathalla, 2004, p.65). Questions were posed within the guideline to enable the production of a comprehensive protocol. The CRD's 'Guidance For Undertaking Reviews In Healthcare' (CRD, 2009) was also invaluable during this process as it outlines key elements of the research protocol, with an explanation of expectations in terms of content. This process was integral to the development of the methodology for this review, and provided the opportunity for refinement following consultation with an advisory panel (Thesis Advisory panel).

In acknowledgement of limited experience performing a systematic review, I attended two taught courses through the University of Sheffield; the Systematic Reviews and Meta-analysis (SCHARR) course and Evidence Synthesis of Qualitative Research in Europe (ESQUIRE) course. The content of both courses provided an invaluable foundation on which to build a masters project, and allowed an improved understanding of the practicalities of performing a systematic review. The curriculum for the courses described assisted with the development of the protocol and final methodology, with refinement of search strategies, and data extraction tool. The ESQUIRE course was particularly useful as the different methods for the synthesis of qualitative data were explained. This helped to form the data analysis section of the methodology, and improved my practical understanding of how data would be managed and analysed. There was also the opportunity to discuss the proposed review with researchers experienced in performing systematic reviews in health care. The provision of constructive feedback further improved the quality of the final methodology.

In conjunction with the MSc by Thesis programme two postgraduate training scheme modules were also completed; Qualitative Methods Applied to Health Research and Understanding Clinical Statistics. These taught modules proved beneficial in the development of the review methodology, through an enhanced understanding of qualitative research methods, and interpretation of medical statistics. This assisted in the process of critical appraisal, and allowed the acquisition of transferrable skills such as; academic writing and data interpretation.

Before undertaking the systematic review it was essential to determine if a review already existed or whether an update was viable. The Database of Abstracts of Reviews of Effects (DARE), and the Cochrane Database of Systematic Reviews (CDSR) were consulted to ensure a review within this area was justified. The Best Evidence in Medical Education (BEME) website was also searched for completed or upcoming reviews relating to the proposed topic area.

3.2. Search Preparation

In order to identify and expand the components of the research question a word bank was created, which is a form of brainstorming technique enabling the identification of alternative spellings, and related terms to be included within the searches (Scott & Nagy, 2009). This also introduced the concept of word consciousness which is defined as; "the interest, in and awareness of words" (Scott & Nagy, 2009, p.107). A greater appreciation for the research subject was fostered, and highlighted difficulties relating to nomenclature (as previously discussed within the introduction). Published reviews within the field of IPE were also considered, in order to identify additional search terms (Barr et al., 2000) (Hammick et al., 2007) (Sharland et al., 2007).

A scoping review was conducted in order to determine the feasibility of a full systematic review. The main concern was that the research question incorporated a narrow subject, and as a result there would be insufficient eligible studies to justify a

review, or provide enough evidence to sufficiently answer the review objectives. Scoping reviews have been described as a means of rapidly 'mapping' evidence for a given topic area, to identify gaps in current literature or guide future research (Arksey & O'Malley, 2005) (CRD, 2009) (Levac et al., 2010). This differs from the nature of a systematic review which attempts to synthesise evidence, in order to answer a clearly defined clinical question (Arksey & O'Malley, 2005) (CRD, 2009) (Armstrong et al., 2011). The methodology for the scoping review was based on Arksey and O'Malley's framework (2005) which outlines five distinct phases;

1. Identifying the research question

2. Identifying relevant studies

3. Study selection

4. Charting the data

5. Collating, summarising and reporting the results*

*The fifth phase was not used, as the purpose of the scoping review was to explore existing literature, assess feasibility, and help define appropriate review parameters. Collation and dissemination of findings were not the primary aim of the scoping review.

3.21. Identifying The Research Question

The review question was further defined using the PICO framework (**P**opulation, **I**ntervention(s), **C**omparator(s) and **O**utcomes) (Figure 7). This built on the components of the research question identified during the pre-search stage of the review. The research question to be addressed was;

> *Is there evidence to support the use of interprofessional education within the palliative care curriculum for medical students?*

Figure 7. Defining the review question using the PICO tool

Population	Undergraduate medical students
Intervention	Interprofessional education within palliative care
Comparator	Pedagogical tools other than Interprofessional Education
Outcome	Student/patient benefit

3.22. Identifying Relevant Studies

The purpose of scoping the topic field was to identify primary published and unpublished studies, and reviews, which would be relevant in answering the research question (Arksey & O'Malley, 2005) (Levac et al., 2010). This also served as a means of assessing feasibility, with the identification of possible studies for inclusion, therefore suggesting whether a review in this area would be viable. It is well considered that medical searches should incorporate multiple databases, and sources in order to reduce the risk of missing significant evidence (CRD, 2009) (Scott & Nagy, 2009). This is particularly pertinent when considering IPE, as the multi-professional nature of this subject area means that evidence may be contained in sources dedicated to allied health professionals, in addition to medical education. The identification of relevant databases, and sources was assisted through the review of guidelines including; 'Systematic searching for evidence in medical education' (Haig & Dozier, 2003), and 'Guidance for Undertaking Reviews In Healthcare' (CRD, 2009). These guidelines were produced with the aim of assisting the completion of health research, and rely on best evidence at a national, and global level. Each guideline outlined multiple data sources including bibliographic databases, and offered a description of their coverage. This allowed the identification of potential sources of relevant evidence for the topic under investigation.

The importance of identifying Grey literature has been well documented as a means of reducing publication bias (CRD, 2009) (Scott & Nagy, 2009). Publication bias is said

to occur; "…when the publication of a study is influenced by its results, hence inclusion of only published studies may overestimate the intervention effect" (CRD, 2009, p. 12). The term 'grey literature' is often applied to material that is not easily accessible in a published form, and is not listed in conventional bibliographic databases (CRD, 2009) (Scott & Nagy, 2009). As a result it was clear that additional sources needed to be considered such as; conference programmes, relevant internet resources, and peripheral (non-mainstream) databases. Search strategies were tested during the scoping review, and reflect the inclusion of keywords identified during the pre-search review phase (see Table 3).

Table 3. Search terms identified from pre-search preparation

Inter-professional/Interprofessional	Collaborative/ Collaboration	Palliative
Inter-disciplinary/Interdisciplinary	Group	Terminal
Multi-disciplinary/Multidisciplinary	Teach	End of life care
Multi-professional/ Multiprofessional	Learn	End of life stages
Multi-agency/Multiagency	Education	
Inter-agency/Interagency	Train/Training/Trainee	
Multi-occupational/Multioccupational	Course	
Trans-professional/ Transprofessional	Program	
Trans-disciplinary/ Transdisciplinary	Workshop	
Multi-departmental/ Multidepartmental		
Trans-departmental/Transdepartmental	student	
Inter-departmental/Interdepartmental	undergraduate	
Inter-institutional/ Interinstitutional		
Inter-organisation/ Interorganisation		
Multi-organisation/Multiorganisation		
Trans-organisation/Transorganisational		

There was continual refinement of the search strategies in order to achieve a balance between sensitivity (proportion of relevant articles retrieved), and specificity (proportion of non relevant articles retrieved) (Haig & Dozier, 2003). Terms relating to 'undergraduate' or 'student' were excluded at this stage as there was significant variability in terminology depending on country of origin e.g. pre-licensed, pre-resident, pre-professional, and the concern was that potentially relevant articles would be missed.

Through this reflexive process it became apparent that subject headings (MeSH terms) failed to identify relevant articles. A MeSH term is; "a Medicine Subject Heading which is 'tagged' to articles to describe the content" (Haig & Dozier, 2003, p. 27). Articles will also be retrieved independently of synonyms or spelling, and if the keyword is omitted from the article title or abstract. For example, using 'interprofessional' as a keyword search produced MeSH terms which were not relevant to the topic (see Figure 8). This in part was due to the heterogenous nature of IPE terminology.

Figure 8. Subject heading mapping display for 'Interprofessional' keyword search

Keyword (free-text) searches, were therefore found to be more appropriate in identifying relevant evidence. Searches had to be tailored based on database specification, due to differences in use of truncation symbols, and proximity commands. Synonyms were combined using the Boolean combination of search concepts (see Figure 9 for example of free text search).

Figure 9. Example of free text search of Medline database using truncation($) and Boolean command OR.

Boolean combinations were further utilised, in order to combine the different elements of the review question (see Appendix 1 for full search strategy). The initial search was implemented on 5th November 2014 using the electronic databases; MEDLINE (1946-present), CINAHL (1981-present), EMBASE (1974-present), ERIC and BEI. These five databases were chosen to obtain a representative sample of articles from medical and allied health research. As the purpose of the scoping review was to assess the feasibility of a full systematic review, no limits were applied on publication date, language, or study type, in order to identify as many relevant articles as possible (full results of the scoping review are reported in the results section).

3.23. Study Selection

The first two thousand articles retrieved from database searches were reviewed in chronological order. This was in consideration of time constraints, and also reaching saturation of relevant studies. Initial review of the retrieved articles indicated that proportionally fewer studies were reported prior to 1990, which may reflect the increased interest in IPE after this time period in response to growing acknowledgement from healthcare agencies, and government bodies. Through the consideration of the review question within the PICO framework, specific inclusion criteria could be defined in a post hoc manner for example; types of participant (undergraduate medical students) and intervention (IPE as defined by CAIPE, 2002) and IPE content concerning palliative or end of life care. Limitations and exclusion criteria were also developed during the scoping review. There was the decision for example to exclude articles not in the English language. This was implemented due to the nature of the research question, and need for fluent consideration of results. The first two thousand identified articles were then screened based on the exclusion, and inclusion criteria. Articles were reviewed initially by title and either excluded, or if potentially relevant to the research question the abstract was then reviewed. If the relevance of the article was unclear from the abstract, the full text was obtained.

3.24. Charting The Data

Arksey and O'Malley within their methodological framework for scoping reviews describe the process of; "…charting key items of information obtained from the primary research reports being reviewed" (Arksey & O'Malley, 2005, p. 15). Retrieved articles which were identified as relevant, were used to pilot the data collection tool produced using Excel software. Data included; author(s), publication year, study location, type of intervention (and comparator if used), study population, aim(s) of study, methodology, outcome measure(s), and main results. The data collection tool was further refined for the full systematic review. Data was then reviewed in a narrative format, in order to guide the methodology of the full

systematic review.

Performing a scoping review allowed an increased familiarity with existing literature, and the refinement of searches. It became apparent through the scoping review that the topic area was vast, and the research question needed to be better defined. As a consequence the research question was altered. As the use of the term 'evidence' implied a preconceived view that there was a positive association between IPE and undergraduate palliative care teaching this was removed. The research question was also broken down into three further questions in order improve clarity, and ensure achievement of the aims and objectives of the review. In addition a clearer outline of study inclusion, and exclusion criteria was achieved. This proved a reflexive process with the continual re-assessment of terminology for searches, and careful consideration of study limitations in order to improve sensitivity.

The majority of retrieved articles reviewed, were qualitative rather than quantitative in nature. This necessitated the consideration of the review analysis, as it became apparent that due to methodological heterogeneity a meta-analysis would not be possible, and therefore a qualitative evidence synthesis was deemed more appropriate. The nature of the research question, and use of Kirkpatrick's model of evaluation as an outcome framework, would be best suited to qualitative evidence synthesis (Barr et al., 2000) (Hammick et al., 2007). The use of quantitative analysis in this case would potentially strip the richness of data, leading to a limited answer to the review question.

3.25. Protocol Development

The research protocol is an important tool, which outlines a 'plan' or 'guideline' of the proposed study (Fathalla & Fathalla, 2004) (CRD, 2009). The significance of the systematic review protocol has been further emphasised by Shamseer et al (2015) for the following reasons;

1. It allows systematic reviewers to plan carefully and thereby anticipate potential problems.

2. It allows reviewers to explicitly document what is planned before they start their review.

3. It prevents arbitrary decision making with respect to inclusion criteria and extraction of data.

4. It may reduce duplication of efforts and enhance collaboration.

The process of protocol development enhanced clarity of the study rationale, objectives, and identified specific methodological considerations. Review of the research protocol by the Thesis Advisory Panel (TAP) allowed further refinement, and correction of any methodological inaccuracies prior to commencement of the full systematic review. The protocol for the review was developed on completion of the scoping review. This provided valuable background for methodological development, particularly in consideration of the research question, and construction of final search strategies. In developing the protocol there was the aim to address the PRISMA-P checklist for reporting systematic review protocols (Shamseer et al., 2015). This ensured that all elements were included within the protocol to enable transparency, and improve quality (see Appendix 2 for completed protocol).

On completion the research protocol was registered with PROSPERO, which is an international database of prospectively registered systematic reviews in health and social care. Details of the protocol can be accessed at www.crd.york.ac.uk/ PROSPERO/display_record.asp?ID=CRD42011001752 (registration number: CRD42014013470). Registration of the protocol served as an additional measure to identify reviews already commenced addressing the same topic, therefore avoiding duplication. There were no current, or planned reviews identified within the same topic following the registration process. This process also improved methodological transparency (Shamseer et al, 2015).

3.3. Methodology for Full Systematic Review

The aim of the scoping review was achieved by the identification of a viable research question for a full systematic review. The final research question is as follows;

What is the role of Interprofessional Education within the medical undergraduate palliative care curriculum?

In addition the process of performing a scoping review has allowed clarification, and refinement of the final search strategies, as well as the development of the review protocol. The following sections outline the methodology for the full systematic review.

3.31. Criteria for Study Eligibility

Inclusion Criteria

Studies were required to meet all of the following criteria in order to be included within the review;

- **Types of Studies**

  Randomised controlled trials (RCTs) were included however, as it was anticipated that few RCTs would be identified for inclusion quasi-experimental studies, were also considered in addition to; case-control, cohort, case study, correlational studies, and cross-sectional studies.

- **Types of Participants**
  The population of interest is medical students. Studies were included if the interprofessional group incorporated this population, irrespective of the year of study, or number of students participating. Studies undertaken in any learning environment were eligible for inclusion (e.g. hospice, university, hospital ward etc.)
- **Types of Intervention**

All types of educational intervention which involved; training, learning, or teaching, with two or more professions in accordance with the CAIPE definition for IPE were included. The context of the IPE intervention (formal versus informal) was not used as a criterion for eligibility.

Exclusion Criteria

Studies were deemed ineligible and excluded based on the following criteria;

- **Types of Studies**

  Studies were excluded if they were not based on primary research i.e. systematic reviews.

- **Types of Participants**

  Studies were excluded if the participant group did not include undergraduate medical students.

- **Types of Intervention**

  Studies were ineligible if the educational intervention described did not adhere to the CAIPE definition of IPE i.e. less than two professional groups represented within the subject population or inactive learning. Learning material for the intervention described also had to relate to palliative care.

3.32. Types of Outcome Measures

Outcome measures were considered in line with Kirkpatrick's educational outcomes model (Kirkpatrick, 1967) which uses a four levels to evaluate teaching and learning;

1. **Reaction**

   Participants' reaction to teaching including; method, delivery, content, environment, quality of teaching, and composition of IPE group.

2. **Learning**

   Degree of learning, relates to acquisition of knowledge and key skills including; collaboration and communication skills, confidence, and role recognition.

3. **Behaviour**

Application of learning, whereby participants alter practice/attitudes following IPE teaching.

4. **Results**

Assessment of learning in relation to specific outcomes such as; patient benefit (direct and indirect), and changes to curriculum delivery. Unintended outcomes of IPE were also considered.

3.33. Search Methods

Relevant studies were identified by searching the following electronic databases; AMED, BEI, BNI, CINAHL, EMBASE, ERIC, MEDLINE, PsychINFO, the Cochrane Central Register of Controlled Trial (CENTRAL), and the Index of Dissertations and Theses (UK and Ireland). Table 4 illustrates the rationale for database inclusion. Information regarding coverage was obtained from the individual databases, and Haig and Dozier (2003).

Table 5 outlines the prefixes used to search for key terms relating to interprofessional practice, which were combined individually with the suffixes listed in the adjacent columns. The search terms in Table 5, were then combined with the terms in Table 6 which incorporate the concepts of education, and palliative care (see Appendix 3 for full search strategies).

Table 4. Rationale for database inclusion

Database	Coverage
AMED	Includes citations relevant to complementary medicine, palliative care, and allied health professionals.
BEI	Provides information on research, policy and practice in education and training in the UK. Includes educational policy and administration, evaluation and assessment, technology and special educational needs.
BNI	Nursing and midwifery database indexing >270 journals, mainly titles published in the UK. Includes other English-language titles.
CENTRAL	Source of reports of randomised and quasi-randomised controlled trials. The majority of records originate from bibliographic databases, but citations are also included from other published and unpublished sources.
CINAHL	Provides indexing for 3,802 journals from the fields of nursing and allied health.
EMBASE	Second largest database. Includes citations related to medical education, and education in a health environment.
ERIC	Provides access to education literature and resources. The database contains >1.3 million records.
MEDLINE	Primary abstracting and indexing service for the medical and biomedical sciences, indexing > 4,600 journals.
ProQuest Index of dissertations and theses (UK and Ireland)	Provides a listing of theses and dissertations accepted for higher degrees by universities in the United Kingdom and Ireland.
PsychINFO	The American Psychological Association's bibliographic database. Contains citations and summaries of journal articles, book chapters, books, technical reports, and dissertations.

Table 5. Search terms for interprofessional practice

Prefixes	Suffixes	
Inter	Professional	Departmental
Multi	Disciplinary	Institute
Trans	Agency	Organisation

Table 6. Search terms incorporating education and palliative care

Teach	Palliative
Train	End of life
Learn	Terminal
Course	
Program	
Workshop	
Group	
Collaboration	

Results were limited to publications from 1993 to February 2015. The time period was chosen to coincide with the publication of the GMC document 'Tomorrow's Doctors' (GMC, 1993), which outlines the need for palliative care teaching within the medical undergraduate curriculum. Database searches were carried out on 1st February 2015.

In order to trace further relevant studies, a manual search of the references within retrieved articles fulfilling the inclusion criteria was performed, a technique termed 'citation pearl growing' (Hartley, 1990). Proceedings from key conferences were also hand searched including; conference programmes from The Association for the Study of Medical Education (ASME) annual scientific meeting (2009 to 2014), the biennial Ottawa conference (2008 to 2014), and conference programmes from An International Association for medical Education (AMEE) (2007 to 2014). Additional grey literature was identified from the website of the UK Centre for the Advancement of Interprofessional Education (CAIPE) (accessed 2nd February 2015).

The qualitative nature of extracted data meant that language fluency was required in order to accurately interpret results, and reduce the risk of missing key concepts. In consideration of this and the lack of resources for translation, searches were restricted to articles in the English language. Limitations (date and articles in the English

language) were applied as part of the search strategy prior to uploading to Endnote software.

3.4. Data extraction and management

The importance of addressing data management within the reporting of a systematic review has been demonstrated (Liberati et al., 2009) (Shamseer et al., 2015). The following sections explain how data was sifted and managed.

3.41. Identification and management of duplicate articles

The use of multiple bibliographic databases resulted in significant overlap in articles. This is due to a combination of multiple papers being published in some cases, and the presence of a given article within more than one database (Haig & Dozier, 2003) (CRD, 2009). These factors can lead to publication bias, as it has been observed that studies with significant results are more likely to be published frequently compared to research with less notable findings (Fathalla & Fathalla, 2004) (CRD, 2009). The screening of the same record multiple times is also time consuming. It was therefore necessary to ensure duplicates were identified and excluded. To achieve this searches were uploaded to Endnote software, and de-duplicated prior to screening. The multiple publication of papers can occur as a result of reporting at different stages of follow up, reporting of different outcomes, or publication in more than one bibliography. As these articles may have different titles or authors de-duplication will be ineffective. These articles were identified at the screening stage, and if appropriate treated as a single study rather than multiple.

3.42 Article screening process

The screening process was divided into three phases (Meade & Richardson, 1997);

1. Screening of title
2. Abstract screen
3. Full text review

In recognition of the risk of selection bias, (whereby studies are identified preferentially based on prior knowledge and preconceptions of the review results (Ahmed et al., 2011)), a second independent reviewer, was recruited to title screen database results. The second reviewer in this case was a palliative care academic research fellow. Selection bias was further reduced by the use of clearly defined eligibility criteria (section 3.31). The second reviewer title screened 20% of endnote articles. This was achieved by each article being attributed a number, and then a random number generator identifying 20% of the total number of articles within endnote. The independent reviewer did not have access to the results of the first reviewer's article screening in order to further reduce selection bias. This method of using a second reviewer to check a percentage of articles has been utilised by other researchers in consideration of time constraints and resources (Halbert et al. 2006) (Sharland et al., 2007).

Agreement between assessors, or inter-rater reliability was determined using percentage agreement and kappa statistics. The percentage agreement was calculated by ascertaining the number of articles in agreement as a percentage of the total number of articles viewed (McHugh, 2006). The main limitation of this method of assessing inter-rater reliability is that it fails to account for the possibility of agreement occurring secondary to chance (Gosall & Gosall, 2006) (McHugh, 2006).

The kappa statistic (k) or 'chance-corrected proportional agreement statistic' indicates;

> *"the level of agreement between measurements by different raters and gives an indication as to whether this agreement is more than can be expected by chance"*

> (Gosall & Gosall, 2006, p.52)

The kappa statistic (k) was calculated using the following formula;

$$k = (P_O - P_E) / (1 - P_E)$$

P_O = observed agreement

P$_E$= agreement expected by chance

The kappa statistic has been utilised by reviewers as a means of assessing consistency between investigators, and potential error as a result of differences in interpretation (Viera, 2005) (Gosall & Gosall, 2006) (McHugh, 2012). Kappa values are categorised as follows; values ≤ 0.2 indicate no agreement beyond chance, 0.21–0.39 minimal agreement, 0.40– 0.59 weak, 0.60-0.79 moderate, 0.80-0.90 strong, and >0.90 almost perfect agreement (McHugh, 2006). The interpretation of kappa in terms of reliability is shown in Table 7.

