

Systematic review and conceptual framework for health literacy training in health professions education

Abstract

Purpose: This review investigates health literacy education interventions for health professions students in higher education settings with the aim of identifying core elements for the first conceptual framework for a health literacy curriculum.

Method: A systematic literature search based on pre-specified inclusion criteria was conducted across education and health peer-reviewed literature - Academic Search Complete; CINAHL; MEDLINE (OVID); ProQuest Health & Medicine; SCOPUS (Elsevier); Australian Education Index Plus Text (AEIPT); Education Research Complete; ERIC; ProQuest Education. Twenty-eight peer-reviewed primary studies were found to be eligible and were systemically examined. Data on intervention characteristics, evaluation methods and key outcomes were extracted and content analysed.

Results: Numerous health professions were represented in the examined studies, with undergraduate students principally targeted. The large majority of interventions reported positive results. Significant heterogeneity was found in instructional methods, evaluation instruments and outcomes. Instructional approaches ranged from single didactic to clinical and community placement interventions. Less than 40% of interventions used a pre/post evaluation design and control groups were used in only 3 of the included studies. The most successful interventions were found to be those that offered numerous training sessions and integrated knowledge and skill acquisition particularly when patient communication and assessment skills were developed within real-world settings with patients or community members. Review findings informed a draft health literacy training framework for conceptualizing multiple dimensions of health literacy training structure, design and assessment.

Discussion/conclusion: Core aspects and best practice teaching elements for health professions health literacy training were identified. It was found that overall, this is an underdeveloped domain in the health professions education field. Future research should focus on identifying an agreed definition of health literacy for this field and structure and process opportunities for health literacy inter-professional education. Also needed is a much better understanding of the impact of health literacy training on specific health profession students, and over what time period to enable targeted curriculum and workforce education planning.

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1. Introduction

Healthcare providers, researchers and policy makers most commonly understand health literacy to mean *patients having an understanding and ability to constructively act on health information*¹. It is a concept that has evolved over time and universal agreement on its meaning remains unrealised². More distinct however, is the growing evidence of association between poor health literacy and worse health outcomes³; the important need to engage with patients⁴; and the key role healthcare providers' play in improving patient health literacy⁵. Healthcare providers are a key source of health information and capacity building for patients and families, and peak organisations have long recommended that health literacy be formally incorporated into the curricula of health professions students⁶. Training in identifying poor levels and how to best teach patients to be health literate has been shown to assist healthcare professionals to better communicate with and support patients with low health literacy⁷. Health professionals who have not had opportunities for health literacy training can unknowingly create barriers to adequate patient health literacy through ineffective communication; use of terminology that is unfamiliar to patients; provision of instructions that are not clear; or allow inadequate time to check patient understanding or how they intend to enact instructions^{8,9}. Health professionals have also been found to neglect or poorly assess and adequately identify poor health literacy in patients¹⁰.

Higher education institutions are often held responsible for not properly developing the necessary expertise among health professionals to ensure adequate patient and family health literacy^{9,11}. A common rationale for not providing specialised health literacy training to health professions students in higher education is insufficient time due to an existing overloaded curricula, and a lack of guidance and research base to inform content, structure and effective teaching approaches for this field^{12,13}. The potential for health professions student training to lead to improvements in health literacy has been under-emphasised in health research, with education interventions primarily targeting qualified health professionals or patients and carers. An internationally agreed consensus statement outlining the rationale and core principles for the development of health literacy curricula indicates that developing relevant knowledge and skills of health professionals, no matter their level of experience, improves patient health literacy¹⁴. A previous investigation of health literacy training for health professionals have found wide diversity in training approaches and content⁹. A core health literacy curriculum framework for health profession students is not currently available, even at the individual health profession level. This review sought to identify and analyse existing primary intervention studies of health literacy training

for health professions students, including their range, nature and reported effectiveness, to characterise core elements for inclusion in a conceptual framework for a standard health literacy curriculum.

2. Methods

An a priori research design is provided where the research question and inclusion criteria were pre-specified. Studies included in this review were qualitative, quantitative and mixed method studies, published in peer-reviewed scholarly journals, reporting the results of a primary health literacy education intervention (i.e. a specific lesson, subject or course with a clear description that health literacy was the principal focus), which was designed and provided within one or more higher education institutions to health professions students. Non-English language papers where translations were unavailable, studies that did not target health professions students or solely evaluated the health literacy needs, knowledge and experience of students were excluded. Also excluded were consensus studies, expert opinion pieces, simulation or case development descriptions, commentary, theoretical articles and dissertations and descriptive studies that solely reported perceptions of need, impact or development of health literacy interventions.