Table 7. Interpretation of kappa

Value of kappa	Level of Agreement	% of Data that are Reliable
0-0.2	None	0-4%
0.21-0.39	Minimal	4-15%
0.4-0.59	Weak	15-35%
0.6-0.79	Moderate	35-63%
0.80-0.90	Strong	64-81%
>0.90	Almost perfect	82-100%

McHugh, (2006)

It is acknowledged that perfect agreement (kappa= 1) is unlikely to be achieved. For the purposes of this review, a kappa value <0.70 was considered inadequate and implied too high a probability of agreement being due to chance alone. This is in keeping with reliability standards outlined in current systematic reviews, and guidelines for the use of kappa statistics (Viera, 2005) (McHugh, 2006) (Olson & Bialocerkowski, 2014).

The limitations of the kappa statistic include; the influence of observer bias, and the distribution of data across categories (Byrt, Bishop & Carlin, 1993) (McHugh, 2006) It is therefore important that the kappa statistic is reviewed in context and not in isolation (Byrt, Bishop & Carlin, 1993).

The full text of studies eligible for inclusion were retrieved, and independently assessed by two reviewers against the eligibility criteria. Any discrepancies over the eligibility of particular studies were discussed, and if consensus could not be reached a third reviewer (project supervisor) was consulted and a decision agreed.

3.43 Data extraction

Data were extracted, and recorded using a pre-piloted data extraction tool (as explained in section 3.24). The extracted data included the following items; author(s), study date, title, country of origin, methodology, sample size, participant characteristics (e.g. year of study and speciality background), details of intervention and comparator if used, outcome measure(s), main findings (see Appendix 4 for copy of data extraction tool).

Methodological rigour can vary dramatically across research, resulting in the potential introduction of bias (Haig & Dozier, 2003) (Fathalla & Fathalla 2004). This has the ability to skew the effect of an intervention in either a positive or negative way. It is therefore important to incorporate the assessment of quality within the review process (Haig & Dozier, 2003) (CRD, 2009). In consideration of the methodological heterogeneity of identified articles different techniques were employed to assess methodological quality.

Research articles were critically reviewed using Coughlan et al., (2007) guideline for the critical appraisal of quantitative research and Ryan et al., (2007) guideline for the analysis of qualitative research. The reason for the use of these guidelines is the distinction made between qualitative and quantitative studies in terms of assessing quality. The guidelines are concise, easy to use and reproducible (see Appendix 5 for copy of the quality assessment guidelines). Alternative tools were considered including the CASP critical appraisal tools, however these were felt to be inappropriate in this context due to the lack of critical consideration of articles, and over reliance on checklists.

The critical appraisal tools focus the consideration of quality under the headings of 'believability' and 'robustness'. The concept of robustness is further divided to incorporate 'rigour,' which is said to be; "…the means of demonstrating the plausibility, credibility and integrity of…the research process" (Ryan et al., 2007). Studies were not excluded based on methodological quality but were critically assessed as part of the review process.

3.5 Data Analysis

The paucity of quantitative studies, and methodological heterogeneity of the qualitative studies identified through the scoping review means that a meta-analysis of study outcomes was not possible. A meta-analysis incorporates the synthesis of quantitative data, in order to combine the results of multiple studies (Gosall & Gosall, 2006). As the results of the review are heavily reliant on the results of qualitative studies, there is not the data available to be able to perform a meta-analysis. A meta-synthesis was therefore considered more appropriate. This differs from a meta-analysis which aims to increase 'certainty' of a causal relationship, with the outcome instead to improve the understanding, and explanation of an event (Walsh & Downe, 2005).

Thematic analysis has been well documented as a valid method for analysing qualitative research (Braun & Clark, 2006) (Thomas & Harden, 2008). This approach combines elements of meta-ethnography, narrative synthesis and grounded theory. Thematic analysis has been defined as;

"…a method for identifying, analysing, and reporting patterns (themes) within data"

(Braun & Clark, 2006, P. 6)

This method was chosen as it allows for phenomenological consideration, and theoretical flexibility. A thematic analysis was therefore performed in order to identify key themes within the data. The analysis was conducted in accordance with guidelines described by Thomas and Harden (2008), which outline a three stage process (see Table 8).

Table 8. Stages of thematic analysis

Stage 1	**Coding Text** *Coding of the findings from primary studies*
Stage 2	**Developing Descriptive Themes** *Organisation of primary codes to construct descriptive themes*
Stage 3	**Generating Analytical Themes** *Combination of themes and generation of new concepts*

The combined analytical themes were considered in-depth, in order to answer the outlined objectives of the review.

4.0 RESULTS

The results of the scoping review, and subsequent full systematic review will be considered separately. Reporting will be influenced by the recommendations of the PRISMA guideline (Liberati et al.,2009) and those of the CRD (2009).

4.1. Results of Scoping Review

The scoping review was carried out as described in the methodology section. The purpose of performing a scoping review was to rapidly map the research field, and determine the value of undertaking a full systematic review.

4.11. Screening Process

A total of 9905 articles were identified from the database searches. Articles were uploaded to endnote software, and duplicate records removed (11% of the total articles identified). Following this process 8783 articles remained. It was informally noted that the majority of articles were produced post 1990. Articles were organised in chronological order, and the first two thousand articles screened by title. Following title screening 1879 articles were excluded (94%) leaving 121 articles (6%) for further abstract review. The second stage of screening involved review of article abstracts. This resulted in 109 articles being excluded (90% of the remaining articles) and a total of 12 articles (10%) progressing to the third stage of screening. On reviewing the full text of the 12 articles identified a further 10 were excluded (Figure 10 depicts a flow chart outlining the screening process and results of the scoping review).

The 12 articles identified during the second stage of the screening process were reviewed in detail (Table 9 shows the reasons for article exclusion) (Appendix 6 displays full details of the 10 articles excluded). The most frequent reason for article exclusion was the lack of full text (abstract only available) despite further literature searching. A total of 3 articles were identified as fulfilling the inclusion criteria however, one article was excluded as it was a duplication (the author's name appeared slightly differently in two citations). The remaining 2 articles fulfilling the study inclusion criteria were used to pilot the data extraction tool.

Figure 10. Flow chart depicting screening process of scoping review

Table 9. Reasons for study exclusion during third stage of screening process for scoping review.

Reason for Exclusion	Number of Studies
Abstract only available	3
Not IPE intervention	3
Postgraduate intervention	2
Participants did not include medical students	1
Duplicate article	1

4.12. Study Characteristics

A narrative review of the 2 articles identified from the scoping review was performed (see appendix 7 for full details of the studies using the data extraction tool). The first study (Dando et al., 2012) describes an evaluation of an IPE intervention in the UK. Participants included; nursing, medical, physiotherapy, and occupational therapy students (n=59). The duration of the intervention was three to six weeks, and the setting a hospice. Outcome measures were student satisfaction, as assessed by a non-validated, structured questionnaire in addition to patient, and mentor feedback. In contrast the second study (Schrader et al., 2005) describes an evaluation of an IPE intervention using an interrupted-time series methodology based in the US. Participants included; medicine, nursing, chaplaincy, social work and pharmacy students (n=231, over a three year period). Outcome measures included; student satisfaction (evaluated through a self-administered questionnaire), and change in knowledge, attitudes, and skills (assessed by a formal test, pre- and post intervention). Difference in knowledge, attitudes, and skills between students attending the seminars and those who did not, was assessed using a survey instrument. Both studies reported a positive response from participants, and a change in attitudes and perceptions of interdisciplinary roles (whether self reported or assessed using unvalidated instruments). The methodologies of the two studies are dissimilar, and the assessment of outcome measures relied on different tools. The reporting of results was poor within both studies.

The results of the scoping review formed the basis for the full systematic review, and highlighted a need for a more sensitive search strategy, which utilised additional sources of evidence.

4.2. Results of Systematic Review

The full systematic review was conducted following the initial scoping review. The result of which guided further refinement of methodology in terms of search strategy, and data management.

4.21. Screening Process

A total of 8972 articles were found following searches of the bibliographic databases specified, 75 articles were identified from additional sources. Articles were uploaded to endnote and duplicates removed. A total of 3365 duplicates (37% of total articles) were removed leaving 5682 articles to enter the screening process. Figure 11 displays a flow chart depicting the results of the searches conducted, and the screening process.

Figure 11. Flow diagram of screening process
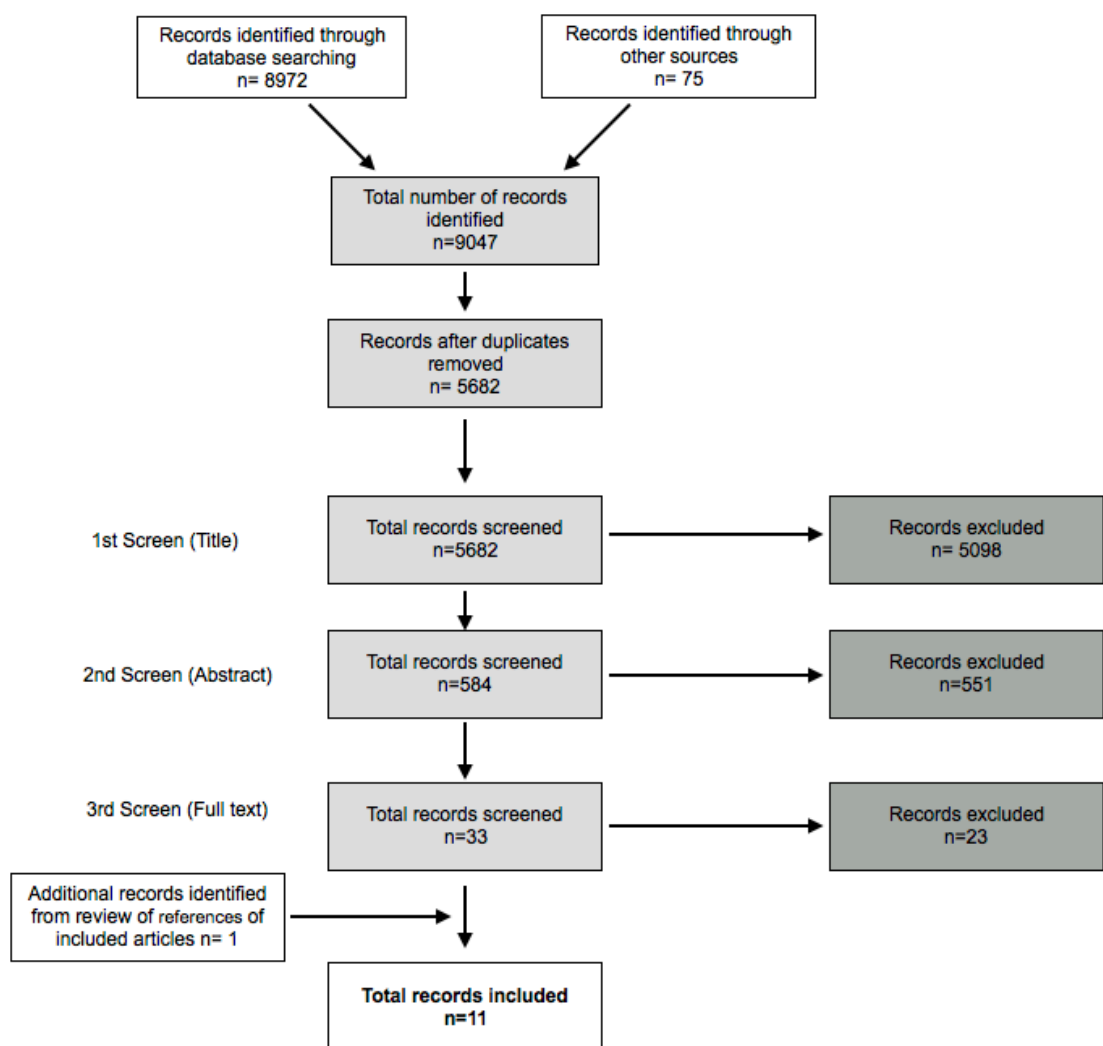
Screening articles by title resulted in the exclusion of 5098 articles (90%), leaving 584 articles to enter the second phase of screening. Abstract screening resulted in the exclusion of 551 articles (94%), and the identification of 33 articles for full text review. Despite the abstract screen being sensitive to the identification of relevant articles relating to IPE, low specificity was observed in terms of identifying IPE interventions pertaining to palliative care in undergraduate students. This was due to the lack of description in many abstracts relating to the intricacies of the IPE intervention, and composition of the student population. This resulted in a greater number of articles requiring full text review. For example a study by Gelfand et al. (2003) which was included in the third stage of screening related to curriculum design rather than an IPE intervention. This was obvious on review of the full text, however there was not enough information contained within the title, or abstract to be able to exclude the article prior to this stage.

Following full text review 23 articles were excluded (69%). A total of 10 articles were identified as fulfilling the study inclusion criteria. A further study was identified following a manual search of the references of the included articles. The percentage of excluded studies at the different stages of the screening process are comparable to prior systematic reviews within medical education (Barr et al., 2000) (Clifton et al., 2006) (Hammick et al., 2007). Table 10 summarises the reasons for exclusion following the third stage of screening. Appendix 8 includes the full details of the excluded studies.
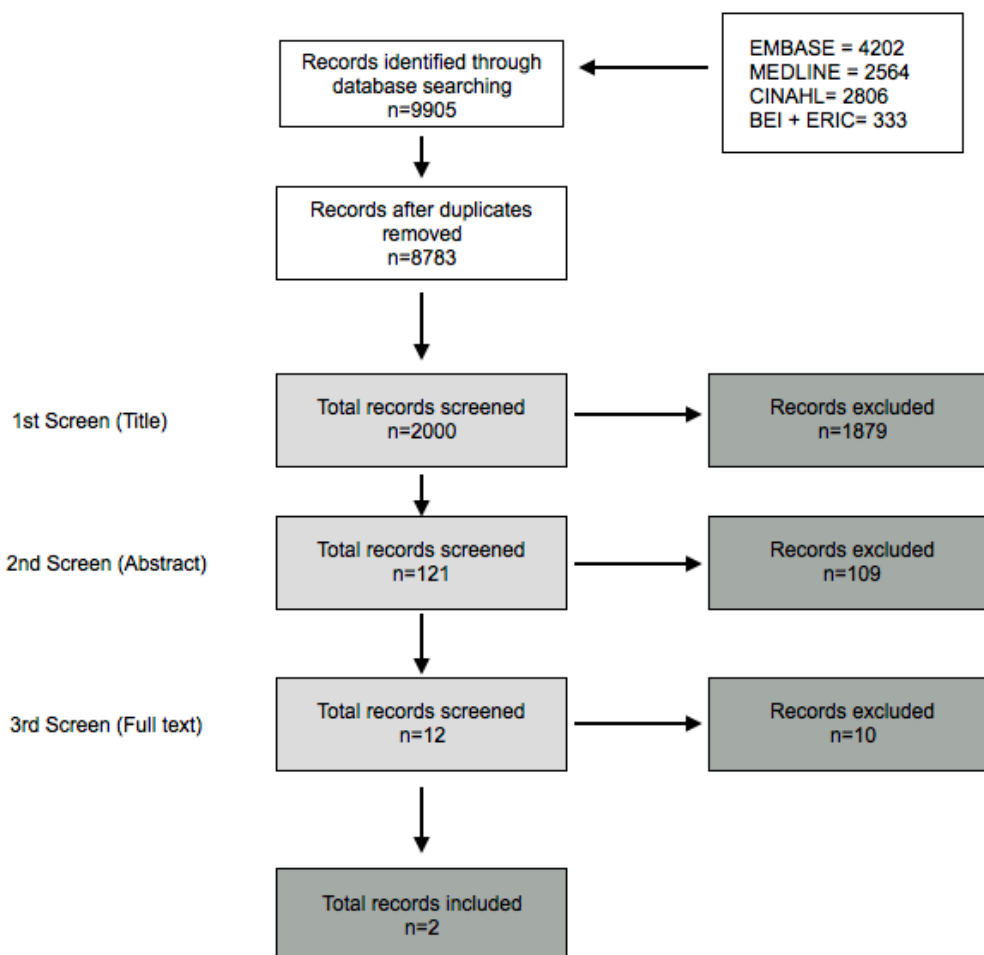
Table 10. Reasons for study exclusion during third stage of screening process for systematic review

Reason for Exclusion	Number of Studies
Abstract only available	9
Not IPE intervention	4
Postgraduate intervention	6
Intervention not related to palliative care	4

A single reviewer screened all titles, and abstracts of the articles identified following searches. Reporting bias was reduced through the use of two assessors. A second assessor reviewed 20% of the articles uploaded to endnote (1136 of 5682).

4.22. Inter-rater Reliability

The 1136 articles screened by both assessor 1 and 2 based on title were reviewed, and the decision from each reviewer regarding inclusion was recorded. Table 11 outlines the observed results for assessor 1 and 2. Agreement between assessors or inter-rater reliability, was determined using percentage agreement and the kappa statistic.

Table 11. Observed results from Assessor 1 and 2 for 20% of the total articles within endnote.

		Assessor 1		
		YES	NO	TOTAL
Assessor 2	YES	96 (a)	146 (b)	242
	NO	13 (c)	881 (d)	894
	TOTAL	109	1027	1136 (N)

The percentage agreement between assessors was calculated as 86% (100x (96+881)/ 1136). Although summarising agreement, this does not take into account concordance observed due to chance alone (Gosall & Gosall, 2005). The kappa statistic was therefore calculated in order to assess inter-rater reliability. The kappa statistic (k) was calculated using the following formula;

$$k = (P_O - P_E)/ (1 - P_E)$$

P_O = observed agreement
P_E = agreement expected by chance

$$P_o = (a+d)/N$$

$$= \frac{96 + 881}{1136}$$

$$= 0.86$$

$$P_E = \frac{(a+c)(a+b)/N + (b+d)(c+d)/N}{N}$$

$$P_E = \frac{(242 \times 109)/1136 + (894 \times 1027)/1136}{1136}$$

$$= \frac{23.2 + 808.2}{1136}$$

$$= 0.73$$

$$k = \frac{P_O - P_E}{1 - P_E}$$

$$= \frac{0.86 - 0.73}{1 - 0.73}$$

$$= 0.48$$

The Standard Error (SE) and confidence interval of kappa was calculated as outlined below;

$$SE(k) = \sqrt{P_0(1-P_0)/n(1-P_E)^2}$$

$$= \sqrt{0.86 \times (1-0.86)/1136 \times (1-0.73)^2}$$

$$= \sqrt{0.12/82.8}$$

$$= 0.038$$

95% confidence interval: $k - 1.96 \times 0.038$ to $k + 1.96 \times 0.038$

$\quad\quad\quad = \quad\quad 0.48 - 1.96 \times 0.038 \quad$ to $\quad 0.48 + 1.96 \times 0.038$

$\quad\quad\quad = \quad\quad$ **0.41 - 0.55**

A kappa statistic of 0.48 is said to represent weak agreement beyond chance (Veira et al., 2005). The kappa statistic is lower than expected in consideration of the observed agreement in table 11. This may be due to the following reasons;

1. Prevalence effects
2. Observer bias

These elements contribute to limitations (paradoxes) in the kappa statistic, and will be further discussed, and statistically investigated in order to fully understand their significance in establishing the accuracy of the kappa result.

Prevalence Effects

The kappa statistic can be influenced by the category probability; in this case the probability of inclusion (yes) and exclusion (no). Table 11 illustrates a disproportionate number of articles in the "no" category. This is not unusual during the screening process with the proportion of included articles increasing during each step reflecting greater relevance and, exclusion of unrelated studies. Similar proportions can be observed during the screening process of other published systematic reviews (Barr et al., 2000) (Clifton et al., 2006) (Hammick et al., 2007). The difference between the probability of "yes" and the probability of "no" was estimated by the Prevalence Index (PI) (Byrt et al, 1993);

PI $\quad = \quad$ (a - d)/N

$\quad\quad = \quad$ 96 - 881/ 1136

$\quad\quad = \quad$ **-0.69**

The PI has a value of zero if there is equal probability of "yes" and "no" (Byrt et al, 1993). A value of -0.69 indicates unbalanced probabilities of the two categories. The

kappa statistic will therefore be influenced by the prevalence effect as the larger the value of PI, the larger the P_e and, the small the kappa value (Byrt et al, 1993) (Mchugh, 2012).

Observer Bias

In this context observer bias is understood to occur when there is a difference in opinion between assessors with regard to an article's status (i.e. whether the inclusion or exclusion criteria is met) (Byrt et al, 1993). On review of table 11 it can be observed that assessor 1 was more likely to exclude articles compared to assessor 2 (90% articles excluded by assessor 1, and 79% excluded by assessor 2). The higher proportion of articles included by the second assessor (21% compared to 10% inclusion by the first assessor) may reflect a reluctance to discount articles due to less familiarity with the study inclusion and exclusion criteria as the individual was not the primary investigator. The second assessor did not have prior experience with systematic reviews or endnote software. In comparison assessor 1 was more experienced with endnote software, and the review protocol as they were the primary researcher.

In acknowledgement of this limitation, the Bias Index (BI) was calculated (Byrt et al, 1993);

BI   =   (b - c)/N

           =   146-13/1136

           =   **0.12**

The BI value is zero if the marginal totals are equal (Byrt et al,1993). In this case the BI is small with a value of 0.12, however it is not 0 therefore there will be some influence on the kappa secondary to differences in observer opinion.

There was a small proportion of articles (n=13) that were included by assessor 1 and excluded by assessor 2 (1% of the total 1136 articles) None of these articles were

included in the final analysis. The converse was also true in that the articles excluded by assessor 1 and included by assessor 2 (13% of the total 1136 articles) were not included in the final analysis.

The kappa statistic was calculated with correction for bias and prevalence through the prevalence-adjusted, bias-adjusted kappa (PABAK) (Cunningham, 2009)

$$\textbf{PABAK} \quad = \quad \textbf{2P}_\textbf{o} - \textbf{1}$$
$$= \quad (2 \times 0.86) - 1$$
$$= \quad 1.72 - 1$$
$$= \quad \textbf{0.72}$$

Following correction for paradoxes the kappa statistic was 0.72, which corresponds to substantial agreement beyond chance (McHugh, 2012). Based on the further statistical analysis of inter-rater reliability it was decided that a higher proportion of articles for second review was not necessary.

4.23. Characteristics of Included Studies

A total of 11 studies were identified as fulfilling the inclusion criteria following the screening process. The final studies were agreed by assessors 1 and 2 based on the specified eligibility criteria. All studies investigated the role of IPE in teaching palliative care to undergraduate medical students. In consideration of methodological heterogeneity, and varied outcome measures between studies, a detailed description of each study is provided. Table 12 outlines the characteristic of the included studies. The outcome measures used have been considered within the framework of Kirkpatrick's model of evaluation (see table footnotes).

Table 12. Study Characteristics

Cadell et al., (2007)	
Study Design	Mixed
Method	Mixed
Participants	Nursing, pharmacy, social work and medical students (n=?)
Setting	Canada; mixed setting (hospice, hospital ward and classroom)
Intervention	**Duration**: 4 days per week for total of 4 weeks (2 instructional days followed by 2 clinical days) CBL undertaken within interprofessional teams. Caregiver interviews with small group discussion and debriefing also took place during clinical placements. Students were also required to submit course assignments including; a weekly reflective journal, a written assignment and interprofessional group presentation.
Outcome Measures	Self-administered questionnaire developed by author using 4 point Likert scale[1] Summative assessment (group presentation and written assignment)[2] Mentor evaluation (method not specified)[2,3]
Main Findings	Students rated questionnaire items pertaining to the development of interprofessional knowledge and skills as 3 and 4 (somewhat and very much achieved) on the 4 point Likert scale. Informal feedback from students highlighted the need for profession-specific material within the course. Recruitment was acknowledged as problematic due to scheduling considerations for students participating in already intense courses. Varied expectations of the course were also found between professions and acted as a barrier to collaboration. Additional barriers to the implementation of an interprofessional course were highlighted by the faculty and included; accommodation of larger student groups, and time commitment required from facilitators.

Dando et al. (2011)	
Study Design	Post-intervention Study
Method	Mixed
Participants	Nursing, medical, physiotherapy, and occupational therapy students (n=59)

Setting	Uk; Hospice
Intervention	**Duration:** 2 day induction followed by a 3 week clinical IPP (palliative care ward) Multidisciplinary groups of 12 students provided hands-on care for a selected group of patients, under the supervision of trained health care professionals.
Outcome Measures	Self administered 11 item questionnaire developed by author using 5 point Likert scale and free text[1] Mentor and patient evaluation (method not specified)[2,3,4]
Main Findings	Students reported an increased understanding of both their own and other professional's roles within the interdisciplinary team. Students acknowledged the feeling of equal status between professions within the multidisciplinary groups, and the sense of working towards common goals in the IPP. Of the 42 students involved in managing a death as part of the IPP, 16 found the experience distressing whilst 26 did not. In addition 41 students (of the possible 42) stated that they would feel better prepared for the death of a patient in the future.

Fairchild et al. (2012)	
Study Design	Interrupted time series
Method	Mixed
Participants	Medical, clinical nutrition, occupational therapy, physiotherapy and speech and language therapy students (n=8)
Setting	Canada; mixed setting (hospice, hospital ward and classroom)
Intervention	Duration: 6 weeks Intervention consisted of; mandatory clinical time, flexible clinical time, weekly facilitated reflective discussions, and exploratory investigation (research project). Students were required to present the research project and clinical experiences to the interdisciplinary group.
Outcome Measures	Self administered questionnaire developed by author (content not specified)[1] Validated questionnaires (18 item IEPS and 20 item AHPQ) performed at baseline, 6 weeks and 6 months[1,2] Informal mentor feedback[2,3]

Main Findings	Scores for 12 items in the IEPS increased, reflecting an improved outlook. Average absolute scores decreased at week 6 in comparison with baseline, with some attitudinal changes maintained to 6 months, some returning to baseline, and still others increasing past baseline values. At the end of the intervention, each participating profession was perceived as more caring and more subservient compared to baseline.

Fineberg et al. (2004)

Study Design	Mixed
Method	Mixed
Participants	Medical and social work students (Intervention group; n=45, control group; n=26)
Setting	US; Classroom and clinical.
Intervention	Duration: 4 weeks (once weekly for 4 consecutive weeks) Experiential exercises including; role play (within a small group format), and clinical visit (in-patient palliative care unit).
Outcome Measures	Self-administered questionnaire developed by author using 7 point Likert scale, and free text performed at baseline, on completion and 3 months post-intervention[1,2,]
Main Findings	The intervention group demonstrated a significant increase in perceived role understanding. Increased role understanding, and collaborative behaviour were maintained in the intervention group at three months. Students reported valuing the multidisciplinary format, with narrative feedback identifying the following themes; sharing, interacting, and exchanging different perspectives.

Hall, Weaver & Willett, (2011)

Study Design	Interrupted time series
Method	Mixed
Participants	Nursing, medical, spiritual care and physiotherspy students (n=20)
Setting	Canada; Online e-learning module

Intervention	Duration: 12 hours over 2 weeks
	Interprofessional online e-learning module incorporating individual learning and group discussion forum. One face-to-face session held at end of module for group discussion and reflection. Participants were assigned groups and required to complete an interprofessional care plan as a final assignment.
Outcome Measures	Self administered questionnaire developed by author using Likert scale, performed at baseline and 3 months post-intervention (content and quantitative results not specified)[1,2]
Pre- and post-intervention; knowledge test developed by author (grading schema and content not specified)[2]
Validated questionnaire (AHPQ)[2]
Main Findings	Increase reported in post-intervention knowledge test scores specifically relating to spirituality, and physical factors contributing to patient suffering. Student survey results at 3 months articulated benefits from intervention, and application to clinical practice.

Latimer et al. (1999)	
Study Design	Mixed
Method	Mixed
Participants	Nursing, medical, physiotherapy and occupational therapy students (n=300)
Setting	Canada; Classroom
Intervention	Duration: 1 day
IPE intervention included; plenary sessions, and small group work using reflective discussion and clinical vignettes. Simulated patients, and role pay also used to provoke group discussion in the form of PBL.
Outcome Measures	Self-administered, post-intervention questionnaire developed by author using Likert scale (content and quantitative results not specified)[1,2]
Main Findings	The course was positively rated by students, and benefit was reported from learning about palliative care in an interdisciplinary format. The majority of students (99%) stated that they would recommend the course to colleagues.
A decline in medical student attendance was noted following the introduction of an interdisciplinary format to the course, The reasons for this are not identified.

McIlwaine et al. (2007)	
Study Design	Post-intervention Study
Method	Mixed
Participants	Medical (n=14) and social work students (n=11)
Setting	UK; Classroom
Intervention	Duration: half day
	Intervention consisted of an interprofessional workshop concentrating on death and dying. The workshop incorporated small group teaching (three mixed professional groups with one tutor per group). Case studies, role play and experiential exercises were also used to facilitate discussion and reflection.
Outcome Measures	Self-administered 11 item questionnaire developed by author using open questions[1]
	Self-administered 12 item questionnaire developed by author using 4 point Likert scale[1]
	Focus group post-intervention[1,2]
	Self-administered 12 item questionnaire developed by author using 4 point Likert scale performed 8 weeks post-intervention[1,2]
	Tutor evaluation using focus group post-intervention[2]
Main Findings	All students reported satisfaction with the intervention and would recommend the workshop to colleagues. The benefits of IPE were acknowledged in 64% of participants. The incorporation of small group discussion and case studies was rated 'useful' or 'very useful' by 94% participants.

Mckee et al. (2010)	
Study Design	Before and after study
Method	Mixed
Participants	Medical, nursing and pharmacy students (n=9)
Setting	Canada; Classroom

Intervention	Duration: 3 days
	The IPE intervention incorporated a PBL module consisting of three, two-hour sessions. A case was discussed within interdisciplinary groups, with independent research conducted by participants between sessions in order to address gaps in knowledge. Sessions were facilitated by an expert clinician.
Outcome Measures	Self-administered 18 item questionnaire developed by author using 6 point Likert scale[1]
	Semi-structured interview[1,2]
	Pre- and post-intervention knowledge test developed by author (grading schema and content not specified)[2]
Main Findings	In general students responded positively to the intervention, with satisfaction related to personal connection, and relevance to palliative care.
	The interprofessional aspect and group dynamics of the PBL module were rated 5 or 6 on the 6 point Likert scale by 8 out of 9 students. Further to this 7 out of 9 students rated 'self-directed learning' and 'motivation to learn' as 5 or 6 on the 6 point Likert scale.
	The semi-structured interviews highlighted comments from students suggesting that this type of learning experience helped re-orientate thinking to a 'patient-centred' rather than 'disease-centred' approach.
	Comparison of pre-and post-knowledge test results showed an expansion in knowledge relating to; medication use, common symptoms at the end of life and, professional roles.

Pahor & Rasmussen (2009)	
Study Design	Mixed
Method	Mixed
Participants	Nursing, physiotherapy, occupational therapy, medical, psychology and social work students (n= 44)
Setting	Sweden and Slovenia; VLE

Intervention	Duration: Not specified The intervention consisted of online resources used to enable acquisition of knowledge regarding palliative care, team work and professional roles. PBL occurred within interprofessional, and international virtual teams through use of a discussion forum. Participants were also required to produce a care plan within interprofessional teams.
Outcome Measures	Self administered questionnaire developed by author (content and quantitative results not specified)[1] Semi-structured interview[1,2]
Main Findings	Students reported that the different disciplines in terms of; age, backgrounds, and profession were extremely important. The course was said to be a positive experience, with many students reporting a change in thinking and attitudes towards interprofessional practice. Cultural differences were noted between the two countries with regard to course enthusiasm, team work, relations between professionals and the clinical management of patients. Differences were attributed to the structure and delivery of the medical undergraduate curriculum between countries, as well as the increased hierarchical tendencies within one of the societies.

Schrader et al. (2005)	
Study Design	Mixed
Method	Mixed
Participants	Medical, nursing, chaplaincy, social work and pharmacy students (n=231 over 3 year period)
Setting	US; Mixed setting Classroom and community (home visits)
Intervention	Duration: 5 days The intervention was composed of five afternoon seminars consisting of home visits (2 hours), didactic content (1 hour) and small group discussion (1 hour) Techniques such as; role play, case studies and group exercises were used to facilitate IPE. Participants were given a training manual at the beginning of the seminars, and were also required to complete a reflective journal.

Outcome Measures	Self-administered questionnaire following each session developed by author using 5 point Likert scale[1] Pre- and post-intervention knowledge test developed by author[2]
Main Findings	Statistically significant improvement was found when comparing pre-and post-intervention knowledge, and attitudes specifically relating to the context of end of life care, use of analgesia, and hospice care. This was supported by qualitative data, which showed that students felt more competent in responding to both the needs of the patient and family. Results from the 5 point Likert questionnaire found students reported that module objectives were more than adequately met, and content was useful (scores rated average 3.74 to 4.43, where 5 indicated *fully met*). A statistically significant difference was observed between the two groups, with attendees benefiting more from peer discussion and preferring teamwork.

Wee et al. (2010)	
Study Design	Post-intervention study
Method	Qualitative
Participants	Medical, nursing, social work, physiotherapy and occupational therapy students (n= ?)
Setting	UK Classroom
Intervention	Duration: Half day The intervention involved facilitator-led small group discussion and reflection. Small interprofessional teams were then tasked with interviewing a family carer, and preparing a presentation for the final plenary.
Outcome Measures	Participant self-administered feedback forms (content not specified)[1] Carer evaluation (method not specified)[2,3]

Main Findings	Students were said to value and enjoy the opportunity for interprofessional learning. Difficulties were noted in group working including unequal contribution to discussions, with some participants dominating the course of sessions. Benefit was reported from meeting a carer. This was also reported as helpful and therapeutic by the carers involved.

HPQ; Attitudes to Health Professions Questionnaire, PBL; Problem-Based Learning, CBL; Case-Based Learning, IEPS; Interdisciplinary Education Perception Score, IPE; Interprofessional Education, IPP; Interprofessional Practice Placement.

Kirkpatrick's levels of evaluation; [1]Reaction, [2]Learning, [3]Behaviour, [4]Results

4.24. Assessment of Study Quality

Research articles were critically reviewed using Coughlan et al. (2007) guideline for the critical appraisal of quantitative research, and Ryan et al (2007) guideline for the analysis of qualitative research. Included studies were appraised in order to gain a greater depth of understanding of the individual articles, and aid analysis. Methodological quality was not used as an exclusion criteria due to the small number of studies included, and the degree of variability in terms of study design. Table 13 documents the appraisal of each study.

Overall study quality was poor with many articles exhibiting gaps in methodology and the reporting of results. Sample sizes were often small, and due to questionable reporting generalisable inferences were inappropriate based on many of the interventions described. There was also a lack of reference to learning theories and contextualisation of the IPE interventions in relation to current research within discussions.

Table 13. Appraisal of studies

Cadell, et al. (2007)	
Believability:	• Credibility of researchers established • Title clear, accurate and unambiguous • Abstract did not provide clear overview of study
Robustness:	• Preparation for course in terms of faculty and curriculum development explained. • Recruitment of participants not clearly described. • Theoretical framework related to Wyness et al (2002) educational model of collaborative practice. • Limited discussion of educational theory, and relevance to study findings. • No ethical considerations were highlighted. • Rigour was not specifically discussed however, credibility and, dependability were established through the in-depth description of the study methodology. • Transferability is difficult to assess without full description of the IPE intervention. • Findings clearly presented and relevant to course objectives. • Limitations and future recommendations considered.
Dando, et al. (2011)	
Believability:	• Credibility of researchers established • Title clear, accurate and unambiguous • Abstract provides clear overview of study
Robustness:	• Conceptual/theoretical framework not identified. • Process of participant recruitment explained. • Composition of interprofessional groups outlined, • No reference to educational theory on discussion of results • Ethical concerns relating to participants addressed. • Rigour was not specifically discussed however, credibility and dependability were established through the in-depth description of the study methodology. • Transferability suggested through shared findings from similar IPE interventions. • Findings clearly presented and relevant to course objectives. • Limitations and future recommendations considered.

Fairchild, et al. (2012)	
Believability:	• Credibility of researchers established • Title clear, accurate and unambiguous • Abstract provides clear overview of study
Robustness:	• Preparation for course in terms of faculty and curriculum development explained. • Clear formulation of steering committee and intervention objectives. • Students self-selected with formal application process required for participation. • Sample size small (n=8) • Follow up data only available for 4 students. • Theoretical framework outlined clearly with reference to relevant learning theories. • Rationale for intervention established. • No ethical considerations were highlighted. • Rigour was not specifically discussed however, credibility and dependability were established through the in-depth description of the study methodology including the use of validated assessment tools. • Findings clearly presented, and relevant to course objectives, with examples of student feedback given. • Lack of measurement relating to clinical outcomes. • Limitations and future recommendations considered.
Fineberg, et al. (2004)	
Believability:	• Credibility of researchers established • Title clear, accurate and unambiguous • Abstract provides clear overview of study
Robustness:	• Theoretical framework discussed with reference to relevant learning theories. • Rationale for intervention established. • Specific ethical consideration was given to ensuring confidentiality and participant safety. • Composition of faculty members explained. • Baseline characteristics of participants clearly outlined. • Methodology appropriate and clearly described. • Allocation to intervention and control groups was not randomised. • Evaluation tools clearly described and reliability testing performed. • Lack of measurement of clinical outcomes. • Appropriate statistical analysis performed with control for confounding variables. • Findings clearly presented and related to prior literature. • Limitations and future recommendations considered.

Hall, Weaver & Willett, (2011)	
Believability:	• Credibility of researchers established. • Title ambiguous as unclear if undergraduate or post graduate intervention. • Abstract fails to provide clear overview of study.
Robustness:	• Development of faculty and model explained (including completion of a literature review, and expert interviews) • Theoretical framework discussed, with reference to relevant learning theory. • Rationale for intervention established. • Ethics approval obtained. • Background of participants outlined. • Participants self-selected. • Small sample size (n=20) • Researchers acknowledged difficulty with rigour and transferability due to use of unvalidated evaluation tools (including knowledge test and satisfaction questionnaires) • Limited discussion of results and grounding in prior literature. • Limitations and future recommendations considered.
Latimer, et al. (1999)	
Believability:	• Credibility of researchers established • Title unambiguous, clear and concise. • Abstract provides clear overview of study
Robustness:	• Formation of planning committee, and development of the course explained. • Clear outline of course objectives to be attained by participants. • Composition of faculty described. • Theoretical framework and educational learning theories not discussed. • Rationale for study and use of IPE explained. • Participants self-selected. • No ethical considerations mentioned. • Lack of measurement of knowledge relating to professional roles and clinical behaviour. • Rigour was not specifically discussed. Credibility and dependability were difficult to establish through the lack of detailed description relating to the IPE intervention. • Transferability was also difficult to assess due to the use of unvalidated evaluation tools. • Dissemination of findings was discussed. • Limitations and future recommendations considered.
McIlwaine, et al. (2007)	

Believability:	• Credibility of researchers established • Title ambiguous as unclear if participants undergraduates or postgraduates. • Abstract provides clear, concise overview of study.
Robustness:	• Rationale for methodology and IPE intervention discussed in relation to prior literature. • Development of course and faculty background explained. • No ethical considerations mentioned. • Participants self-selected. • The theoretical framework and educational learning theories relating to the intervention were discussed. • Course objectives clearly outlined. • Follow-up evaluations only available for 72% participants. • Change in knowledge and clinical skills of participants not formally assessed. • Rigour was not specifically discussed. Credibility and dependability were implied through detailed description of the IPE intervention and overall study methodology. • Transferability was difficult to assess due to the use of unvalidated evaluation tools.

McKee, et al. (2010)

Believability:	• Credibility of researchers established. • Title ambiguous as unclear if participants undergraduates or postgraduates. • Abstract provides clear, concise overview of study.
Robustness:	• Rationale for methodology and IPE intervention discussed in relation to prior literature. • Limited explanation of intervention. • Participants self-selected. • Course objectives not clearly outlined. • Theoretical framework and educational learning theories not discussed. • Ethics approval obtained. • Rigour was not specifically discussed. Credibility and dependability were difficult to establish through the lack of detailed description relating to the IPE intervention. • Transferability was difficult to assess due to the use of unvalidated evaluation tools. • Limitations and future recommendations considered.

Pahor, & Rasmussen (2009)

Believability:	• Unclear if authors have a background in palliative care. • Title ambiguous as unclear if participants undergraduates or postgraduates. • Abstract provides clear, concise overview of the study.

Robustness:	• Rationale for methodology, and IPE intervention discussed in relation to prior literature in addition to cultural considerations. • Development of course and faculty explained. • Limited explanation of intervention. • Course objectives not clearly outlined. • Participants self-selected. • Theoretical framework discussed. • No ethical considerations mentioned. • Rigour was not specifically discussed. • Credibility and dependability were difficult to establish through the lack of detailed description relating to the IPE intervention. Authors also acknowledged subjectivity towards findings. • Transferability was difficult to assess due to the use of unvalidated and poorly described evaluation tools. • Results were not discussed in terms of prior literature or research. • Limitations and future recommendations considered.

Schrader, et al. (2005)

Believability:	• Title ambiguous as unclear nature of intervention and sample population. • Abstract fails to provide clear, concise overview of study particularly with regard to the IPE intervention.
Robustness:	• Rationale for methodology and IPE intervention discussed in relation to prior literature. • Development of the course and faculty explained. • Objectives of the course and curriculum clearly outlined. • Theoretical framework and educational learning theory not discussed. • No ethical considerations mentioned. • Participants self selected. • Rigour was not specifically discussed. • Credibility and dependability were implied through the detailed description relating to the IPE intervention. • Transferability was difficult to assess due to the use of unvalidated evaluation tools. • Results were not discussed in terms of prior literature or research. • Limitations and future recommendations considered.

Wee, et al. (2010)

Believability:	• Title unambiguous, clear and concise. • Abstract provides clear, concise overview of study. • Credibility of authors established.

Robustness:	• Rationale for methodology and IPE intervention discussed in relation to prior literature. • Development of the course and faculty explained. • Objectives of the course were outlined. • Sample size and participant background not discussed • Theoretical framework and educational learning theories not discussed. • No ethical considerations mentioned. • Medical students were required to attend intervention as part of palliative care module incorporated in to their undergraduate curriculum, remaining healthcare students attended voluntarily. • Rigour was not specifically discussed. • Credibility and dependability were implied through the detailed description relating to the IPE intervention. • Transferability was difficult to assess due to the use of unvalidated and poorly described evaluation tools.

4.25. Narrative Review of Included Studies

A narrative review was performed to allow the consideration of results across studies. The aim was to provide further texture to the review results and inform the later process of qualitative analysis.

Geography

Table 14 shows the breakdown of the country of origin for the included studies. The majority of studies originated in Canada (46%), followed by the UK (27%). One study (Pahor & Rasmussen, 2009) incorporated an international format with the IPE intervention involving participants in two countries (Sweden and Slovenia). The remaining studies involved interventions in single countries.

Table 14. Country of origin of included studies

Country of Origin	Number of Studies (%)
Canada	5 (46%)
United kingdom	3 (27%)
United States	2 (18%)
Sweden/Slovenia	1 (9%)

Participant Characteristics

The total number of students varied (8 to 300), with one study failing to report the number of participants recruited. All studies included medical students, however additional professional representation came in the form of; nursing, social, physiotherapy, occupational therapy, pharmacy, spiritual care, dietetics, speech and language therapy, and psychology students. Participants were recruited from two professions exclusively in two (18%) studies (Fineberg et al., 2004) (McIlwaine et al., 2007) and more than two professions in nine (82%) studies. A breakdown of the number of participants from each profession was given in 45% of studies (n=5). Gender was disclosed in four studies (Fineberg et al., 2004) (McIlwaine et al., 2007) (Pahor & Rasmussen, 2009) (Hall, Weaver & Willett, 2011) all of which report predominantly female participants. The age of participants was only reported in two studies (Fineberg et al., 2004) (Pahor & Rasmussen, 2009). Fineberg et al. (2004) was the only study which reported the ethnicity of participants, and previous experience of loss, and training regarding death and dying. This information was used by investigators in an analysis of co-variance to adjust for prior collaboration experience, which at baseline was found to be associated with an increased perception of role understanding. Pahor and Rasmussen (2009) was the only study that accurately reported participants year of study.

There were reported differences in receptivity to IPE between professions. Dando et al. (2011) describe an interprofessional practice placement (IPP) in an in-patient palliative care unit, whereby the shift-based design was said to emphasise the nursing perspective and proved unpopular with medical students. In addition mentor evaluations suggested that; "some medical students were reluctant to participate in general patient care" (Dando et al., 2011, p.182). Latimer et al. (1999) observed a decline in attendance from medical students with the introduction of an interdisciplinary format to a day-long palliative care course. It is unclear if this finding was coincidental, or representative of a professional avoidance of interprofessional teaching.