2.1 Data sources

Key disciplines where research in this field might be published were identified through an initial broad test search. The following databases were subsequently accessed and systematically searched: Academic Search Complete; CINAHL; MEDLINE (OVID); ProQuest Health & Medicine; SCOPUS (Elsevier); Australian Education Index Plus Text (AEIPT); Education Research Complete; ERIC; ProQuest Education.

2.2 Search and study selection

A core strategy for MEDLINE (via PubMed) was developed based on an analysis of MeSH headings and key words of selected articles identified a priori. The strategy, which used MeSH terms such as ‘students health occupations’, ‘health literacy’ and ‘education’, formed the fundamental basis of search strategies for the other electronic databases. Specifically, the following groups of keywords were combined (using the Boolean operators *AND* and *OR*) (a) *education (MeSH), intervention, training (b); students health occupation (MeSH), allied health, pharmacy, dental, optometry, audiology, orthoptics, podiatry, speech therapy, paramedical, occupational therapy, physiotherapy, dietetics, medicine, nursing, public health, health management, health promotion, health science (c) higher education (MeSH), university, college, faculty (d) student, tertiary, undergraduate, post-graduate (e) health literacy (MeSH)*. Searches took place between December 2016 and

May 2017. Title and abstract searches located 158 peer-reviewed studies that explicitly acknowledged health literacy education interventions in higher education. Reference lists and papers citing each full text article were then searched to identify additional studies that may have been missed in the database searches and 14 further studies were identified. The removal of duplicates, exclusion of papers that were published prior to 2000, and non-English papers where translations were unavailable, left a total of 76 papers for inclusion. A further 48 papers were excluded as they were found to be ineligible based on inclusion criteria. The final included scholarly papers totalled twenty-eight. **Figure 1** provides information on the search findings.

Figure 1: Summary of study identification process

2.3 Data extraction and analysis

Data were independently extracted by two team members (CS, DP). All data extracted were checked by the third team member (JL). Data on the aim of the study, participant characteristics (discipline, year etc.), intervention type and length, evaluation (i.e. type and timeframes) and key findings were extracted and content analysed to identify discreet information categories relevant to the central hypothesis and research questions delineated above. The identified categories were then used to develop a data summary template specific to this investigation (Table 1).

The quality of eligible studies was assessed on the basis of the ReLIANT Instrument, a thirty-five-question framework for the evaluation of education intervention research to ensure consistent quality assessment.¹⁵ All items under each of the *study design*, *educational context* and *results* subheadings were assessed in each paper by all authors (the five questions under the subheading of ‘relevance’ were not assessed as we were not assessing the intervention for individual lesson development for a specific setting or use). The overall quality rating for each paper was based on whether a response to each question was clearly discernible and explicitly met as determined from the descriptions and analyses provided in each paper. Educational interventions were rated between 1 and 35 (with a score of between 1-12 having a high risk of bias, 13-25 as having a moderate risk of bias and 26-35 having a low risk of bias). A category called ‘inadequate’ was used when an item was not described adequately with a score of 0.5 awarded. A category of ‘unknown’ was used when no information was provided and a zero score was given.

3. Results and Discussion

3.1 Quality Assessment

Most of the included studies were rated as a low^{16,17,20,23,26,30,32,38,39,44,53,60} to medium^{18,24,25,31,34,35,36,37,42,50,51,52,54,55,}⁶¹ risk of bias. Only one of the included studies⁴³ rated as a potentially high risk of bias with a score of 11, however this low score largely reflects inadequate information and thus a high number of 0.5 scores. This paper was included as our aim in this review was to identify core elements of health literacy training across as many primary studies as possible to support the development of a conceptual framework for a standard health literacy curriculum.