The emergence of a hierarchy was refuted in many studies, with students instead working towards 'common goals' and 'patient-centred care' (Dando et al., 2011)

(Fairchild et al., 2012). Challenges within group work were reported by Wee et al. (2001), with certain participants dominating discussions. Pahor and Rasmussen (2009) offered a more positive interpretation, as one student wrote on feedback; "Conflict can be a good way to lead towards constructive solution of a case" (Pahor & Rasmussen, 2009, p. 480). The inclusion of multiple professions was generally well accepted by participants in the included studies, and was viewed as a valuable element of effective IPE. For example following a four week, mixed setting IPE initiative one student reported;

"It was really great having students from the different professions together...The different view points were helpful in understanding one's own".
(Fineberg et al., 2004, p. 774)

Context and Setting

External drivers for IPE came in the form of both; 'top down' and 'bottom-up' stimuli. All studies reported a desire to improve interprofessional collaboration. Fairchild et al. (2012, p. 231) for example identified IPE as "empower [ing] practitioners to cope with issues that surpass the scope of any one profession". The importance of collaboration in relation to palliative care was further highlighted by McIlwaine et al. (2007, p. 151);

"In delivering a 'good death' it is essential that each professional has a clear understanding of their roles and responsibilities and that there is a collaborative approach to provide the most appropriate care for patients and relatives."

Facilitators in the form of 'top-down' stimuli for the initiatives studied included; government bodies, professional and educational organisations. External funding for development and/or evaluation was reported in four studies (36%) (Fineberg et al., 2004) (Pahor & Rasmussen, 2009) (McKee et al., 2010) (Fairchild et al., 2012). This is an important driver for IPE initiatives as all four studies described pilot interventions. Mckee et al. (2010) for example, reported funding from a Health Canada initiative and involvement with a local education project (Educating future Physicians in Palliative and End-of-Life care). Cadell et al. (2007) also quoted Health Canada as a precipitator

for the educational initiative described. The Standing Committee on Postgraduate Medical and Dental Education (SCOPME) was quoted by Wee et al., (2001) in order to challenge traditional hierarchical relationships between professionals, and provide rationale for adopting IPE in palliative care teaching. The only international course was described by Pahor and Rasmussen (2009) with facilitators including work by the Swedish National Board of Health and Welfare. Further rationale was based on the observation that palliative care teaching was potentially lacking in the countries studied in comparison to global initiatives.

'Bottom-up' stimuli included the need to improve the quality of patient care as Wee et al., (2001, p. 487) states;

> *"The complexities presented by patients with multiple clinical problems require effective organisation, communication and teamwork, which require professionals, patients and carers to work together for the benefit of the patient".*

The imminent change in patient demographics, with escalating life expectancies and increasingly complex, and prolonged disease processes were highlighted by McKee et al. (2010) as rationale for promoting IPE at an undergraduate level. This served to prepare the fledgling workforce for the increasing demands on palliative care delivery. The majority of studies (7, 64%) describe novel programmes, which have been piloted and evaluated. Established IPE interventions were described in four studies (36%) (Latimer et al., 1999) (Wee et al., 2001) (Schrader et al., 2005) (Cadell et al., 2007). Latimer et al. (1999) for example, report on a day-long palliative care course which had been running for seven years and Schrader et al. (2005) described an End-of-Life seminar through nine iterations. All studies outlining established initiatives also report a dynamic process of curriculum development with continual refinement, which Latimer et al. (1999, p. 730) described as necessary to; "…create a dynamic program that is truly interdisciplinary in nature". Schrader et al. (2005) also described the evaluative process as a means of identifying areas for improvement.

Curriculum design was described in all studies, however detail was significantly varied. Learning objectives were explicitly outlined in only four studies (36%) (Latimer et al., 1999) (Schrader et al., 2005) (Cadell et al., 2007) (Fairchild et al., 2012). The value of multiprofessional involvement at the design stage was highlighted by Mcilwaine et al. (2007, p. 152) through the observation that;

> *"A relative lack of knowledge about each others' professional role within this interested group emphasised the need to enable interprofessional exploration within the workshop".*

The positive influence of curriculum design on faculty was further noted by Cadell et al., (2007). The wider benefits departmentally through recommitment to interprofessional practice was acknowledged by Fairchild et al., (2012). Specific educational theories were referenced in three cases with regard to intervention development (McIlwaine et al., 2007) (Hall et al., 2011) (Fairchild et al., 2012). This may be an under-representation as education theories would have been explored by most faculties and steering groups at the design stage but not explicitly described within the context of the written research articles.

The difficulty catering to individual professions undergraduate curricula was acknowledged as a barrier by investigators, as Latimer et al. (1999, p.731) stated; "In designing a course, there is a creative tension between providing relevant information and promoting experiential learning". McIlwaine et al., (2007) also made reference to similar difficulties in consideration of profession-specific skills and levels of knowledge. The use of multiple professions was however viewed by participants as a positive influence on IPE initiatives.

The setting of the IPE intervention differed between studies; two studies described on-line learning modules embedded in a VLE platform (Pahor & Rasmussen, 2009) (Hall, Weaver & Willett, 2011), five studies utilised both a classroom and clinical setting (Fineberg et al., 2004) (Schrader et al., 2005) (Cadell et al., 2007) (Dando et al., 2011) (Fairchild et al., 2012), and four studies were exclusively classroom based (Latimer et al., 1999) (Wee et al., 2001) (McIlwaine et al., 2007) (Mckee et al., 2010). The setting

did not influence the level of student satisfaction or engagement, however both faculty and participants are reported as benefiting from clinical exposure. Utilising clinical placements had at wider positive impact on multidisciplinary teams, as Cadell et al. (2012, p.278) noted;

"The collaborative process between educators and clinical sites has resulted in strengthening existing relationships within the palliative care community".

Dando et al. (2011) describe an intervention incorporating an interprofessional practice placement (IPP) with the aim of providing 'real-life' learning experiences, this was described as 'challenging' by students but was also attribute to an enhancement in knowledge and understanding.

Resources

Faculty composition was similar between studies, with most initiatives using facilitators with palliative care experience. A single study (McKee et al. 2010) failed to explicitly explain the credibility of the sole facilitator in terms of professional background. A robust faculty comprising of representatives from the professional groups from which students were recruited was considered integral to credibility. For example Wee et al. (2001, p.490) describe facilitators as;

"…Credible to the students, not only because they are experienced palliative care practitioners themselves, but also because they are used to working as part of a team…".

It was further stated that; "skilled facilitation is important in order to help students draw out generic lessons from the collective experiences…" (Wee et al., 2001, p. 491). Facilitator experience was acknowledged as an important influence on the success of an IPE intervention, as Fineberg et al. (2004, p. 775) commented; "students highly valued having a multidisciplinary team of instructors". Issues relating to faculty recruitment and timetabling were described by researchers, particularly when the intervention incorporated clinical placements, and extended more than one day.

Barriers were highlighted in reference to program resources. Dando et al. (2011) found feedback from mentors highlighted that the clinical placement was 'resource intensive'. Logistical considerations relating to the use of multiple sites, and strain on clinical resources were responsible for limiting numbers of participants in some studies. Cadell et al. (2007) describe an IPE intervention occurring four days a week for four weeks (2 days classroom based, 2 days clinical), with enrolment capped at twenty students annually due to the stress on clinical teams of a larger number of participants. In contrast programs occurring over a shorter period of time and those not involving clinical placements did not express the same limitations. Logistical constraints were avoided by both Pahor and Rasmussen (2009) and Hall, Weaver & Willett, (2011) who describe online IPE initiates.

Recruitment

Recruitment was voluntary in nine studies (82%) with only two studies (18%) reporting mandatory interventions. Wee et al. (2001) and Schrader et al. (2005) describe established IPE initiatives, which were incorporated into the palliative care curriculum. Cadell et al. (2007) describe a voluntary IPE intervention that was accredited however, this was noted to cause difficulties initially due to different expectations of work load between professions. The potential for selection bias due to self-election of participants can lead to artificially positive results and was recorded as a limitation by McIlwaine et al. (2007) and Pahor and Rasmussen (2009). In contrast Latimer et al. (1999, p.730) viewed voluntary recruitment as; "consistent with the faculty's self-directed problem-based learning philosophy". As opposed to deliberate design, voluntary recruitment was viewed by other investigators as a means of accommodating complex timetabling issues between professions (Dando et al., 2011) (Fairchild et al., 2012).

Study Design and Method of IPE

All studies described formal IPE initiatives as defined by Hammick et al. (2007). In addition all studies report on discrete interventions which occurred over a set timeframe. There was significant variability in the duration of interventions ranging from half a day to six weeks (one study did not specify duration). An IPE intervention in excess of two week duration was reported in four cases (36% of studies) (Fineberg

et al., 2004) (Cadell et al., 2007) (Dando et al., 2011) (Fairchild et al., 2012). The following study designs were utilised by researchers; time series study (n=2), post-intervention study (n=3), mixed methods (n=5) and before and after study (n=1). No randomised controlled trials were identified for inclusion.

The method of IPE delivery varied considerable with interventions including;

- Observation-based learning

    e.g. joint home visits, reciprocated shadowing

- Simulation-based learning

    e.g. role play, clinical simulations (supported by technology or simulated patients)

- Case-based and problem-based learning

    e.g. discussion of clinical cases/scenarios

- Clinical-based learning

    e.g. interprofessional student team providing care under supervision

- Narrative-based

    e.g. sharing professional or personal experiences

All studies used more than one method of IPE delivery. The most common mode of IPE was case-based learning which featured in six studies. PBL was utilised in three studies (Latimer et al., 1999) (Pahor & Rasmussen, 2009) (McKee et al, 2010). Formalised reflection was apparent in eight studies (Wee et al., 2001) (Fineberg et al., 2004) (Schrader et al., 2005) (Cadell et al., 2007) (McIlwaine et al., 2007) (Pahor & Rasmussen, 2009) (Dando et al., 2011) (Fairchild et al., 2012). There was no direct comparison of pedagogical methods.

The duration of IPE effect was questioned by researchers. Three of the eleven studies conducted participant follow-up surveys, illustrating maintained role understanding at

three months (Fineberg et al., 2004) (Hall, Weaver & Willett, 2011) and change in attitudes persisting at six months (Fairchild et al., 2012).

Study Outcome Measures

A number of studies describe using questionnaires to evaluate learning outcomes (n=10). Despite using potentially quantitative measures such as, the Likert scale the majority of these tools are unvalidated and poorly described within the full text of the study. Only two studies (Hall, Weaver & Willett, 2011) (Fairchild et al., 2012) describe using a validated assessment tool (AHPQ: The Attitudes to Health Professions Questionnaire or IEPS: the Interdisciplinary Education Perception Score). The use of unvalidated instruments, and reliance instead on questionnaires developed by the author(s) means that comparing results between studies is difficult due to the variability in content of the assessment tools. In studies where a questionnaire is described it has been in an abridged form, with only selected results used to support the author's discussion. For example Cadell et al. (2007) report;

> *"All five items pertaining to inter professional knowledge and skills have consistently rated between 3 and 4"*
>
> *(Cadell et al., 2007, p. 277)*

Although a partial description of the Likert scale is given there is no specific information relating to the number of students responding with theses scores, or the specific wording of the 'five items' mentioned. The authors also refer back to 'several years' of results rather than just one cohort, which again makes it difficult to establish the significance of these findings. A single study (Fineberg et al., 2004) used statistical analysis of questionnaire results in order to determine pre- and post-training perceptions, and included an analysis of covariance (ANCOVA) to adjust for prior collaborative experience as a confounding variable. Unvalidated pre- and post-intervention knowledge tests were also utilised by three studies (Schrader et al., 2005) (McKee et al., 2010) (Hall, Weaver & Willett, 2011) of which only one study provides an example of items from the instrument along with statistical analysis (Schrader et al., 2005). Hall, Weaver & Willett, (2011) reported;

> " **[post-module knowledge]** *Scores doubled for identification of the spiritual (pre-score=10, post-score=22) and physical factors (pre-score=25, post score=43) that contribute to the patient's suffering"*
>
> *(Hall, Weaver & Willett, 2011 p. 245)*

There is no further description of the instrument in terms of content, also the scoring system is not explained making it difficult to contextualise the findings. Overall the included studies tended to report the results of quantitative instruments in a narrative format.

Similar problems can be observed on review of the qualitative data obtained from the included studies. Several studies (n=7) used unvalidated questionnaires with mixed qualitative and quantitative components (Cadell et al., 2007) (Dando et al., 2011) (Latimer et al., 1999) (McIlwaine et al., 2007) (McKee et al, 2010) (Pahor & Rasmussen, 2009) (Schrader et al., 2005). In addition two studies used semi-structured interviews (Pahor & Rasmussen, 2009) (McKee et al., 2010) and one study employed a focus group post-intervention (McIlwaine, 2007). Reporting was varied with a lack of description relating to methodology and results. Both questionnaire and interview results were heavily processed with only a small number of extracts reported. Some authors reported participant responses in a generalised narrative format rather than including direct extracts. This brings in the influence of second order constructs, which are described as; 'key findings of primary researchers' (McInnes, 2011, p. 12), as opposed to first order constructs which result from; 'direct feedback from study participants' (McInnes, 2011, p. 12). For example Hall, Weaver and Willett (2011) reported;

> *"In a three-month follow-up survey, learners articulated the benefits of the interprofessional teamwork experience, reported sustained value from the module and indicated that they were applying learning in their clinical practice."*
>
> *(Hall, Weaver & Willett., 2011, p. 243)*

The difficulties with this statement reflect a lack of evidence in the form of direct student quotes and also the ambiguity relating to 'benefits' and 'sustained value'.

4.26. Learner Outcomes and Kirkpatrick's Model of Evaluation

The outcome measures of the included studies will be considered within the framework of Kirkpatrick's model of evaluation (Kirkpatrick, 1967) in order to address the review objectives.

Evaluation of Reaction

The lower level of Kirkpatrick's model (Kirkpatrick, 1967) focuses on student satisfaction or learner reaction. This was assessed within all studies meeting the inclusion criteria, and was often used as a surrogate marker for the success of an IPE intervention. All studies reported results from student evaluations following the interventions, however the degree of detail was significantly variable. Student perception or reaction to the educational intervention was predominantly measured using self-administered questionnaires (n=11). These often utilised a combination of a Likert scale (e.g. 1=strongly disagree, 2=disagree, 3=neither agree or disagree, 4=agree etc.) and open questions. Only five studies (45%) included examples of the questions used within their evaluation tools (Schrader et al., 2005) (McIlwaine et al., 2007) (Pahor &Rasmussen, 2009) (Dando et al., 2011) (Fairchild et al., 2012). In addition semi-structured interviews were used in two studies (Pahor & Rasmussen, 2009) (Mckee et al., 2010) and one study used a focus group post-intervention (McIlwaine et al., 2007) in order to gain insight into participants' experiences. All studies reported positive student perceptions of the IPE intervention, with one researcher stating that;

> *"All 25 students thought that the workshop was worthwhile and would recommend it to their colleagues"*

> (McIlwaine et al., 2007, p.154)

Fineberg et al., (2004, p. 774) also commented that;

> *"Students' comments emphasised that they perceived benefits from interprofessional interactions, experienced each other as valuable resources, and appreciated opportunities to learn from each other".*

Evaluation of Learning

Evaluation of learning relates to the acquisition of skills and knowledge. In this case specifically the development of knowledge pertaining to palliative care and skills promoting collaborative practice. The acquisition of skills and knowledge along with a change in attitudes and perceptions were evaluated by all of the included studies (n=11). Measurements used to evaluate learning included; self-administered student questionnaires, interviews, pre- and post-intervention knowledge tests and formal assessment of changes in attitudes. Multiple methods of assessing learning were utilised by ten studies (91%). Unvalidated self-administered questionnaires were used in seven studies (64%) thereby relying on participants perceptions of own learning rather than an objective measure. Unvalidated pre- and post-intervention knowledge tests were utilised by three (27%) studies. Only two studies report a change in attitudes and perceptions based on validated instruments (AHPQ or IEPS). Overall the majority of studies (n=9) relied on outcome measures which were self-reported by students or considered by researchers anecdotally.

Despite inconsistencies in the reporting of results all studies noted a change in students' attitudes and perceptions;

> *"Pre- and post-module knowledge tests… [showed] scores doubled for identification of the spiritual and physical factors that contributed to the patient's suffering. Respondents also explicitly identified the need for interprofessional collaboration five times more frequently after the module"*
>
> *(Hall, Weaver & Willett, 2011, p. 245)*

"Comparison of pre-test and post-test data from students revealed some significant improvements in knowledge and attitudes after taking the EOL seminar"

(Schrader et al., 2005, p. 381)

"Student feedback suggests the overall goals of enhancing interprofessional attitudes and collaboration were achieved. This was particularly evident in the positive comments from the medical and nursing students, who appeared to develop a degree of professional respect for each other"

(Dando et al., 2011, p. 182)

Evaluation of Behaviour

Progressing through the levels of Kirkpatrick's model, the evaluation of behaviour concerns the transfer of learning to the workplace. A change in behaviour was directly assessed by four studies (36%) (Cadell et al., 2007) (McIlwaine et al., 2007) (Dando et al., 2011) (Fairchild et al., 2012). The majority of these studies (n=3) achieved this by using more than one instrument. Mentor evaluation was used in all four studies, whereby three studies used formal evaluation (Cadell et al., 2007) (McIlwaine et al., 2007) (Dando et al., 2011) and one used informal feedback (Fairchild et al., 2012).

Measuring a change in clinical behaviour is difficult to quantify within the area of IPE with many studies focusing instead on surrogate markers such as; student perception and facilitator feedback. This is true of the studies identified from this review, as one researcher remarks;

"Reflections from the professionals supporting the educational process at clinical sites as well as in the classroom confirm that students are engaging in an effective learning process, as evidenced by the posing of appropriate questions and meaningful dialogue"

(Cadell et al., 2007, p. 278)

Evaluation of Results

The final level of Kirkpatrick's model is the evaluation of results or the wider impact on patient care and society in general. Cross study comparison of outcome measures illustrates a trend towards the evaluation of the first two levels of Kirkpatrick's model ('reaction' and 'learning'). There is significantly less attempts to measure the fourth level relating to 'results' and the translation of benefit to society. There was no formal measure of wider societal impact or patient benefit. The difficulty measuring the wider implications of IPE may in part relate to follow-up. As all studies reported interventions aimed at undergraduates, some in the first year of training this would require a prolonged follow-up period in order to accurately assess 'results' in terms of professional practice. One researcher for example stated that;

> *"...Measurement of effectiveness would be particularly difficult in that it would require following students over years to evaluate their entry and effectiveness in the profession".*
>
> *(Cadell et al., 2007, p. 277)*

Only two studies (Wee et al., 2001) (Schrader et al., 2005) reported patient or carer feedback. Both patients and carers reported that taking part in IPE was beneficial and in some cases 'therapeutic'. This reflects the learning or behavioural element of Kirkpatrick's model rather than a true impact on patient care. Again surrogate markers have been used to imply a wider benefit of IPE within palliative care such as student perception. For example one student states;

> *"Shadowing other disciplines will better inform my collaborations and consultations with other professionals in future"*
>
> *(Fairchild et al., 2012, p. 237)*

> **[What surprised you about the studentship?]** *"How much I changed as a person and how my professional outlook changed in such a short time"*
>
> *(Fairchild et al., 2012, p. 237)*

> *"When I'm finished, I have to work with other professions all day long but it's only in this course that I have had the opportunity to learn HOW to do it"*
>
> *(Pahor & Rasmussen, 2009, p. 480)*

It was further anecdotally noted that;

> *"The collaborative process between educators and clinical sites has resulted in strengthening existing relationships within the palliative care community."*
>
> *(Cadell et al., 2007, p. 278)*

This implies a broader benefit of IPE to both faculty and clinical sites. McIlwaine et al. (2007) also reported a benefit to faculty members at the design stages of a palliative care workshop.

4.3. Qualitative Analysis

Thematic synthesis was performed in accordance with guidelines outlined by Thomas and Harden (2008). The synthesis takes the form of three stages; coding text, developing descriptive themes and development of analytical themes. An inductive approach to analysis was adopted which is described by Braun and Clarke (2006) as;

> *"...A process of coding data without trying to fit into a pre-existing coding frame, or the researcher's analytical preconceptions".*
>
> *(Braun & Clarke, 2006 p. 12)*

This form of thematic analysis is often described as 'data-driven' (Braun & Clarke, 2006) (Thomas & Harden, 2008). This approach was adopted in order to ensure a rich description of the overall data, and to avoid missing potentially subtle or unexpected themes which would be of interest in the final analysis. It is important to acknowledge however that inevitably there will be an element of theoretical influence based on personal epistemological tendencies. Analysis was undertaken by a single investigator as the use of multiple investigators would influence results, which in the context of this review and its contribution to an MSc degree would not be appropriate.

4.31. Coding Text

The term 'coding' refers to; "the most basic segment, or element, of the raw data or information that can be assessed in a meaningful way regarding the phenomenon" (Boyatzis,1998, p. 63). Initial codes were formed through the extraction of data from the included studies. There was considerable variability in terms of methodology and reporting of results. Coding was therefore conducted for text within the study sections labelled; 'results' or 'findings' and 'discussion'. This allowed for as rich a data corpus as possible, with the inclusion of first and second order constructs. Initial codes were recorded in tabulated form as 'free codes' (without a hierarchical structure) for each study. This allowed for the 'translation of concepts' from one study to another in order to begin the process of synthesising data (Thomas & Harden, 2008). A total of twenty-six codes were identified from this initial stage. Appendix 9 contains the initial coding table for stage one of the thematic analysis.

4.32. Developing Descriptive Themes

A theme is said to; "…represent some level of patterned response or meaning within the data set" (Braun & Clark, 2006, p. 10). Similarities as well as differences between codes were observed in order to begin the process of developing a hierarchical thematic structure. The initial codes were then organised into broader themes. This stage in the analysis identified six main themes with twenty-one sub-themes (see Figure 12). The main themes identified included; student perception, interprofessional learning, professional development, personal development, clinical experience and curriculum design. These themes were developed from the grouping of connected free codes, for example personal development was related to students' perceived learning, personal reaction to the intervention (emotional response) and reported need for time to reflect on learning. During the descriptive phase the six main themes were treated separately, however there was overlap within sub-themes, for example collaboration was linked to both; students' professional development and interprofessional learning.

Figure 12. Thematic map displaying results from stage two of analysis
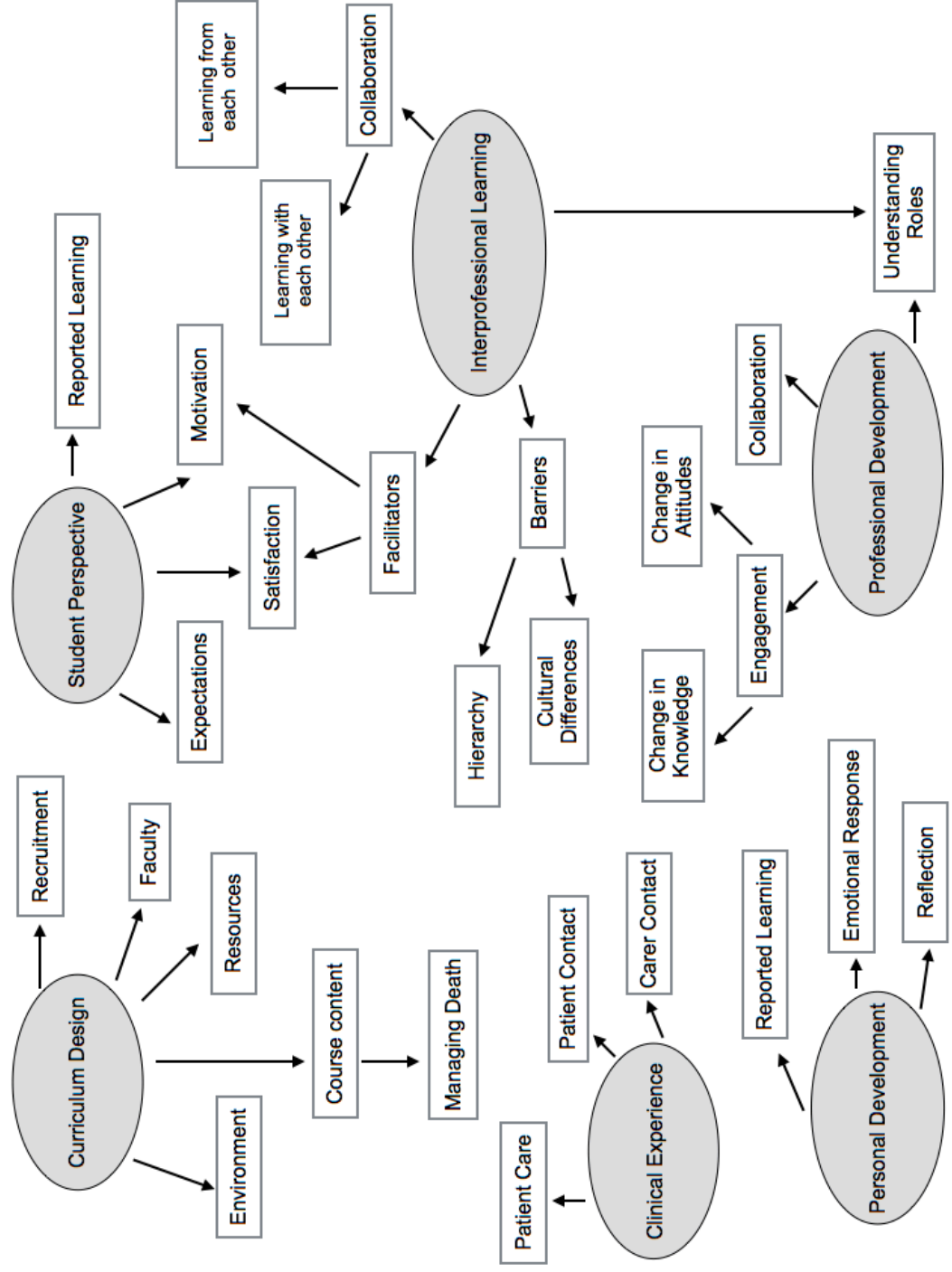
4.33. Generating Analytical Themes

The data corpus was further reviewed and descriptive themes re-examined. Within this process the main distinct themes identified through the second stage of thematic analysis were re-conceptualised, and considered in terms of relationship to the unifying theme of IPE. The objectives for this systematic review were re-visited and considered in the development of the analytical themes. Figure 13 displays the thematic map resulting from stage three of thematic analysis. The thematic schema representing IPE within the context of the undergraduate palliative care curriculum concentrates on three main analytical themes; barriers, facilitators and outcomes. These themes are considered further through a second layer of sub-themes. As Figure 13 illustrates there is significant overlap between sub-themes. In particular many of the identified barriers to IPE also act as facilitators depending on context. Cultural differences were linked as a barrier to IPE and considered as an independent variable. The reason for the perceived lack of integration of this sub theme relates to it being an important factor to consider in IPE delivery particularly in the knowledge that palliative care varies significantly globally.

IPE outcomes were separated into direct and indirect themes in acknowledgment of the difficulties accurately measuring and interpreting study outcomes. Personal development is shown to incorporate both themes as it has been measured directly via self administered questionnaires e.g. Fineberg et al, (2004), McIlwaine et al., (2007) and Hall, Weaver & Willett (2011), and indirectly through mentor evaluation e.g. Cadell et al. (2007), Dando et al., (2011). Societal and interdisciplinary impact are considered indirect sub-themes. This accounts for the difficulty accessing these outcomes directly and the need to acknowledge the wider implication of IPE.

Figure 13. Thematic map displaying results from stage three of analysis
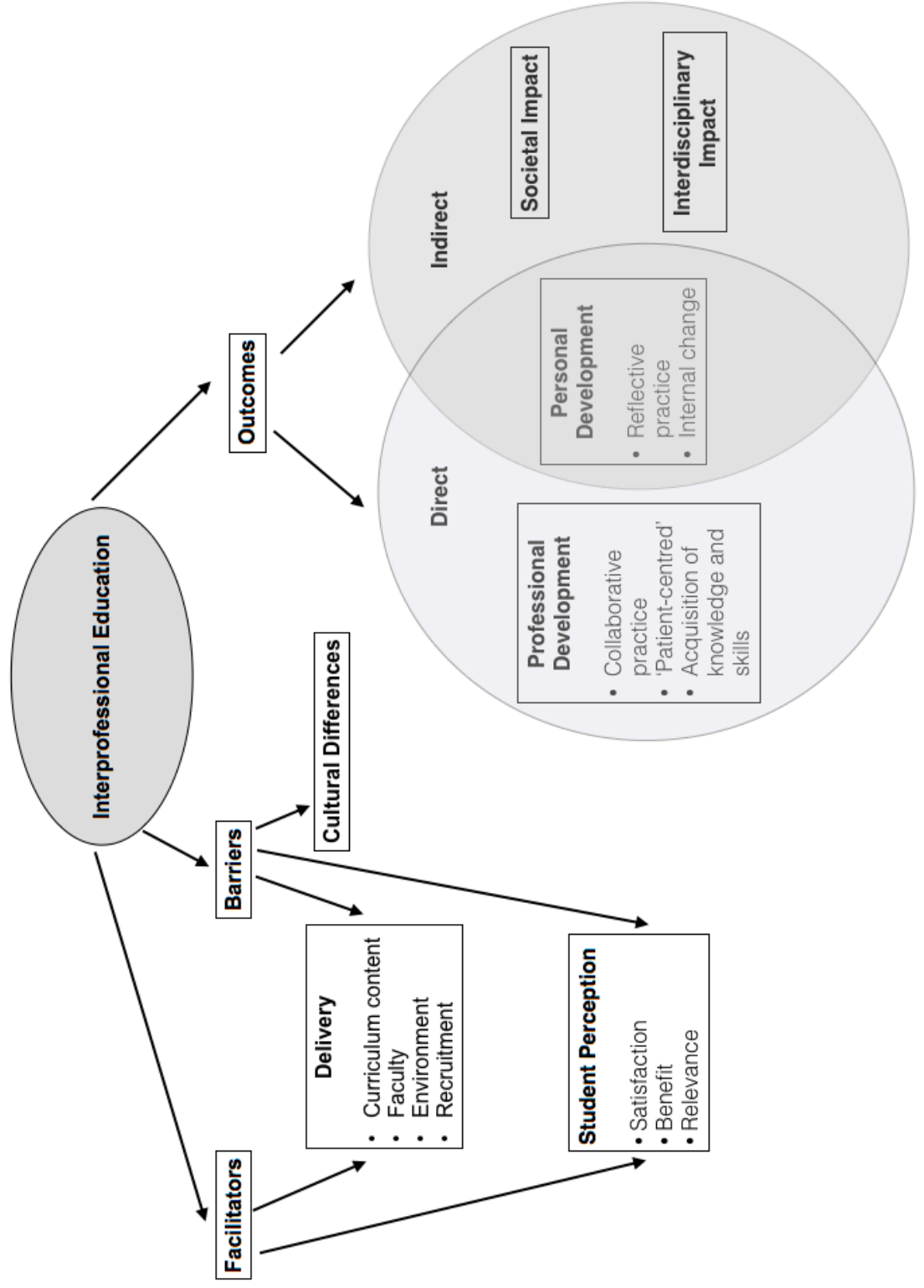
4.34 Overview of Themes

It is apparent from qualitative analysis that successful IPE within the setting of undergraduate palliative care teaching is multifactorial. The elements contributing to positive outcomes are complex with significant overlap and interplay. The use of a thematic schema allows for a clearer framework to consider these elements in more detail.

Students' main perceptions relating to IPE included; satisfaction, benefit and relevance. These sub-themes could be interpreted as facilitators or barriers to IPE, for example if students are not satisfied with the IPE intervention level of engagement will reduce. Overall the included studies reported high levels of student satisfaction in response to IPE;

> *"On the satisfaction evaluation questionnaire, learners' Likert scale ratings showed that they enjoyed working with the module and felt they had learned about collaborative practice"*
>
> *(Hall, Weaver & Willett, 2011. p. 245)*

> *"…The majority of students consistently reported the sessions to contain useful content, to be 'very valuable' and helpful both personally and professionally."*
>
> *(Schrader et al., 2005. p.383)*

Student perception was found to be multifactorial with overlapping themes. This is reflective of the complexities of personal and professional drivers for learning and development. Perceived benefit was a recurring theme within the primary studies, as students reported satisfaction being linked to increased confidence in collaborative practice, and acquisition of skills that were felt to benefit patient care (Dando et al., 2011) (Fairchild et al., 2012). Student satisfaction was also linked to perceived relevance of the IPE intervention in relation to palliative care and wider clinical practice as one study stated;

> *"The most prominent theme to emerge was that of personal connection and relevance to palliative care"*

<div align="right">(McKee et al., 2010, p. 195)</div>

The nature of recruitment was said to influence students' attitude to the IPE intervention as one researcher stated;

> *"...the students who joined the course were very positive from the very start as they embarked on the course out of their own free will and interest in the topic"*

<div align="right">*(Pahor & Rasmussen, 2009)*</div>

As previously described the majority of studies recruited participants on a voluntary basis. McIlwaine et al. (2007) was the only study to report on students' motivation for participation. Reasons for attendance included; personal interest in the grief process and identification of a self-perceived learning need. This links in to the outcomes of IPE, as self-selected students, motivated to enhance their personal, and professional development will be more willing to engage with interventions, and consequently report positive outcomes.

The facilitators identified for IPE within palliative care teaching relate to delivery of the intervention with influences from; curriculum content (e.g. managing death, end-of-life-care, MDT organisation and professional role understanding), faculty development, environment (e.g. hospice, ward, university) and participant recruitment (e.g. voluntary versus mandatory). Many of the sub-themes contributing to the facilitation of IPE also act as barriers. Curriculum content for example was identified as a barrier by some students in relation to a lack of discipline-specific teaching, and a facilitating factor for others in terms of promoting team work and collaborative practice. In a similar way faculty can act as a barrier or facilitator to IPE. Facilitation of IPE initiatives by multiprofessional and clinically relevant faculty members was

associated with increased credibility and augmented student satisfaction (Dando et al., 2011) (Hall et al., 2011). The converse was found when uniprofessional facilitators were employed. Students also found it beneficial to have facilitators representative of their own profession (Cadell et al., 2007).

Environment was reported as influential to successful IPE with an emphasis on 'reflection' and 'support'. Fineberg et al., (2004) describe a classroom-based intervention for medical and social work students which was supported by theories of professional socialisation and experiential learning. When asked what they found to be the most enjoyable one student stated; "meeting social work students in a very open, honest, reflective, and supportive forum" (Fineberg et al., 2004, p. 774). The importance of students feeling safe during discussions centring on highly emotive topics, such as death and dying was emphasised by Dando et al., (2011) and reaffirms the need for qualified facilitation.

The importance of understanding ones own role and responsibilities within the multidisciplinary setting was also valued by students. Schrader et al. (2005) describes an interdisciplinary seminar for which one medical student reported the experience as: "…[an] opportunity for me to examine my role and identify aspects I don't feel quite comfortable with" (Schrader et al., 2005, p. 383). McIlwaine (2007) reported that students identified an enhanced awareness of their professional role following an interprofessional workshop.

The outcomes of IPE were categorised into direct and indirect themes. There was significant overlap of sub-themes, for example personal development was observed both as a direct and indirect result of IPE. Overall there were inconsistencies in the measurement of IPE effect with some studies using validated survey-based instruments (e.g. ATHCT and AHPQ), whereas other studies relied on more simplistic and anecdotal reporting of results. The wider implications of IPE in terms of societal and interdisciplinary impact although repeatedly referenced within the data corpus were difficult to accurately measure, therefore the true effect on patient care and

service provision is not quantifiable. As a result researchers often referred to outcomes based on softer indicators such as facilitator observation of collaborative practice or student feedback relating to perceived skill and knowledge development;

"Student feedback suggests the overall goals of enhancing inter professional attitudes and collaboration were achieved"

(Dando, N. et al. 2011. p. 182)

"Students felt more confident in responding to the needs of patients and their families at end-of-life and grew in their appreciation for interdisciplinary process"

(Schrader, S.L. et al. 2005. p.382)

"All the students felt the placement would alter their future clinical practice in managing patients with life-limiting illness"

(Dando, N. et al. 2011. p. 182)

An important aspect of personal development was reflection. Many studies acknowledged the importance of this element through formalised reflection (Wee et al., 2001) (Fineberg et al., 2004) (Schrader et al., 2005) (Cadell et al., 2007) (McIlwaine et al., 2007) (Pahor & Rasmussen, 2009) (Dando et al., 2011) (Fairchild et al., 2012). This was a recurring theme from student evaluations, as one student when asked what was the most interesting or helpful aspect of an IPE elective reported

"...Time for meaningful reflection and debriefing, enabling us to put our learning into perspective".

(Fairchild et al., 2012, p. 237)

The importance of reflection as a means of putting learning into perspective, is a concept akin to experiential learning theory.

4.4. Summary of Findings

The main findings of the systematic review and qualitative analysis are listed below.

- Significant heterogeneity was observed between studies in relation to methodology, outcome measures and quality of reporting.
- There was a distinct lack of reference made to learning theories.
- IPE was viewed positively by students and facilitators.
- Different professions were found to provide a unique contribution to IPE teaching through contrasting knowledge and skills.
- There is evidence to support the durable acquisition of knowledge and skills for collaborative practice.
- The importance of IPE as a means of improving students' understanding of own professions role.
- Barriers include; resources, timetabling, cultural differences, uniprofessional faculty, recruitment.
- Facilitators include; student satisfaction, clinical relevance and perceived benefit to personal and professional development.

5.0. DISCUSSION

Interprofessional education has been championed by government and educational bodies as a facilitator for collaborative practice in the healthcare setting. The knowledge and skills developed within the IPE environment are potentially of great value to palliative care due to the complex care needs of the patient population. Although its value as an educational paradigm has been established, the intricacies of the working elements which contribute to successful engagement are not fully understood. This formed the rationale for further review, as a means of establishing the value of IPE within the palliative undergraduate medical curriculum. This review is unique in the use of qualitative evidence synthesis and thematic analysis to investigate the use of IPE as a method of delivering undergraduate palliative care teaching.

This review demonstrates that IPE is positively received by both facilitators and undergraduate students as a means of delivering palliative care teaching, with the acquisition of knowledge and skills required for collaborative practice. The benefit to patients and wider society however is not well evidenced.

5.1. Principal Findings

The eleven studies included in this review describe different IPE interventions with varied designs and modes of delivery. This leads to significant difficulties in interpreting results between studies and the ability to make generalisable inferences.

The heterogeneity of IPE research in relation to methodology and the measurement of outcomes has been noted in prior systematic reviews (Clifton et al., 2006) (Buring et al., 2009) (Olson & Bialocerkowski, 2014). A BEME review produced by Hammick et al. (2007) describes using a narrative format to present results due to the 'eclectic' nature of the studies identified. Reeves et al. (2013) also adopted a narrative format due to the inability to perform a meta-analysis. In addition to methodological

heterogeneity, study quality was also diverse. This has been a recurring criticism of IPE research (Clifton et al., 2006) (Hammick et al., 2007) (Reeves et al., 2013) (Olsen & Bialocerkowski, 2014), leading to the development of formalised guidelines for this field of inquiry (Barr & Low, 2012, 2013).

The overall quality of studies included in this review was poor. There were several studies which exhibited gaps in the reporting of methodology and results (Cadell et al., 2007) (Pahor & Rasmussen, 2009) (Wee et al., 2010) (Hall, Weaver & Willett, 2011). It was also apparent that results were frequently reported in a heavily censored manner. This was often in the form of extracted quotes from participant or facilitator evaluations. The introduction of reporting bias is a concern, and therefore care needs to be taken in the interpretation of results and the ability to make accurate inferences. It was observed that authors of the studies under review were predominantly from clinical backgrounds as opposed to educationalist. Barr et al., (2000) noted similar findings following a systematic review investigating the evaluations of IPE. This may have a bearing on study quality due to lack of familiarity with the theoretical and practical foundations of IPE. This may also explain the impression that initiatives were delivered and evaluated on a trial and error basis as opposed to theory driven.

This review has demonstrated a positive response from both students and facilitators towards IPE initiatives. This coincides with findings observed in earlier reviews investigating the wider field of IPE (Clifton et al., 2006) (Hammick et al., 2007) (Reeves et al., 2013). Lumague et al, (2006) for example, describe an IPE clinical placement on a Stroke Rehab inpatient unit. The perspectives of each undergraduate profession were explored with the overall consensus that the IPE initiative was an important opportunity to develop collaborative skills. The question arises as to what elements of IPE are responsible for this positivity? This review has identified a multifactorial answer with the interplay of several barriers and facilitators.

Student satisfaction was a recurring outcome measure within the included studies corresponding to the first level ('reaction') of Kirkpatrick's model of evaluation. All

studies reported high levels of student satisfaction. This was attributed to different elements including; perceived relevance and benefit (both personal and professional). Relevance seemed to be transparent to participants in all the IPE initiatives reviewed, and was independent of teaching modality or setting. This finding echoes the results of Lumague et al, (2006), as the students' perspectives all document the perceived benefit of understanding professional roles, and learning in an interdisciplinary format in order to function at a professional level within a multidisciplinary team. The correlation between relevance and engagement with IPE can be explained through Knowles' Adult Learning Theory, which makes the assumption that readiness to learn is related to the need to learn in order to cope with real-life problems (Knowles, 1980). Contextualisation is important to IPE with 'realistic' interventions leading to more successful IPE (Hammick et al., 2007) (Freeth, 2010). This would explain in part the positivity towards the IPE interventions studied, as experiential learning methods such as; clinical placements, simulation or case-based learning were commonly used in isolation or combination.

In general clinical placements were positively evaluated by both students and facilitators, with the acquisition of knowledge and skills required for the development of collaborative practice. The enhancement of knowledge and professional role understanding through an IPP, as described by Dando et al. (2011) parallels findings from a UK-based training ward. Reeves et al. (2002) report on interprofessional learning on a training ward for undergraduate healthcare students, which on evaluation was valued by students for its clinical realism and relevance to future practice. At present there is a lack of evidence to support one modality over another, as there are no studies compare teaching method or setting within the context of palliative care.

In consideration of the wider field of palliative care teaching, a systematic review reported by Pulsford et al., (2011) concluded that classroom-based teaching was useful for enhancing professional skills in the delivery of end-of-life care, but should be reinforced by clinical experience (i.e. blended learning). The importance of clinical exposure has been further supported by MacLeod et al., (2003) through the description

of an undergraduate programme incorporating reflective practice following interviews with dying patients, and their families. Medical students were shown to undergo a transformation in attitudes, with the development of an empathetic realisation of the dying process, and also the adoption of a patient-centred approach. A similar method was employed by Jacoby et al., (2010), who describe an undergraduate clinical rotation in a UK-based hospice. This intervention was shown to enhance participants' knowledge of professional roles, and the appreciation of the interprofessional team. As previously mentioned it is this sense of realism that is associated with increased levels of student engagement in response to IPE initiatives (Reeves, 2000). This leads on to the concepts of motivation.

Thematic analysis linked student satisfaction with motivation. This is an important element to consider as the adult learner is motivated by internal rather than external stimuli (Knowles, 1980). The majority of included studies (9, 82%) describe voluntary recruitment, therefore is the degree of positivity observed in participants a reflection of a self-motivated group, with independently identified learning needs, or true IPE engagement? The fact that those studies reporting mandatory initiatives were also viewed positively by students would suggest that there is further complexity to this argument. The influence of self-selected recruitment in terms of bias was acknowledge by investigators (McIlwaine et al., 2007) (Pahor & Rasmussen, 2009). The true effect of recruitment on outcome measures has not been quantified within the wider IPE setting.