3.2 Target Groups

Studies originating from the USA, Australia and Ireland were identified. Numerous health professions were represented in the examined studies, with pharmacy students targeted most often (39%, n = 11), followed by medicine (36%, n=10). Other disciplines were less represented: nursing (10%, n=3); nutrition/dietetics (7%, n=2). While the disciplines of dentistry, public health, management and physiotherapy each had a single study. The large majority of studies targeted undergraduate students (86%, n=24), with 3rd year pharmacy students more likely to receive health literacy training than other health student groups. Sample sizes varied considerably with 4, 8, 10 and 2 studies with >10-<50; >50-<100; >100-<250 and >250 students respectively. One study did not provide the number of students trained in health literacy and 2 studies reported 10 or less participants. **Table 1** provides a summary of included studies.

3.3 Study design

Ten of the twenty-eight studies (36%) used a pre/post evaluation design, of which one used a control group¹⁶. Most pre and post assessments took place immediately before and after the training. Of the 18 studies that used a post evaluation design only (64%), two used a control group^{17,18}. No pre-post assessment design or control group means it is difficult to know whether improvements in health literacy knowledge and skills were a direct result of the training¹⁹. While one author reported health literacy and cultural competency concepts were integrated throughout three concurrent courses in one semester²⁰, none of the studies reported health literacy content embedded within a core curriculum that spanned the full program of a health professions curriculum. If it is to positively impact on graduate outcomes and patient care, implementing a core curriculum across courses and years is important for an area like health literacy^{21,22}. This level of exposure ensures a robust, responsive curriculum which prepares graduates to support and train patients in health literacy. Moreover, establishing core

content will also assist educators to determine pedagogical methods best suited to the broader curriculum. Four of the single site studies ran the same intervention across two student cohorts either in different years or with cohorts in different stages in their training^{17,23,24,25}. Only one of the studies reported placing health profession students in a multidisciplinary learning environment²⁶. Multidisciplinary healthcare teams are now fundamental to a large proportion of health care delivery²⁷ and this will continue to grow alongside an increasing understanding of the complexity of human health and its management, and associated health care provision. A consistent understanding among health care professionals of the need for and effective approaches to support improvements in health literacy is necessary to ensure patients gain the most benefit through reinforcement across care providers.

3.4 Interventions

None of the studies provided complete information on the health literacy training interventions however a number of broad, and often common, aspects were identified. Most studies included some best practice training methods such as integrative approaches to health literacy knowledge and skill acquisition through multiple training episodes and scaffolded activity which gave emphasis to group work and learning through concrete hands-on activities that enhance thinking and problem solving capabilities²⁸. It has been found that multidimensional health literacy approaches consider competencies beyond text literacy that include participation in verbal interactions, cultural competency, ways of seeking understanding²⁹ and systems demands and complexities². This is important as many aspects of health literacy cannot be directly taught and require practical experience, such as the complexities of undertaking a health literacy assessment in the context of varied patient capacity and cultural backgrounds. In this regard, it is important for health literacy training to offer some authentic learning to provide health professionals an opportunity to construct their own system of knowledge, self-awareness and integrity concerning patients.

Reflecting the fact that health literacy impacts the real-world interaction between health care providers and patients, several teaching and/or evaluations incorporated professional practice^{30,31,32}. However only one study used a professional practice environment as a primary intervention setting³². Overall, classroom-based learning was the most common approach reported for the delivery of health literacy education with the most commonly mentioned training method being didactic information sessions that introduced the topic. Didactic sessions supplemented with interactive activities such as discussions, role play and case studies have been shown to facilitate better learning and application to the workplace³³. Simulation labs were used in two studies^{23,34} and

education interventions were delivered entirely online in a further two ^{35,36}. These sessions were most often reinforced with interactive learning strategies, often as small group activities. Case studies took a variety of formats including descriptive cases i.e., responding to simple patient assessment questions³⁷, providing detailed descriptions of situations³⁸, and more complex, decision-based case studies³⁹. Teaching with case studies has been widely used in health professional education⁴⁰, as it is considered that by abstracting principles from the cases provided, learners develop skills in analysis, problem solving and decision-making in complex situations⁴¹ such as is commonly found in healthcare environments.