In addition to the effects of recruitment, gender may also contribute as a confounding factor to the interpretation of IPE success. Those studies which reported gender were also shown to have proportionally more female participants. McIllwaine et al., (2007) suggested that this may reflect female students' attributing a greater degree of benefit towards non-curriculum courses. Alternatively this finding may be due to the greater proportion of women in healthcare roles. The effect of gender on IPE engagement was not explored in any of the studies included in this review. Wilhelmsson et al., (2011) reported on medical and nursing students readiness for collaboration through the use

of the Readiness for Interprofessional Learning Scale (RIPLS). The results found that regardless of educational programme, female students displayed more positive beliefs relating to teamwork and collaboration. Findings from a survey-based review of health sciences faculty also supported the observation that female gender was associated with an improved attitude towards IPE at a postgraduate level (Curran, Sharpe & Forristall, 2007). It is not unfeasible to consider that gender will contribute to the positive responses observed in the evaluation of IPE initiatives. There is not enough evidence within this review however to determine the significance of this finding.

IPE was consistently associated with enhancing palliative care teaching through the development of collaborative skills, and supporting a change in attitudes and perceptions towards interdisciplinary roles. A change in knowledge and collaborative ability has also been observed in systematic reviews investigating the general benefits of undergraduate IPE (Barr et al., 2000) (Clifton et al., 2006) (Hammick et al., 2007). There is further support for the achievement of learning outcomes in IPE initiatives concentrating on alternative constituents of the undergraduate curriculum. Darlow et al., (2015) for example, performed a prospective controlled trial evaluating a discrete (11 hour) IPE programme focusing on the management of longterm conditions. Multiple instruments were utilised in order to evaluate learning including; AHPQ and RIPLS scales. The findings illustrated significantly higher mean, post-intervention attitude scores in the intervention group compared to the control group. This also brings in to question the sustainability of IPE outcomes. The studies incorporated in this review concern discrete, formal IPE interventions with only a small number providing follow-up data (Fineberg et al., 2004) (Hall, Weaver & Willett, 2011) (Fairchild et al., 2012). Collectively results showed that a change in attitudes and perceptions following an IPE initiative could be maintained up to six months post-intervention. It is difficult to determine whether exposure to informal IPE during this follow-up period (e.g. through an undergraduate clinical rotation) influences these findings.

There were no negative outcomes reported by the eleven studies reviewed. Different professions were found to provide a unique contribution to IPE teaching through contrasting knowledge and skills (Fineberg et al., 2004) (McIlwaine et al., 2007) (Dando et al., 2011) (Fairchild et al., 2012). Students consistently reported valuing shared learning with multiple professions and associated the experience with an improved understanding of professional roles.

The importance of understanding one's own professional role and responsibilities was a recurring theme (Fineberg et al., 2004) (Dando et al., 2011) (Fairchild et al., 2012). This finding has been corroborated through systematic reviews of general IPE (Barr et al., 2000) (Hammick et al., 2007). The importance of self-realisation has often been lost in favour of the achievement of alternative outcome measures (Reeves et al. 2000) (Clifton et al., 2006). Personal development is potentially underplayed within IPE research. The use of discipline-specific material within IPE can be helpful in reaffirming participant's roles and professional identities (Cadell et al., 2007). This finding concurs with existing research, including a Swedish study taking place on an interprofessional training ward, which found that collaboration was dependent on an understanding of students' own and other profession's roles (Lidskog, Lofmark & Ahlstrom, 2007).

Social identity is an important element of self-perception, as health professionals are drawn to different roles based on many internalised factors including personality (Hind et al. 2003) (Sargeant, 2009). Tribalism and socialisation may therefore be viewed as inherent (Atkins, 1998) (Sargeant, 2009). Following this consideration IPE has the additional purpose of allowing individuals to maintain their profession identity whilst recognising the value of other profession's skills and knowledge. Challenges were acknowledged in consideration of group dynamics, however conflict was found to enhance IPE through promotion of discussion and constructive problem solving (Wee et al., 2001) (Pahor & Rasmussen, 2009). This is a finding which does not appear to translate to the wider IPE environment (Clfiton et al., 2006) (Olsen & Bialocerkowski, 2014).

Past experience of professional collaboration has been linked to increased role understanding and IPE engagement (Fineberg et al., 2004), a findings which is supported by current subject knowledge (Curran, Sharpe & Forristall, 2007) (Olson & Bialocerkowski, 2014). Differences were also observed between professions in terms of susceptibility to IPE (Fineberg et al., 2004) (Cadell et al., 2007). This is a shared finding, supported by prior studies of IPE in the wider healthcare setting. A study by Larkin et al. (2013) describes an IPE initiative for architectural and occupational therapy students. This failed to work due to a lack of professional cohesion. The two groups did not share common goals, which has been described by Fineberg et al. (2004) and Dando et al. (2011) as essential to successful IPE. These two groups of participants have completely different knowledge and experiences and do not normally work together. The initiative was therefore trying to foster a professional relationship which is unobtainable. This is akin to putting two groups together each speaking a different language and expecting them to work cohesively. This relates back to relevance and perceived benefit for participants both personally and professionally. The need for mutual understanding and common goals within IPE was apparent from student and facilitator evaluations (Cadell et al., 2007) (Dando et al., 2011). These qualities also feature in research articles describing the theoretical basis of IPE interventions (Hall, 2005) (Oandassan & Reeves, 2005) (Abela, 2009) (Sargeant, 2009).

Cultures view death and dying very differently. The studies identified through this review were predominantly of western origin. Results therefore cannot be generalised on a global level, as even subtle differences were observed in countries with close cultural ties (Pahor & Rasmussen, 2009). Cultural differences have been identified as a barrier to IPE due to the inability to make generalisable inferences across cultural boundaries, and the lack of global representation generally within the IPE field (Barr et al., 2000) (Clifton et al., 2006) (Hammick et al., 2007).

Despite the origins and rationale for IPE being heavily theory driven there is a distinct lack of reference to educational theories within literature. Only three studies within

this review explicitly related theory to practice (McIlwaine et al., 2007) (Hall et al., 2011) (Fairchild et al., 2012). This is not an unexpected finding as several studies have also acknowledged this deficiency in primary research (Clifton et al., 2006) (Hammick et al., 2007). The connection between educational theories and IPE research has been further investigated in a large scale systematic review by Hean et al., (2012) the results of which corroborate the findings of this systematic review.

Facilitation was shown to be integral in achieving collaborative skills (Cadell et al., 2007) (McIlwaine et al., 2007) (Dando et al., 2011). The background of the facilitator was influential to student engagement, as response was related to structured facilitation by tutors with palliative care experience, as this contributed an additional layer of credibility (Fineberg et al., 2004) (Wee et al., 2010). This is in keeping with current knowledge of IPE and the role of facilitation (Clifton et al. 2006) (Hammick et al. 2007) (Freeth, 2010). Fallsberg and Hammer (2000) for example, describe experiences of an interprofessional training ward and the importance of appropriate facilitation. In addition use of reflection was described as an important means of developing knowledge and overall group dynamics. Reflection was a recurring theme within the eleven studies identified from this review with benefit described secondary to the contextualisation of learning and opportunity for internalisation of experiences (Fairchild, et al. 2012). A finding which can be related back to adult learning theories and Mezirow's concept of transformative learning, which describes mechanisms of assimilation and contextualisation of experiences (Abela, 2009) (Freeth, 2010).

IPE in the setting of palliative care teaching was found to promote the acquisition of knowledge and skills in undergraduates required for collaborative practice. There were challenges identified in the interpretation of learning outcomes across studies. Such challenges were also found in prior systematic reviews of general IPE (Clifton et al., 2006) (Hammick et al., 2007) (Olson & Bialocerkowski, 2014). Learning was often established through self-reported assessment tools, with several studies disclosing selected extracts from participants' or facilitators' surveys in order to evidence the success of an intervention and inform discussion. This adds an additional layer of

subjectivity as researchers may be less inclined to include negative statements regarding IPE leading to reporting bias. The use of selected extracts means that further analysis is reliant on results which have already been filtered and processed reflecting second order constructs rather than first order constructs. The measurement of a change in clinical behaviour has also been difficult to quantify within the area of IPE with many studies focusing instead on surrogate markers such as; student perception and facilitator feedback. These outcome measures have been identified as weak markers of assessing clinical behaviour (Hammick et al., 2007).

5.2. Strengths and Limitations

A rigorous review methodology was employed in accordance with national and global guidelines (Fathalla & Fathalla, 2004) (CRD, 2009). This included the observation of the PRISMA guideline for reporting systematic reviews and meta-analyses (Liberati et al.,2009). The priority was to ensure transparent reporting in addition to producing a robust and reproducible systematic review strategy. Extensive preparation prior to commencing the review including the completion of a protocol assisted with this goal. The protocol produced was influenced by the PRISMA-P guideline for the reporting of systematic review and meta-analysis protocols (Shamseer et al., 2015). In addition the protocol was registered with the PROSPERO international database of prospectively registered systematic reviews in health and social care. This allowed confirmation that no review in this area had already been commenced, therefore avoiding duplication. The databases, DARE and CDSR along with the BEME website were also consulted for the same reason to ensure that no prior review had been undertaken with the same research question in mind.

Systematic reviews can be susceptible to publication bias due to the tendency for positive or significant results to be published. Consequently the acknowledgement of grey literature is an important step in reducing this source of bias. Within this review grey literature was explored as part of the search strategy and included; utilising the index of thesis and dissertations database and hand searching key conference

proceedings and prominent medical education websites (BEME and CAIPE). Relevant studies were also identified through the process of 'citation pearl growing' (Hartley, 1990). Language bias may also occur as mainstream databases are often heavily skewed towards articles published in the English language. The search strategy for this review also employed language as a limitation which will contribute further to this form of bias and affect the generalisability of findings. The reasons for this were explained in the methodology section, as due to the mostly qualitative nature of the data abstracted language fluency was essential to ensure subtle findings were not missed. If time and resources were not influential it would be preferable to include all articles regardless of language as this may provide additional information relating to cultural differences in palliative care and IPE.

Selection bias can occur during the review process, this was in part reduced by the formation of a research protocol, comprehensive search strategy and specific eligibility criteria. A second reviewer was used to screen 20% of articles identified for title screening and all articles identified for full text review. The purpose was to reduce selection bias and ensure potentially eligible articles were not missed. It is acknowledged however that the ideal standard would be for a second investigator to review 100% of the articles identified at each review stage. Unfortunately due to time constraints and resources it was not possible for this to be achieved. The use of a second reviewer to check/assist with data extraction was not suitable in this circumstance due to the review being used in partial fulfilment of an Msc by thesis.

The nature of the review process identifies diverse studies in terms of quality, methodology and outcome measures. Pooling data for a systematic review does not overcome inadequacies in study design (Gopalakrishnan & Ganeshkumar,2013). Study quality was addressed during the review however it was not used as a means of excluding studies from the final analysis. In retrospect it may have been beneficial to score the final studies based on methodological quality in order to ensure only high quality data was incorporated in the analysis. Consequently this would have resulted in less primary studies in the final analysis and impacted on the quantity of useable data.

5.3. Implications for Curriculum Design and Delivery

As outlined there are limitations of this review. The heterogeneity between study design, outcome measures, and quality of reporting, make generalisable inferences difficult. Results should therefore be reviewed within context and applied specifically to undergraduate palliative care teaching.

The results of this review suggest that utilising IPE in the medical undergraduate palliative care curriculum is feasible. In consideration of curriculum design models of experiential learning have repeatedly been used with success and a blended approach has been adopted by several studies. The importance of trained, clinically credible facilitators has been emphasised in several studies in addition to the use of formalised reflection.

Brief integrated educational interventions have been shown to increase students' perceived understanding of professional roles, and are less resource intensive compared to clinical placements or courses spanning several weeks. At present there is no evidence to suggest a discrete, short duration intervention is less effective than that of a longer duration. This has implications for curriculum design particularly in consideration of larger student cohorts and limited resources which influence the ability to offer clinical placements.

5.4. Recommendations for Future research

> *"Well planned interactive learning promotes flexible, mutually supportive, patient-centred and cost effective collaboration, not only in interprofessional teams, but also more widely within a policy−aware understanding of organisational relationships."*

> *(CAIPE, 2012, p. 3)*

This review has highlighted several challenges associated with the synthesis of IPE based research. There is currently a distinct lack of robust methodology and transparent reporting. Several reviewers have already attempted to address these concerns through either large scale systematic reviews or the development of practical guidelines for the planning and delivery of IPE interventions (Barr et al., 2000) (Hammick et al., 2007) (Sharland et al., 2007). There is however further scope for improvement.

It is not enough to say that this pedagogical method should benefit palliative education, more needs to be known about what elements specifically promote IPE in order to optimised student and ultimately patient benefit. Unfortunately this could not be adequately answered through this review due to limitations relating to study methodology and significant omissions in reporting.

Following completion of this review several questions arise;

- Do learning styles have an impact on IPE delivery and if so is this related to participants' profession background?

- Should patients be more involved in the development of IPE intervention?

- What is the durability of IPE interventions? Is this related to the duration of the original intervention?

In consideration of these questions and to follow on from this review, it would be appropriate to suggest further investigation in the form of a before-and-after study design with a comparable control group. This would allow a direct comparison between formal IPE versus uni-professional teaching. A patient focus group prior to intervention development would enable the consideration of patient expectations of collaborative practice and alignment of learning objectives. Integration of the IPE intervention into the undergraduate palliative care curriculum would alleviate bias

associated with participant self-recruited. In terms of design, a classroom-based intervention with case-based learning would offer a controlled setting to investigate IPE teaching. The reason for not using a clinical placement is that there is less ability to control the learning environment and too many confounding factors may influence the results. For example participants will not be exposed to exactly the same clinical experience in terms of; ward, clinic, patient cohort or staff, depending on timetabling. The use of validated instruments such as; the AHPQ and the IEPS, would allow assessment of knowledge and attitudes in both the intervention, and control groups at baseline, directly after the intervention and on follow-up. In addition survey-based measures could be administered to both facilitators and participants at the same intervals to provide qualitative data for further evaluation. Although some studies use knowledge assessments, this would not be a primary outcome, as it would be of more interest to determine whether a change in attitude and understanding of collaborative practice had occurred as opposed to an increase in clinical acumen.

The duration and durability of IPE has been questioned and one method of addressing this may be to introduce an initiative whereby a group of participants receive a single IPE teaching session or further sessions with interval follow-up. Repeat assessment at the point of qualification may help answer questions relating to wider patient benefit. The difficulty of using clinical assessments to establish benefit is that many students will undertake their foundation training in different areas. An alternative may be to review scoring of work-place-based assessments (WPBA) or results from patient feedback surveys located in individual's electronic records of professional learning (NHS e-portfolios). It is acknowledged however, that no one study will be able to answer all remaining questions relating to the implementation of IPE due to the complexity of this educational paradigm.

6.0. CONCLUSION

The results of both the scoping review and full systematic review serve to illustrate the difficulties navigating the field of IPE. Despite limitations the results of this review indicate value in the use of IPE within the medical undergraduate palliative care curriculum. IPE has the potential to enhance palliative care teaching through the acquisition of knowledge and skills required for collaborative practice. This is based on evidence identified through the use of Kirkpatrick's model of evaluation, and relate to the initial stages of reaction and learning. Determination of the wider implications of IPE in terms of patient and societal benefit is currently limited due to inadequacies in outcome measures, and lack of longterm follow-up.

The use of thematic analysis allowed the identification of facilitators, and barriers to IPE within palliative care teaching, in addition to the direct and indirect outcomes which collectively influence positive implementation. Consequently the success of IPE interventions are multifactorial and therefore planning and delivery at an organisational level needs to be carefully considered.

More needs to be known regarding which combination of elements are associated with successful IPE initiatives in order to optimise student, and ultimately patient benefit. This would also allow the tailoring of interventions to fulfil specific curriculum objectives and enhance delivery. There is therefore a requirement for more robust research with the utilisation of standardised reporting guidelines, validated tools for assessing outcomes, and longitudinal follow-up to assess the appropriateness of stand-alone versus integrated (embedded within undergraduate curriculum) courses.

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APPENDIX 1

Full search strategies for scoping review

MEDLINE (1946-present) and EMBASE (1974-present) search strategy;

1. Inter-profession$ or interprofession$

2. Inter-disciplin$ or interdisciplin$

3. Multi-disciplin$ or multidisciplin$

4. Multi-profession$ or multiprofession$

5. Multi-agenc$ or multiagenc$

6. Inter-agenc$ or interagenc$

7. Multi-occupation$ or multioccupation$

8. Trans-profession$ or transprofession$

9. Trans-disciplin$ or transdisciplin$

10. Multi-department$ or multidepartment$

11. Trans-department$ or transdepartment$

12. Inter-department$ or interdepartment$

13. Inter-institut$ or interinstitut$

14. Inter-organi#ation$ or interorgani#ation$

15. Multi-organi#ation$ or multiorgani#ation$

16. Trans-organi#ation$ or transorgani#ation$

17. OR 1-16

18. Collaborat$

19. Group$

20. Teach$

21. Learn$

22. Train$

23. Education$

24. Course$

25. Program$

26. Workshop$

27. Curricul$

28. OR 18-27

29. Palliat$

30. terminal$

31. End of life care

32. End of life stages

33. OR 29-32

34. 17 AND 28 AND 33

CINAHL, BEI and ERIC search strategy;

TX Inter-profession* OR TX interprofession* OR TX inter-disciplin* OR TX interdisciplin* OR TX multi-disciplin* OR TX multidisciplin* OR TX multi-profession* OR TX multiprofession* OR TX multi-agenc* OR TX multiagenc* OR TX inter-agenc* OR TX interagenc* OR TX Multi-occupation* OR TX multioccupation* OR TX trans-profession* OR TX transprofession* OR TX trans-disciplin* OR TX transdisciplin* OR TX multi-department* OR TX multidepartment* OR TX trans-department* OR TX transdepartment* OR TX inter-department* OR TX interdepartment* OR TX interinstitut* OR TX inter-institut* OR TX inter-organi?ation* OR TX interorgani?ation* OR TX multi-organi?ation* OR TX multiorgani?ation* OR TX trans-organi?ation* OR TX transorgani?ation* AND TX collaborat* OR TX group* OR TX teach* OR TX learn* OR TX education* OR TX train* OR TX course* OR TX program* OR TX workshop* OR TX curricul* AND TX palliat* OR TX termin* OR TX end of life care OR TX end of life stages

Msc By Thesis

Project Protocol

The role of interprofessional education within the medical undergraduate

palliative care curriculum. *A systematic review.*

Natalie Jeffery

2015

REVIEW QUESTION

What is the role of Interprofessional Education within the medical undergraduate palliative care curriculum?

BACKGROUND

Interprofessional Education (IPE) has been utilised by several medical and allied health specialities as a way of enhancing undergraduate teaching (Clark, 1997) (Howe et al., 2001) According to The Centre for the Advancement of Interprofessional Education (CAIPE) IPE is said to occur;

"...when two or more professions learn with, from and about each other to improve collaboration and the quality of care".

(CAIPE 2002)

The role of IPE within the medical undergraduate curriculum has been explored in relation to effects on professional practice, healthcare outcomes and development of professional identity (Zwarenstein et al., 2009) (Reeves et al., 2013) It has been suggested that this method of teaching is particularly beneficial within palliative care due to the complexity of palliative issues and the multidisciplinary approach adopted (Latimer et al., 1999) (Fineberg et al., 2004) At present the role of IPE within palliative care particularly at an undergraduate level is imprecise. At present there is no systematic review within this area. A systematic review will allow the collation and synthesis of research in order to answer the question posed regarding the use of IPE within the undergraduate palliative care curriculum.

The National Institute of Clinical Excellence (NICE) defines palliative care as;

"...the active holistic care of patients with advanced, progressive illness"

(NICE, 2004, p. 24)

NICE further defines end of life care as; "…any palliative care within the last 12 months of life" (NICE, 2011, p.1) For the purpose of this review the term palliative care will be used as it incorporates the period of end of life care.

The General Medical Council (GMC) document 'Tomorrow's Doctors' states that doctors should; "contribute to the care of patients and their families at the end of life" (GMC, 2009, p. 23) There is therefore a need to ensure a robust undergraduate curriculum in order to address the complex and challenging issues relating to palliative care. In response there has been the development of multiple curricula for undergraduate palliative care teaching (Billings et al., 1997) (Gibbins et al., 2009) including a white paper produced by the European Association for Palliative Care (EAPC) which outlines 10 core inter-disciplinary competencies in palliative care (Gamondi et al., 2013) There is however a lack of evidence to suggest the most effective way of achieving these competencies. The question arises as to whether IPE would be of benefit within this area of the taught medical curriculum. At present this question has not been answered despite there being evidence of benefit for its use in students from allied health specialities (Clark, 1997) (Howe et al., 2001)

The need for improved palliative care teaching is emphasised by the Office of National Statistics (ONS) with the estimated increase in the UK population of 4.9million by 2020 and an expected 55 percent increase in the number of people over 85 years of age between 2010 and 2035 (ONS, 2011) An escalating elderly population will in turn lead to increasingly complex medical problems and a greater demand on palliative care services. It has been estimated that this may lead to an additional 90,000 people dying in institutions by 2030 (Gomes & Higginson, 2008) As a result clinicians within both primary and secondary care will have increased contact and involvement in the provision of palliative care. Effective education at an undergraduate level is therefore essential.

The predicted changes in population demographics and impact on palliative care provision mean that as a profession we have to evolve to ensure our patient's changing medical needs are met. Part of this evolution is to develop the role of the multidisciplinary team in order to provide holistic and tailored care for our patients. This highlights a learning need within medical students' education which will only be achieved through the development of collaboration and communication skills. IPE may help to address this learning need through the development of these skills.

AIM

The aim of this review is to critically assess the use of IPE within the medical undergraduate palliative care curriculum. Kirkpatrick's hierarchy of evaluation (Kirkpatrick, 1998) will be used as a framework to answer the following questions;

1. What is the contribution of IPE to the development of knowledge and key skills in palliative care (including communication and collaborative skills)?

2. What factors influence students' perceptions of IPE?

3. What contribution does IPE make to patient care in the palliative setting?

OBJECTIVES

The objectives of this review are;

1. To evaluate the outcomes of IPE in relation to students' knowledge and key skills development.

2. To identify factors which influence students' perceptions of IPE and determine a hierarchy of importance.

3. To describe the impact of IPE on patient care both direct and indirect.

4. Evaluate the use of IPE as a method of delivering palliative care teaching to medical students.

METHODOLOGY

To achieve the aim and objectives, a systematic review will be performed. For the purpose of this review the Cochrane Collaboration definition of a systematic review will be used which explains;

"A systematic review is a high-level overview of primary research on a particular research question that tries to identify, select, synthesize and appraise all high quality research evidence relevant to that question in order to answer it."

(Cochrane Collaboration, 2014)

To ensure transparency the PRISMA guideline will be observed for reporting the results of this systematic review (Liberati et al., 2009)

Criteria for Study Inclusion

- **Types of Studies**

Randomised controlled trials (RCTs) will be included however, it is anticipated that few RCTs will be identified for inclusion therefore quasi-experimental studies will also be considered in addition to; case-control, cohort, case study, correlational studies and cross-sectional studies. Studies undertaken in any learning environment will be eligible for inclusion.

- **Types of Participants**

The population of interest is medical students. Studies will be included if the interprofessional group incorporates this population irrespective of year of study.

- **Types of Intervention**

All types of educational intervention which involve; training, learning, or teaching with two or more professions in accordance with the CAIPE definition for IPE will be included.

Types of Outcome Measures

Outcome measures will be based on Kirkpatrick's educational outcomes model (Kirkpatrick 1998) which uses a four level hierarchy to evaluate teaching and learning;

1. **Reaction**

Participants' reaction to teaching, including; method, delivery, content, environment, quality of teaching and composition of IPE group.

2. **Learning**

The degree of learning relates to acquisition of knowledge and key skills including collaboration and communication skills, confidence and role recognition.

3. **Behaviour**

Application of learning; whereby participants alter practice/attitudes following IPE teaching.

4. **Results**

Assessment of learning in relation to specific outcomes such as; direct and indirect patient benefit, changes to curriculum delivery. Unintended outcomes of IPE will also be considered.

Search Methods

Relevant studies will be identified by searching the following electronic databases; MEDLINE, EMBASE, AMED, CINAHL, SCOPUS, ERIC, BEME, BEI, BNI, PsychINFO and the Cochrane Central Register of Controlled Trial (CENTRAL). Search terms will include; palliative, terminal, end of life care, end of life stages and interdisciplinary, multidisciplinary, multiprofessional, interprofessional, teaching and learning (See appendix for full search strategy) Results will be limited to publications from 1993 to present. The time period was chosen to coincide with the publication of the GMC document 'Tomorrow's Doctors' which outlines the need for palliative care teaching within the medical undergraduate curriculum.

In order to trace further relevant research articles a manual search of the references within retrieved articles will be performed. Conference programmes from The Association for the Study of Medical Education (ASME), An International Association for medical Education (AMEE) and the Centre for the Advancement of Interprofessional Education (CAIPE) will also be searched in order to identify any

relevant grey literature. Searches will be restricted to original research articles and articles in the English language. Country of origin will not be used as an exclusion criteria.

Data extraction and management

Searches will be uploaded to Endnote and de-duplicated prior to screening. Titles and abstracts of reviewed studies and those from additional sources will be screened independently by two reviewers to identify studies meeting the inclusion criteria. The full text of eligible studies will be retrieved and independently assessed by two reviewers. Any discrepancies over the eligibility of particular studies will be discussed with a third reviewer and a decision agreed. Data will be extracted and recorded using a pre-piloted data extraction tool. The data extraction tool will include the following items; author, title, country of origin, study method, setting (e.g. hospital, hospice), sample size, participant demographics (year of study and speciality background), details of intervention (method of IPE), outcome measures studied, method of analysis and theoretical explanation of findings.

Research articles will be critically reviewed using Coughlan et al. (2007) guideline for the critical appraisal of quantitative research and Ryan et al (2007) guideline for the analysis of qualitative research. Studies will not be excluded based on methodological quality but will be assessed as part of the review process.

Data Analysis

The expected lack of quantitative studies and methodological heterogeneity of the qualitative studies identified means that a meta-analysis of study outcomes may not possible. Thematic analysis has been well documented as a valid method for analysing qualitative research (Thomas & Harden, 2008) (Guest & Namey, 2012) This method was chosen as it allows for phenomenological consideration and theoretical flexibility. A thematic analysis will therefore be performed in order to identify key themes within the data. The analysis will be conducted in accordance with guidelines described by Thomas and Harden (2008) which outline a three stage process (see table 3). The

combined analytical themes will then be considered in-depth in order to answer the outlined objectives of the review.

Table 3. Stages of Thematic Analysis

Stage 1	**Coding Text** *Coding of the findings from primary studies*
Stage 2	**Developing Descriptive Themes** *Organisation of primary codes to construct descriptive themes*
Stage 3	**Generating Analytical Themes** *Combination of themes and generation of new concepts*

SUMMARY

Inter-professional Education (IPE) has been utilised by medical and allied health specialities to enhance undergraduate teaching. Predicted changes in population demographics and impact on palliative care provision highlights a learning need within undergraduate medical students for the development of collaboration and communication skills. IPE may help to address this learning need through the development of these skills. The evidence for the use of IPE within the medical undergraduate palliative care curriculum will be critically assessed through a systematic literature review. Electronic search engines such as Medline, CINAHL, Embase and ERIC will identify relevant research articles. All types of educational intervention which involve; training, learning, or teaching with two or more professions in accordance with the CAIPE definition for IPE will be included. Articles which fulfil the inclusion criteria will be further critically assessed using specified schemas.

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Thomas, J., Harden, A. (2008) Methods for the thematic synthesis of qualitative research in systematic reviews. BMC Medical Research Methodology 8:45.

Zwarenstein, M., Goldman, J., Reeves, S. (2009) Interprofessional collaboration: effects of practice-based interventions on professional practice and healthcare outcomes. Cochrane Database of Systematic Reviews.

APPENDIX 3

Full search strategy for systematic review

AMED (1985-present), EMBASE (1974-present), MEDLINE (1946-present) and PsychInfo (1806-present) search strategy;

1. Inter-profession$ or interprofession$

2. Inter-disciplin$ or interdisciplin$

3. Multi-disciplin$ or multidisciplin$

4. Multi-profession$ or multiprofession$

5. Multi-agenc$ or multiagenc$

6. Inter-agenc$ or interagenc$

7. Multi-occupation$ or multioccupation$

8. Trans-profession$ or transprofession$

9. Trans-disciplin$ or transdisciplin$

10. Multi-department$ or multidepartment$

11. Trans-department$ or transdepartment$

12. Inter-department$ or interdepartment$

13. Inter-institut$ or interinstitut$

14. Inter-organi#ation$ or interorgani#ation$

15. Multi-organi#ation$ or multiorgani#ation$

16. Trans-organi#ation$ or transorgani#ation$

17. Or 1-16

18. Teach$ or Train$

19. Education$ or learn$

20. Course$ or program$ or workshop$

21. Group$ or collaborat$

22. Or 18-21

23. Palliat$ or terminal$

24. End of life or end of life stages

25. Or 23-24

26. 17 and 22 and 25

BNI search strategy;

((inter-profession* OR interprofession*) OR (inter-disciplin* OR interdisciplin* OR multi-disciplin* OR multidisciplin*) OR (multi-profession* OR multiprofession* OR multi-agenc* OR multiagenc*) OR (inter-agenc* OR interagenc* OR multi-occupation* OR multioccupation*) OR (trans-profession* OR transprofession* OR trans-disciplin* OR transdisciplin*) OR (multi-department* OR multidepartment* OR trans-department* OR transdepartment*) OR (inter-department OR interdepartment* OR inter-institut* OR interinstitut*) OR (inter-organi?ation* OR interorgani?ation* OR multi-organi?ation* OR multiorgani?ation*) OR (trans-organi?ation* OR transorgani?ation*) AND (teach* OR train* OR education* OR learn* OR group* OR collaborat* OR course* OR program* OR workshop*)) AND (palliat* OR terminal*)

BEI, CINAHL, ERIC and Index of Dissertations and Theses (UK and Ireland) search strategy;

TX Inter-profession* OR TX interprofession* OR TX inter-disciplin* OR TX interdisciplin* OR TX multi-disciplin* OR TX multidisciplin* OR TX multi-profession* OR TX multiprofession* OR TX multi-agenc* OR TX multiagenc* OR TX inter-agenc* OR TX interagenc* OR TX Multi-occupation* OR TX multioccupation* OR TX trans-profession* OR TX transprofession* OR TX trans-disciplin* OR TX transdisciplin* OR TX multi-department* OR TX multidepartment* OR TX trans-department* OR TX transdepartment* OR TX inter-department* OR TX interdepartment* OR TX interinstitut* OR TX inter-institut* OR TX inter-organi? ation* OR TX interorgani?ation* OR TX multi-organi?ation* OR TX multiorgani? ation* OR TX trans-organi?ation* OR TX transorgani?ation* AND TX collaborat* OR TX group* OR TX teach* OR TX learn* OR TX education* OR TX train* OR TX course* OR TX program* OR TX workshop* AND TX palliat* OR TX termin*

The Cochrane Central Register of Controlled Trials (CENTRAL) required a simplified search strategy and used a basic key word search coupled with truncation and Boolean operators;

inter-profession* or interprofession* or multi-profession* or multiprofession* and education* and palliat*

APPENIDX 4

Data Extraction Tool for Systematic Review;

CRITERIA	COMMENT
Author(s): **Title:** **Country of origin:**	
Methodology:	
Participants:	
Intervention:	
Outcome Measure(s):	
Main Findings:	
Notes:	

APPENDIX 5

Copy of quality assessment guidelines for quantitative research studies;

Table 1. Research questions - guidelines for critiquing a quantitative research study

Elements influencing the believability of the research

Elements	Questions
Writing style	Is the report well written – concise, grammatically correct, avoid the use of jargon? Is it well laid out and organized?
Author	Do the researcher(s') qualifications/position indicate a degree of knowledge in this particular field?
Report title	Is the title clear, accurate and unambiguous?
Abstract	Does the abstract offer a clear overview of the study including the research problem, sample, methodology, finding and recommendations?

Elements influencing the robustness of the research

Elements	Questions
Purpose/research Problem	Is the purpose of the study/research problem clearly identified?
Logical consistency	Does the research report follow the steps of the research process in a logical manner? Do these steps naturally flow and are the links clear?
Literature review	Is the review logically organized? Does it offer a balanced critical analysis of the literature? Is the majority of the literature of recent origin? Is it mainly from primary sources and of an empirical nature?
Theoretical framework	Has a conceptual or theoretical framework been identified? Is the framework adequately described? Is the framework appropriate?
Aims/objectives/ research question/ hypotheses	Have aims and objectives, a research question or hypothesis been identified? If so are they clearly stated? Do they reflect the information presented in the literature review?
Sample	Has the target population been clearly identified? How were the sample selected? Was it a probability or non-probability sample? Is it of adequate size? Are the inclusion/exclusion criteria clearly identified?
Ethical considerations	Were the participants fully informed about the nature of the research? Was the autonomy/ confidentiality of the participants guaranteed? Were the participants protected from harm? Was ethical permission granted for the study?
Operational definitions	Are all the terms, theories and concepts mentioned in the study clearly defined?
Methodology	Is the research design clearly identified? Has the data gathering instrument been described? Is the instrument appropriate? How was it developed? Were reliability and validity testing undertaken and the results discussed? Was a pilot study undertaken?
Data Analysis / results	What type of data and statistical analysis was undertaken? Was it appropriate? How many of the sample participated? Significance of the findings?
Discussion	Are the findings linked back to the literature review? If a hypothesis was identified was it supported? Were the strengths and limitations of the study including generalizability discussed? Was a recommendation for further research made?
References	Were all the books, journals and other media alluded to in the study accurately referenced?

Coughlan et al., (2007)

Copy of quality assessment guidelines for qualitative research studies;

Table 1. Research questions: guidelines for critiquing a qualitative research study

Elements influencing believability of the research

Elements	Questions
Writing style	Is the report well written – concise, grammatically correct, avoids the use of jargon? Is it well laid out and organized?
Author	Do the researcher's qualifications/position indicate a degree of knowledge in this field?
Report title	Is the title clear, accurate and unambiguous?
Abstract	Does the abstract offer a clear overview of the study, including the research problem, sample, methodology, findings and recommendations?

Elements influencing robustness of the research

Elements	Questions
Statement of the phenomenon of interest	Is the phenomenon to be studied clearly identified? Are the phenomenon of interest and the research question consistent?
Purpose/significance of the study	Is the purpose of the study/research question clearly identified?
Literature review	Has a literature review been undertaken? Does it meet the philosophical underpinnings of the study? Does the review of the literature fulfil its objectives?
Theoretical framework	Has a conceptual or theoretical framework been identified? Is the framework adequately described? Is the framework appropriate?
Method and philosophical underpinnings	Has the philosophical approach been identified? Why was this approach chosen? Have the philosophical underpinnings of the approach been explained?
Sample	Is the sampling method and sample size identified? Is the sampling method appropriate? Were the participants suitable for informing research?
Ethical considerations	Were the participants fully informed about the nature of the research? Was the autonomy/confidentiality of the participants guaranteed? Were the participants protected from harm? Was ethical permission granted for the study?
Data collection/data analysis	Are the data collection strategies described? Are the strategies used to analyse the data described? Did the researcher follow the steps of the data analysis method identified? Was data saturation achieved?
Rigour	Does the researcher discuss how rigour was assured? Were credibility, dependability, transferability and goodness discussed?
Findings/discussion	Are the findings presented appropriately? Has the report been placed in the context of what was already known of the phenomenon? Has the original purpose of the study been adequately addressed?
Conclusions/implications and recommendations	Are the importance and implications of the findings identified? Are recommendations made to suggest how the research findings can be developed?
References	Were all the books, journals and other media alluded to in the study accurately referenced?

Ryan et al., (2007)

APPENDIX 6

Details of studies excluded during third stage of screening process for scoping review

Author(s)	Year	Title	Reason for Exclusion
Alt-Epping, B., Lohse, C., Viebahn, C. et al.	2014	On death and dying - an exploratory and evaluative study of a reflective, interdisciplinary course element in undergraduate anatomy teaching.	Not IPE
Andrew, I., Todd, A., Husband, A., Nazar, H.	2013	A palliative care (PC) hospice placement: Students' qualitative evaluation of experience-based learning.	Not IPE
Andrew, J., Taylor, C.	2012	Follow-up evaluation of a course to develop effective communication and relationship skills for palliative care	Postgraduate intervention
Bartlett, J.L., Thomas-Wright, J., Pugh, H.	2014	When Is It Okay to Cry? An End-of-Life Simulation Experience	Not IPE
Bays, A.M., Engelberg, R.A., Back, A.L. et al.	2014	Interprofessional Communication Skills Training for Serious Illness: Evaluation of a Small-Group, Simulated Patient Intervention	Postgraduate intervention
Dando, N., D'Avray, L., Colman, J., Hoy, A., Todd, J.	2012	Evaluation of an interprofessional practice placement in a UK in-patient palliative care unit	Duplicate
Galbraith, A., Harder, N., Macomber, C.A., Roe, E Roethlisberger, K.S.	2014	Design and Implementation of an Interprofessional Death Notification Simulation	Participants nursing and social work students only
Kalender-Rich, J., Hayley, D., Long, K.	2013	Simulated death: An innovative, inter-professional teaching method	Abstract only
Kiley, S., Stuart-Moss, K., DeGennaro, R.	2013	Interdisciplinary education forum increases nurse participation in end of life discussions (S737)	Abstract only
Walling, A.M., Fineberg, C., Brown-Saltzman, I., Wenger, K., Neil, S.	2011	An Interdisciplinary Educational Program to Improve Knowledge and Attitudes About an End-of-Life Symptom Management Protocol	Abstract only

Full details of studies fulfilling inclusion criteria identified from scoping review using data extraction tool.

Author(s):	*Dando, et al. (2011)*
Title:	*Evaluation of an interprofessional practice placement in a UK in-patient palliative care unit.*
Country of origin:	*United Kingdom*
Method:	Post-intervention study, reporting on undergraduate students' evaluation of a hospice based clinical placement aimed at developing interprofessional learning within the clinical environment.
Participants:	Nursing, medical, physiotherapy and occupational therapy students (n=59)
Intervention:	Interprofessional practice placement (IPP) within a hospice. Programme designed around nursing shift pattern. Students attended for a three week rotation. Each interprofessional group consisted of final-year students. Recruitment was through a combination of self-selection and random allocation in order to fill clinical placements. A two-day induction programme was also developed for students prior to the IPP. Clinical-based learning experience with student conference on final day of each placement, individual reflective presentation and group discussion.
Outcome Measure(s):	Student satisfaction (structured questionnaire using Likert scale and free text, additional feedback assessed using open questions relating to IPP, evaluations also included from patients and mentors.
Main Findings:	The placement was positively evaluated and students report an increased understanding of both their role and that of other professionals in the team.
Notes:	• Participants' year of study not specified.

Author(s):	*Schrader, et al. (2005)*
Title:	*Education In End-Of-Life Care: Bridging Disciplinary And Institutional Boundaries.*
Country of origin:	*United States*
Method:	Mixed study design aimed at evaluating an interdisciplinary, inter institutional seminar series in palliative care for undergraduate students.
Participants:	Medicine, nursing, chaplaincy, social work and pharmacy students (n=231 over 3 year period)
Intervention: **Outcome Measure(s):** **Main Findings:** **Notes:**	The intervention was composed of five afternoon seminars consisting of home visits (2 hours), didactic content (1 hour) and small group discussion (1 hour) Techniques such as; role play, case studies and group exercises were used to facilitate IPE. The five seminars covered relevant end of life topics for undergraduate students. Participants were given a training manual at the beginning of the seminars and were also required to complete a reflective journal. Student satisfaction evaluated through the use of a self-administered questionnaire following each seminar. Change in participants' knowledge, attitudes and skills in end of life care assessed by a formal test pre- and post intervention. Difference in knowledge, attitudes and skills in palliative care between students attending seminars and those who did not was assessed using a survey instrument. Comparison of pre-test and post-test data from students revealed significant improvements in knowledge and attitudes after taking the EOL seminar. • Surveys not validated • Participants self-selected

The characteristics of the 23 articles excluded following full text screen for the systematic review are outlined below (ordered alphabetically by author);

Author(s):	*Abel, et al. (2001)*
Title:	*Breaking bad news- development of a hospital-based training workshop.*
Country of origin:	*United Kingdom*
Reason For Exclusion:	Postgraduate intervention

Author(s):	*Adler, et al. (2015)*
Title:	*Death Cafes: A tool for teaching about end of life in both academic and community settings.*
Country of origin:	*United States*
Reason For Exclusion:	Abstract only

Author(s):	*Alt-Epping, et al. (2014)*
Title:	*On death and dying- an exploratory and evaluative study of a reflective, interdisciplinary course element in undergraduate anatomy teaching.*
Country of origin:	*Germany*
Reason For Exclusion:	Not IPE

Author(s):	*Anderson & Thorpe (2010)*
Title:	*Learning together in practice: an interporfessional education programme to appreciate team work.*
Country of origin:	*United Kingdom*
Reason For Exclusion:	Not palliative care

Author(s):	*Andrew & Taylor (2012)*
Title:	*Follow-up evaluation of a course to develop effective communication and relationship skills for palliative care.*
Country of origin:	*United Kingdom*
Reason For Exclusion:	Postgraduate intervention

Author(s):	*Bartlett et al., (2014)*
Title:	*When is it okay to cry? An end-of-life simulation experience.*
Country of origin:	*United States*
Reason For Exclusion:	Not IPE

Author(s):	*Bays et al. (2014)*
Title:	*Interprofessional Communication Skills Training for Serious Illness: Evaluation of a Small-Group, Simulated Patient Intervention.*
Country of origin:	*United States*
Reason For Exclusion:	Postgraduate intervention

Author(s):	*Betz, &Turman (1997)*
Title:	*A Process of Developing Terminal Competencies for an Interdisciplinary Training Program.*
Country of origin:	*United States*
Reason For Exclusion:	Postgraduate intervention

Author(s):	*Brajtman, et al. (2008)*
Title:	*An interprofessional educational intervention on delirium for health care teams: Providing opportunities to enhance collaboration.*
Country of origin:	*Canada*
Reason For Exclusion:	Postgraduate intervention

Author(s):	*Blackhall, et al. (2013)*
Title:	*Development and validation of a collaborative behaviours objective assessment tool for end-of-life communication.*
Country of origin:	*United States*
Reason For Exclusion:	Not IPE

Author(s):	*Brajtman, et al. (2008)*
Title:	*An interprofessional educational intervention on delirium for health care teams: Providing opportunities to enhance collaboration.*
Country of origin:	*Canada*
Reason For Exclusion:	Postgraduate intervention

Author(s):	*Cooke, et al. (2003)*
Title:	*Collaborative training in breaking bad news to patients.*
Country of origin:	*United Kingdom*
Reason For Exclusion:	Abstract only

Author(s):	*Davray, et al. (2009)*
Title:	*Interphoressional learning in student teams.*
Country of origin:	*United Kingdom*
Reason For Exclusion:	Abstract only

Author(s):	*Ellman, et al. (2011)*
Title:	*Interdisciplinary palliative care education module.*
Country of origin:	*United States*
Reason For Exclusion:	Abstract only

Author(s):	Ersek, et al. (2010)
Title:	Development and evaluation of an international, interdisciplinary palliative care workshop in Botswana.
Country of origin:	Botswana
Reason For Exclusion:	Postgraduate intervention

Author(s):	Fairchild, et al. (2009)
Title:	A multidisciplinary summer studentship in Palliative and Supportive care in Oncology.
Country of origin:	Canada
Reason For Exclusion:	Abstract only

Author(s):	Gelfand, et al. (2003)
Title:	Developing end-of-life interdisciplinary programs in university wide settings.
Country of origin:	United States
Reason For Exclusion:	Not IPE

Author(s):	Haidet, et al.(2011)
Title:	The meaning of interprofessional education: An exploration of students' perspectives.
Country of origin:	United States
Reason For Exclusion:	Abstract only

Author(s):	Head, et al. (2013)
Title:	Interdisciplinary curriculum for oncology palliative education (icope)
Country of origin:	United States
Reason For Exclusion:	Abstract only

Author(s):	Kalender-Rich, et al. (2013)
Title:	Simulated death: An innovative, inter-professional teaching method.
Country of origin:	United States
Reason For Exclusion:	Abstract only