Real-world activities such as patient case scenarios¹⁸, assessment of patient health literacy levels⁴², case-based role-playing using the teach-back method⁴³, assessing the readability of patient information pamphlets using existing validated appraisal instruments and simulation with standardised patients (SPs)²³ were also used to teach and/or evaluate health literacy knowledge and skills⁴⁴. A standardised patient is an individual who has been trained to represent, in a reliable (standardised) manner, a patient in a healthcare environment. One of the major advantages of replicating real-life situations using SPs is the ability to control the learning process. For example, educators can carefully construct relevant scenarios for different health trainee cohorts, and can introduce SPs at appropriate points in the curriculum. Moreover, SP facilitated learning can be paused and restarted at various points for didactic discussion, which makes for more learner-centred rather than patient-centred, and accessible rather than opportunistic education⁴⁵. The ‘teach-back’ strategy, where students clarify patients’ understanding of instructions, was also reported. This technique has been the subject of extensive study, and has been endorsed as best practice for health literacy education^{46,47}. Evidence suggests patients who clearly understand information such as hospital discharge instructions, medication administration and follow up appointments use the health system more efficiently and are less likely to visit the emergency department or be readmitted to hospital⁴⁸.

An effective health curriculum evaluation supports an understanding of the extent to which health student training is translated into sound patient care⁴⁹. Student-developed health literacy content was another reported learning method, including descriptions of the importance of health literacy and other resource creation such as a patient care plan³⁹, amendment of patient information such as rewriting medication information in user-friendly plain language format⁵⁰, presenting health information to a lay audience³¹, assessing readability of patient materials⁴⁴ and development of multimedia animations⁵¹.

3.5 Evaluation and outcomes

Studies predominantly reported only positive results (89%, n=25), three reported mixed results, while none reported solely negative results. Positive behaviour changes were more likely to be reported with multiple and/or sequenced episodes of training (n = 16), rather than single episodes (n=12). Milford 2016 et al resurveyed medical students after seven months and found statistically significant increases in self-reported knowledge, skills and confidence pre and post intervention. However, no change was found in students' ability to define health literacy and identify health literacy issues on multiple choice questions. After two classroom sessions and two assignments, Wilcoxon 2013 et al. reported significant improvements ($p < 0.05$) at post-test for the intervention group compared to the control group for attitudes toward health literacy and perceived behavioural control when communicating with patients with poor health literacy. Nonetheless, no significant changes were observed for intentions to communicate with patients possessing inadequate health literacy. Only two studies reported intermediate term evaluation^{30,32}, the large majority reported short term end-of-program evaluation only. The true impact of training on students is best evaluated over the longer term (e.g., at one and five years after graduation), and should also include gathering data around employer perceptions of the preparedness of graduates to meet the various challenges of their work settings⁵⁰. A diverse range of evaluation approaches were used, with the different methods known to have varying levels of complexity, rigour and reliability. Student health literacy knowledge and/or skills and/or application in practice were most commonly assessed, often as single post education evaluation.⁵² Multifaceted evaluations were used in a few studies^{53 54}, Roberts 2012 et al reported the use of a researcher designed survey instrument pre and post curriculum sessions, as well as a purpose designed blackboard discussion evaluation and student follow-up one year later. Other studies reported the use of self-reported measures of knowledge and/or confidence alone or as part of a multifaceted evaluation strategy^{35,50}. In a six-month post intervention evaluation, 61% of community pharmacists that had been trained by students reported improvements in practice³². One investigations used a self-reflection approach to assess students' experience of a written piece to critique that was filled with health jargon³⁴ and another used reflective journaling to evaluate student experiences in the health literacy learning process⁵⁵.

Lacking across the studies is a coordinated approach to measurable competencies and assessment. Best practice calls for an external reference point, i.e., a consistent set of standards⁵⁶, or an agreed-upon set of health literacy practices and competencies (i.e., knowledge, skills, behaviours, and attitudes) against which students are assessed and health literacy curricula evaluated⁹. Study specific non-validated researcher designed evaluation

instruments were mainly used across the investigated studies (71%, n=20). A single study adapted the principles of Theory of Planned Behaviour in a researcher designed assessment tool¹⁷. Less common was the use of previously validated assessment instruments including readability instruments like the Flesch-Kincaid⁵⁷ and DISCERN⁵⁸ instruments, which were used to assess students' plain language writing skills or in student skill building exercises such as assessing the readability of patient information materials^{16,26}. Validated measures to assess the current health literacy levels of students were also used^{26,23}. Grice 2013 et al. used the Four Habits Model to summatively self and peer assess communication skills with patient, while Jackson 2010 et al. used the Short Test of Functional Health Literacy in Adults (S-TOFHLA) tool⁵⁹ in a professional practice activity to assess patient health literacy level. As part of this evaluation, students were required to respond to two questions about using this tool; with results indicating around half of students feeling uncomfortable assessing patient health literacy and half feeling the S-TOFHLA test took an excessive amount of time during the appointment. Other evaluation approaches included a checklist of communication principles⁴³; trained simulated patients provided feedback²⁴; and evaluation of key elements of case assessments^{18 60}. One study that evaluated health literacy training from the student's perspective found that most identified the analysis of patient handouts and role modelling to be effective methods to teach this domain.⁶¹