Author(s):	Reising, et al. (2011)
Title:	Comparison of communication outcomes in traditional versus simulation strategies in nursing and medical students.
Country of origin:	United States
Reason For Exclusion:	Not palliative care

Author(s):	Schapmire, et al. (2015)
Title:	From silos to synergy: Results of the interdisciplinary curriculum in oncology palliative education (ICOPE) on student learning outcomes.
Country of origin:	United States
Reason For Exclusion:	Abstract only

Author(s):	Sheppard, et al. (2015)
Title:	The interprofessional clinical experience: interprofessional education in the nursing home.
Country of origin:	United states
Reason For Exclusion:	Not palliative care

Author(s):	Smith, (2014)
Title:	Health Care Interprofessional Education: Encouraging Technology, teamwork, and Team Performance.
Country of origin:	United States
Reason For Exclusion:	Not palliative care

Study No.	initial Codes	Data extract (context)	Source
1	Effectiveness	"measurement of effectiveness would be particularly difficult in that it would require following students over years to evaluate their entry and effectiveness in the profession".	Researcher
	Satisfaction	"students consistently rate the course highly on a quantitative evaluation"	Researcher
	Course content	"…in the first year, the pharmacy students said they felt that teaching specific to pharmacy was greatly lacking".	Researcher
	Course content	"The faculty has become increasingly aware over the years of the importance of discipline-specific teaching within the course".	Researcher
	Course content	"…this design in conjunction with the concentrated nature of the course being delivered in an intensive format over one month, served to exhaust the students. As a result, the curriculum was redesigned such that the process or feeling-orientated emotional work was situated in the middle of the four weeks…"	Researcher
	Personal reaction	"the faculty found that when the students needed to talk about intense or touching experience, they did so in the context of the regular classroom discussion".	Researcher
	Personal reaction Reflection	"Students are always encouraged to talk in the class about their reactions to the material and to reflect on learning"	Researcher
	Recruitment	"Scheduling an intensive four-week course within an already consuming program of study has proven to be difficult"	Researcher
		"…there have been recruitment issues with nursing students, most of whom are working and need to take the course while on holidays"	Researcher
		" As a result there have been some years with up to six students from pharmacy and social work, who were recruited to fill in the gaps left by medicine and nursing"	Researcher
	Motivation Expectations	"…the medical students are graded only on a pass/fail basis and, in the initial years, it was unclear as to whether the course would appear on their academic record. This resulted in tensions on the student teams between those with differing expectations of work levels".	Researcher
	Course content	"…Paediatric content has become more infused throughout the four week curriculum. This is due in part to the inclusion of the paediatric clinical site".	Researcher
	Faculty	" The faculty members believe it is very important to have professional mentorship both in the classroom and the clinical placement. It is not enough to integrate additional students if they are not going to have a faculty mentor".	Researcher
	Faculty	"Student feedback concerning the richness of being taught by professionals who are actually working in the field indicates it [IPE] is worth the effort".	Researcher
	Engagement	"Reflections from the professionals supporting the educational process at clinical sites as well as in the classroom confirm that students are engaging in an effective learning process, as evidenced by the posing of appropriate questions and meaningful dialogue".	Researcher

Study No.	initial Codes	Data extract (context)	Source
	Collaboration	"The collaborative process between educators and clinical sites has resulted in strengthening existing relationships within the palliative care community".	Researcher
2	Reflection Understanding roles	"The students felt there were sufficient learning opportunities and time for reflection, and an increased understanding of both their role and that of other professionals in the team."	Researcher
	Hierarchy	"There appeared to be equal status between the students from the different professions…"	Researcher
	Course content	"…they felt there were common goals"	Researcher
	Understanding roles	"Close working with nursing students greatly enhanced my understanding of their work and pressures"	Medical student
		"[most useful aspects of the placement]…the importance of understanding your own role and contribution to a team and taking responsibility"	Nursing student
		"Shift work was exhausting, but now understand what it is like for nursing staff on shifts"	Occupational therapy student
	Learning from each other	"I felt the nursing and medical students were really able to learn from each other theory from medics and hands on care from nurses"	Medical student
		"I learnt a lot working with other members of the team"	Medical student
	Learning together	"Working in the same team as medical students made me realise we do not work separately but can work together very easily"	Nursing student
	Personal reaction	"Subtle learning about myself, how I work in a team and communicate with patients and professionals"	Medical student
	Course content	" Being ward-based and following nurse shift pattern made the placement very nursing in nature."	Medical student
	Expectations Course content	"Students arriving with an expectation of profession-specific experience occasionally display a lack of enthusiasm".	Researcher
	Expectations	"Mentor feedback also suggested that some of the medical students were reluctant to become involved in general patient care"	Researcher
	Team work Patient care	[Regarding learning experiences] "The importance of team working and MDT even in the terminal stages of life"	Student Student
		"Contribution of all the different MDT members needed to provide good holistic care for patients and families".	
	Managing death	"Importance of listening and caring about small things at the end"	Student
		"To be open and honest when discussing death with patients and family"	Student
		"The process of dying was very new to me, I was not sure how I would cope but now I feel I can."	Student
		"Not to be afraid of death but appreciate the responsibility we have to give all patients as 'good a death' as possible"	Student

Study No.	initial Codes	Data extract (context)	Source
	Personal reaction	[Regarding challenge of hospice setting] "Constant process of breaking bad news, but felt very supported by the team" "Dealing with own emotions regarding own experiences of death-reflections very beneficial for this".	Student Student
	Personal reaction Managing death	"A number of individuals reflected on the difficulty in communicating with, and providing psychological support to, patients in the terminal phase of illness".	Researcher
	Engagement	"The feedback also indicates that students actively engaged in learning from one another in the clinical environment".	Researcher
	Change in attitudes	"Student feedback suggests the overall goals of enhancing interprofessional attitudes and collaboration were achieved. This was particularly evident in the positive comments from the medical and nursing students, who appeared to develop a degree of professional respect for each other".	Researcher
	Satisfaction	"All the students stated that they would recommend the placement to a colleague".	Researcher
	Satisfaction	"Fantastic experience, all disciplines should experience IPP".	Student
	Environment	"Prior to commencing the IPP at [hospice], serious concerns had been raised as to whether this would be distressing environment for students. We were therefore keen to explore the students' experience of dealing with death and dying". "The experience enhanced their understanding of symptom management, communication and attitudes to death and dying". "Understandably the students also found the hospice environment a challenging place in which to learn". "Working with dying patients and their families on a palliative care ward provided a safe environment that demonstrated to students the importance of interprofessional teamwork".	Researcher Researcher Researcher Researcher
	Effectiveness	"All the students felt the placement would alter their future clinical practice in managing patients with life-limiting illness".	Researcher
	Contact with carers	"The experience of hearing the carers' unrehearsed, authentic story enhanced the learning experience for students and often necessitated adoption of an unconscious interprofessional team approach to support the carer during the story telling process".	Facilitator
	Recruitment	"Low numbers of nursing and therapy students in some groups meant these teams had less overall experience of interpofressional working" "The complexity of timetabling students from different professions was evident"	Researcher Researcher
	Reseources	"Feedback from the mentors and facilitators highlighted that the placements were resource intensive for the ward teams".	Researcher

Study No.	initial Codes	Data extract (context)	Source
3	Change in attitudes	"At the end of the elective, students generally described a more positive view of MDT practice and a better appreciation of the cancer journey."	Researcher
		"Scores [IEPS] usually decrease at week 6 in comparison with baseline, with some attitudinal changes maintained at 6 months, some returning to baseline and still others increasing past baseline".	Researcher
		"All scores [AHPQ] decreased at week 6 in comparison with baseline, with many changes in perception still present at 6 months but some returning to baseline".	Researcher
	Personal reaction	[what surprised you about the studentship?] "How much I changed as a person and how my professional outlook changed in such a short time".	Student
	Engagement	"All steering committee members who attended the final presentations considered that both the exploratory investigation and the presentation positively affected students' learning".	Researcher
	Effectiveness Course content	"Learning must prepare students for the real world in which they will work, especially in emotionally charge areas".	Researcher
	Reflection	"…time for meaningful reflection and debriefing, enabling us to put our learning into perspective".	Student
	Patient contact	"Participating in patient classes provided insight into their experience".	Student
	Reported learning	"The importance, advantages and challenges of working in an MDT and the necessity of good team communication".	Student
	Patient care	"..better understanding of patient-centred care and the value of compassionate support".	Student
	Personal reaction	"The role of emotion and compassion in healthcare".	Student
		"An appreciation of the disease experience of cancer patients".	Student
		"A broader understanding of the complex needs of [oncology] patients".	Student
		"That the experience of being a patient is incredibly overwhelming, frightening and exhausting".	Student
	Personal reaction	[What will you take from this experience?]	
		"A better perspective of my own life struggles"	Student
		"Personal growth… a realignment of professional and personal priorities".	Student
	Environment	"Exploring supportive care in different settings was enlightening".	Student

Study No.	initial Codes	Data extract (context)	Source
	Understanding roles	"Shadowing other disciplines will better inform my collaborations and consultations with other professionals in future".	Student
		"Time within my own discipline to practice clinical skills".	Student
		[What will you take from this experience?] "A better appreciation as to how disciplines benefit patients within an MDT".	Student
		[What will you take from this experience?] "More confidence working with other disciplines as a result of knowing what they do".	Student
	Change in attitudes	"It made me realise how much collaboration is not occurring in other clinical situations"	Student
	Learning from each other	"We discussed our experiences during the times we were together. Alone it would have been a very different and less rich experience".	Student
		[What surprised you about working with other disciplines?] "The amount of information which can be overlooked if only one discipline assesses a patient".	Student
	Hierarchy	"I never sensed a hierarchy in the MDT (which is what I had expected".	Student
	Understanding roles	"Overall role understanding was not statistically significant on the pre-intervention test".	Researcher
		"Medical students and social work students had similar levels of perceived understanding of the physician role, but social work students reported understanding the social work role significantly better than did medical students".	Researcher
4	Understanding roles	"Both medical students and social work students in the intervention group increased their perceived role understanding ".	Researcher
		"…the brief integrated educational intervention increased students' perceived understanding of professional roles".	Researcher
		"[comparision with control group] suggest that without targeted education, at least over the short-term, interprofessional and collaborative role perceptions do not develop".	Researcher
	Understanding roles	"[I] feel that I will have much more open, understanding and compassionate approach towards physicians in collaborative work".	Student
		"[My favourite aspect was] bringing social work and medical students together early on in their careers to heighten awareness about each other's role independently and working together".	Student
	Effectiveness	"gains made by the intervention groups in perceived understanding of professional roles and collaborative behaviour were maintained three months later".	Researcher

Study No.	initial Codes	Data extract (context)	Source
	Learning from each other	"It was really great having students from the different professions together…The different view points were helpful in understanding one's own".	Student
		"interacting with the social work students and learning from their very different perspective".	Medical Student
		"[I most liked the] mix of social work and medical students, [the] atmosphere conducive to sharing and mutual support".	Student
		"[I most liked] meeting social work students in a very open, honest, reflective and supportive forum".	Student
	Satisfaction	[students]…"described the multidisciplinary approach and the opportunity to be with students from the other profession as aspects they liked most about the training".	Researcher
	Reported learning	"Themes derived from the students' narrative responses regarding what they valued about the multidisciplinary format included sharing, interacting, and exchanging different perspectives".	Researcher
	Faculty Learning together	"Students highly valued having a multidisciplinary team of instructors, having active interaction within a multidisciplinary group of students, and learning in a supportive environment."	Researcher
	Experience	"Students with prior collaboration experience had greater perceived role understanding before participating in the training".	Researcher
5	Change in attitudes	"There was no significant difference between pre-and post-module scores on the ATHCT".	Researcher
	Satisfaction	"On the satisfaction evaluation questionnaire, learners' likert scale ratings showed that they enjoyed working with the module and felt they had learned about collaborative practice".	Researcher
	Effectiveness	"Pre- and post-module knowledge tests [showed] scores doubled for identification of the spiritual and physical factors that contributed to the patient's suffering. Respondents also explicitly identified the need for interprofessional collaboration five times more frequently after the module".	Researcher
	Effectiveness	"In a three-month follow up survey, learners articulated the benefits of the interpforessional teamwork experience, reported sustained value from the module, and indicated that they were applying the learning in their clinical practice".	Researcher
6	Satisfaction	"With regard to the day as a whole, 2 questions are posed: "Do you believe it is beneficial to learn about palliative care in an interdisciplinary format?" and "would you recommend the session to other students?"… students have answered these questions in the affirmative 99% of the time".	Researcher
	Recruitment	"Attendance of medical students has decreased, coincident with the introduction of the interdisciplinary format".	Researcher
	Course content Personal reaction	"The small discussion groups were not rated highly by students in the early years. Several factors were responsible for this. Discussion dealt with emotionally charged issues such as personal thoughts and feelings about death and caring for dying patients; this may have been uncomfortable".	Researcher
7	Satisfaction	"All 25 of the students thought that the workshop was worthwhile and would recommend it to their colleagues".	Researcher

Study No.	initial Codes	Data extract (context)	Source
	Recruitment	"Eighteen [out of 25 students] suggested that it [IPE intervention] should be a compulsory part of the curricula, while the remaining 7 believed that it should remain voluntary".	Researcher
	Motivation	"Students cited reason for attending the workshop as having a particular personal interest in the grief process".	Researcher
		"Students attending the workshop because they had identified a lack in their professional knowledge about dying and death. The medical students in particular were concerned about legal issues".	Researcher
		"…social work students felt that they had not had any other teaching in the subject in their course".	Researcher
	Motivation Reported learning	"The interpforessional nature of the workshop was mentioned by only 3 [3/25] participants as a reason for attending. The benefit of it however was acknowledged in response to an open question by 16 [16/18] as what they learned most".	Researcher
	Effectiveness Change in attitudes	"Two [2/14] of the medical students would have preferred the workshops to have been uniprofessional, but the other 16 respondents [16/18] enjoyed having students from other professions. In particular they commented on the benefit of it, and that it challenged preconceived ideas".	Researcher
	Satisfaction	"The small group case discussion and case study feedback focused on both the professional and interpforessional roles, with 94% students rating this as very useful or useful".	Researcher
	Personal reaction Managing death	"How loss would affect them [students] personally was brought out best when asked about the death of a person now living that would affect them most. parallels were drawn by the students between these experiences and how they should be remembered when dealing with death in a professional capacity".	Researcher
		"The tutors thought that this session worked extremely well in allowing the students to work through their own feelings and in some way allow them to progress to the next level".	
	Learning together	"All students engaged in the activity of completing the [death] certificate though only medical students would be required professionally. As none of them had done it before, this appeared to promote collaboration".	Researcher
	Reported learning	"a stronger awareness of their professional role" "an improved knowledge of the scope of the role of the other [students]".	Researcher
8	Satisfaction	"students indicated they were satisfied with all aspects of the course".	Researcher
	Satisfaction	"The interprofessional and group dynamic aspects of the PBL module were rated most highly by most students".	Researcher
	Personal reaction Course content	"The most prominent theme to emerge was that of personal connection and relevance to palliative care".	Researcher
	Team work	"The advantage of working in a team to tackle complex and difficult problems, such as those presenting in palliative care, also emerged".	Researcher

Study No.	initial Codes	Data extract (context)	Source
	Reported learning Understanding roles	"Three themes were identified from their [student] comments: respect for other professionals, role identification and patient-centred approach to care".	Researcher
	Change in attitudes	"The comments suggested this type of learning experience may have helped reorient their [students'] thinking from the disease-centred model to a more patient-centred approach".	Researcher
	Effectiveness	"The answers to the post-test questions were expanded to include more information about medication use, common symptoms at the end of life and specific roles for certain professions".	Researcher
	Effectiveness	"In the pre-test students listed doctors, nurses and pharmacists as the team members they would want involved. In the post-test this list expanded to include social workers, therapists and spiritual care workers".	Researcher
9	Understanding roles	"As a doctor-to-be, I wasn't aware of how much the other professions are important". "I got view of different professions, which I have hardly known before the course. Especially I got interested in OT (occupational therapist), which I haven't met before". "It has many advantages working interdisciplinary and is a good way to get to understand each other's competencies".	Student Student Student
	Personal reaction Learning from each other	"The interdisciplinary composition of the group made us think differently, to be aware of our responsibilities and limits. Conflict can be a good way to lead towards constructive solution of a case".	Student
	Learning from each other	"I was really glad we worked in interdisciplinary teams, so we could exchange different opinions…" "When I'm finished, I have to work with other professions all day long but it's only in this course that I have had the opportunity to learn HOW to do it".	Student Student
	Patient care	"Students commented that working as a team brought a holistic view of the patient to the forefront."	Researcher
	Effectiveness	"The students gained insight and as a result felt that interprofessional learning is direly needed in health care education".	Researcher
	Cultural differences	"Cultural differences between Sweden and Slovenia were not very pronounced in some sessions, yet they came to the fore regarding teamwork and relations between professions, as well as what is considered to be the most appropriate action to take in relation to patient's problems". "These discussions [case studies] brought cultural issues at the forefront, and were valued by students because it made them aware of the relationship between culture and experiences of what is considered appropriate and inappropriate practice".	Researcher Researcher
	Cultural differences Hierarchy	"Slovenian society is generally more hierarchical than Swedish society, including hierarchies in healthcare and the position of doctors in the team".	Student

Study No.	initial Codes	Data extract (context)	Source
	Cultural differences	"I came in touch with differences between Sweden/Slovenia of perceiving death and realised how much needs to be done in this direction in Slovenia". "sometimes we did not understand each other".	Student Student
	Cultural differences	"The point with team work was, among other things, to reveal and understand cultural differences, and that would not have happened if we have had national teams."	Student
	Motivation	"…the students who joined the course were very positive from the very start as they embarked on the course out of their own free will and interest in the topic".	Researcher
10	Effectiveness	"Comparison of pre-test and post-test data from students revealed some significant improvements in knowledge and attitudes after taking the EOL seminar". "Students felt more confident in responding to the needs of patients and their families at end-of-life and grew in their appreciation for interdisciplinary process". "Student feedback suggests the overall goals of enhancing inter professional attitudes and collaboration were achieved"	Researcher Researcher Researcher
	Change in attitudes Understanding roles	"I feel that the optimal goal for hospice families is for them to be at peace with their lives and to enjoy their last months living on earth as much as possible. I will remember this situation in my future practices. I will remember the gentle kindness and patience the nurses use when interacting with [the patient]. I also learned that it is not up to me to decide when someone should die, whether it be from taking someone off a ventilator or whether they die of natural causes. It is my job to be in the moment with people, respect their wishes and do my best to facilitate peace and comfort to them and their families".	Nursing student
	Environment Personal reaction Patient contact	"When I arrive [at the hospice setting] I am not sure what to expect, and this creates some feelings of fear. I realise that I may never lose my anxiety, but it is important for me to face these fears because I learn about myself and see my hospice experience as a special gift. The patients and family members have shared very personal stories with me about their lives. I am grateful to have learned about their experiences and to have the chance to explore my own feelings about death."	Nursing student
	Patient contact	"The patient spoke of hospice as "buying time" for her and her family. because of the care she is receiving, she is being kept very comfortable. This has allowed her to make housing plans for her disabled daughter and has given her and her family time to accept and prepare for death".	Nursing student
	Change in attitudes	"The seminar has allowed mr to reconsider many of my feelings and attitudes towards death and care of the dying".	Medical student
	Understanding roles Personal reaction	"I am glad for the opportunity to better understand the roles of other professionals in the life of a dying patient. This seminar is also an opportunity for me to examine my role and identify aspects that I don't feel quite comfortable with".	Medical student
	Satisfaction	"…the majority of students consistently reported the sessions to contain useful content, to be "very valuable" and helpful both personally and professionally."	Researcher
	Change in attitudes	"Attendees seemed to benefit more from peer discussion about EOL issues, preferred to work in teams, and felt stronger in their ability to be advocates at end-of-life".	Researcher

Study No.	initial Codes	Data extract (context)	Source
11	Learning from each other	"Being with students of other professions, you can see what questions they ask, their follow-up and what they think".	Student
	Change in attitudes	"You can feel awful on the wards; in every new placement you feel like a spare part… I didn't know medics felt like that too".	Student
	Hierarchy	"I couldn't get a word in- it was clear who the leader was!".	Student
		"They were very bossy".	Student
	Carer contact	"The carer talking about care given from their point of view- we've never had that kind of experience before".	Student
		"Hearing the carer helped me put a lot into context"	Student
	Change in attitudes	"The impact of today has changed me so much, I'm determined to listen to patients. We tend at work to do this and that,…we are so busy. I will find out their [the patient's] needs and talk to them more".	Student
	Carer contact	"I found it very helpful, therapeutic, because I hadn't realised that I was holding within me a lot of anger about medical care and the hospital…and so it was the first time I had an opportunity for medical people to listen and I unloaded quite a lot of my personal feelings about it".	Carer
		"…this group of young people were very interested and you know-it was the fact that I could get it all out".	Carer
		"they need to be given experience of human feelings. When you train you become a robot…they forget you aren't just a number…and the group I talked with said they had forgotten that…"	Carer
		"I think they coped very well. I was upset, emotionally upset and they coped with that very well and I didn't feel at all anxious about it. They didn't try and take it away from you, which I think was very important. They allowed you to be as you wanted to be and I thought that was great".	Carer
	Carer contact Personal reaction	"Facilitators explicitly recognize that hearing the carer's story is very powerful and may raise personal issues for students".	Researcher
	Personal reaction	"Following their meeting with the carers, students tend to show a strong identity with their professional group by taking responsibility for the quality of their professional group's care, especially where the care had been suboptimal. Within the safety of the workshop, however students seem to share their feelings with students of other professional groups rather than behave defensively".	Researcher

ATHCT: Attitudes toward healthcare teams scale; **AHPQ**: Attitudes to health professions questionnaire; **EOL**: end of life; **IEPS**: Interdisciplinary education perception scale; **IPE**: interprofessional education; **IPP**: interprofessional practice placement; **IPT**: interprofessional teaching; **PBL**: problem based learning

<u>**Colour Key**</u>
Initial coding and corresponding description feature in same coloured text (some colours have been used for more than one initial code)

Cell colour;

█ = First order construct

█ = Second order construct