Assessment of health literacy understanding was the most common evaluation target. None of the included studies evaluated whether the training led to appropriate ongoing application or its impact on health professional practice, markers which should be a priority in this area⁹. Moreover, examined articles provided little understanding of how context-sensitive the health literacy education interventions were, nor how resource and time intensive they were for educators and/or students. These are important factors that need to be better understood if health literacy is to be widely incorporated into the curriculum of health professions. Of most importance are the clinical outcomes such as change in patient health status or health-related behaviour of patients, towards which the education is directed⁶². Systematic reviews in continuing medical education acknowledge that the relationship between training interventions and impact on patients has been under-researched, although there is some evidence to suggest that interventions such as sequenced, interactive sessions that use multiple modes of instruction can improve clinical outcomes⁶³.

The major limitation of this review was the inability to combine the single study results for a meta-analysis or to compare intervention outcomes due to considerable variability between studies. There are numerous sources of

heterogeneity, some of which include differences in sample characteristics and study type and intervention and assessment methodologies.

Table 1. Summary of Included Studies

4. Health Literacy Curriculum Framework

This research identified a lack of a standard evidence-based health literacy curriculum for health profession students across and within profession types, years and settings. However, a number of core elements and themes were recognised in an examination across the studies analysed. For example, one core element is the necessary provision of genuine real-world learning where opportunities are provided to students to apply learnings in either actual patient care settings or tangible scenario contexts. Another core component is the creation of avenues for reflection, whether in small groups or post activity discussions to enable students to grasp the social implications of health literacy and to develop values and visualise their own behaviours from their learnings, particularly in relation to future clinical care delivery. We used the findings of this review and the broader literature to draft a health literacy training framework for health professions students in higher education. Our framework depicts the essential connections between training design, setting, delivery method, timeframe, curriculum placement and required student outcomes in terms of attitude, performance and impact (Figure 2). The framework is not intended to be a definitive health literacy training framework but a foundation resource that provides a map of components and dimensions across strategy, methods, effects and years to move on from single unit of work approaches that were most common in our research. Flexibility and pedagogic latitude for instructors is available in this general framework. Multiple sub-frameworks of health literacy training may be necessary depending on student year, learning activity and complexity, setting and/or training outcomes sought. It is hoped that the use of the framework as a guiding tool will encourage

consistency in instructional development approaches to health literacy training in higher education settings.

Figure 2 conceptual framework here

5. Conclusion

This article offers an overview of primary intervention studies conducted in the emerging field of health literacy training for health profession students in higher education. It identifies a number of important gaps including the need for harmonised health literacy teaching and learning across health disciplines and offers the first conceptual framework as a starting point on which to expand this critically important field. This study has identified a worldwide paucity of research on health literacy education for health profession students which signals that this is an underdeveloped domain in the health professions education field. The introduction of health literacy into health student training standards would potentially support improvements in the level of commitment in higher education settings. First however, research is needed to identify an agreed definition of health literacy for the field and to determine curricular and educational process opportunities for health literacy inter-professional education. Validated tools to evaluate the short, intermediate and longer-term impact of health literacy training among health profession students are also required. A much better understanding of the impact of health literacy training, including for specific health disciplines, and over what time period will enable targeted curriculum and integrated workforce education planning in this critical domain. Given the current worldwide poor health outcome burden of low health literacy and high potential for improvement, a greater focus on this area, which includes health profession student training, is warranted. Ensuring future health professionals have a sound understanding of health literacy and the ability to assess and educate patients to aid their health improvement will contribute to improved patient outcomes. Ignoring this urgent need will be at the peril of patients and a wider health literate society. It is a failed society that recognises its problems without ever doing anything about them.

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Figure 1: Summary of study identification process

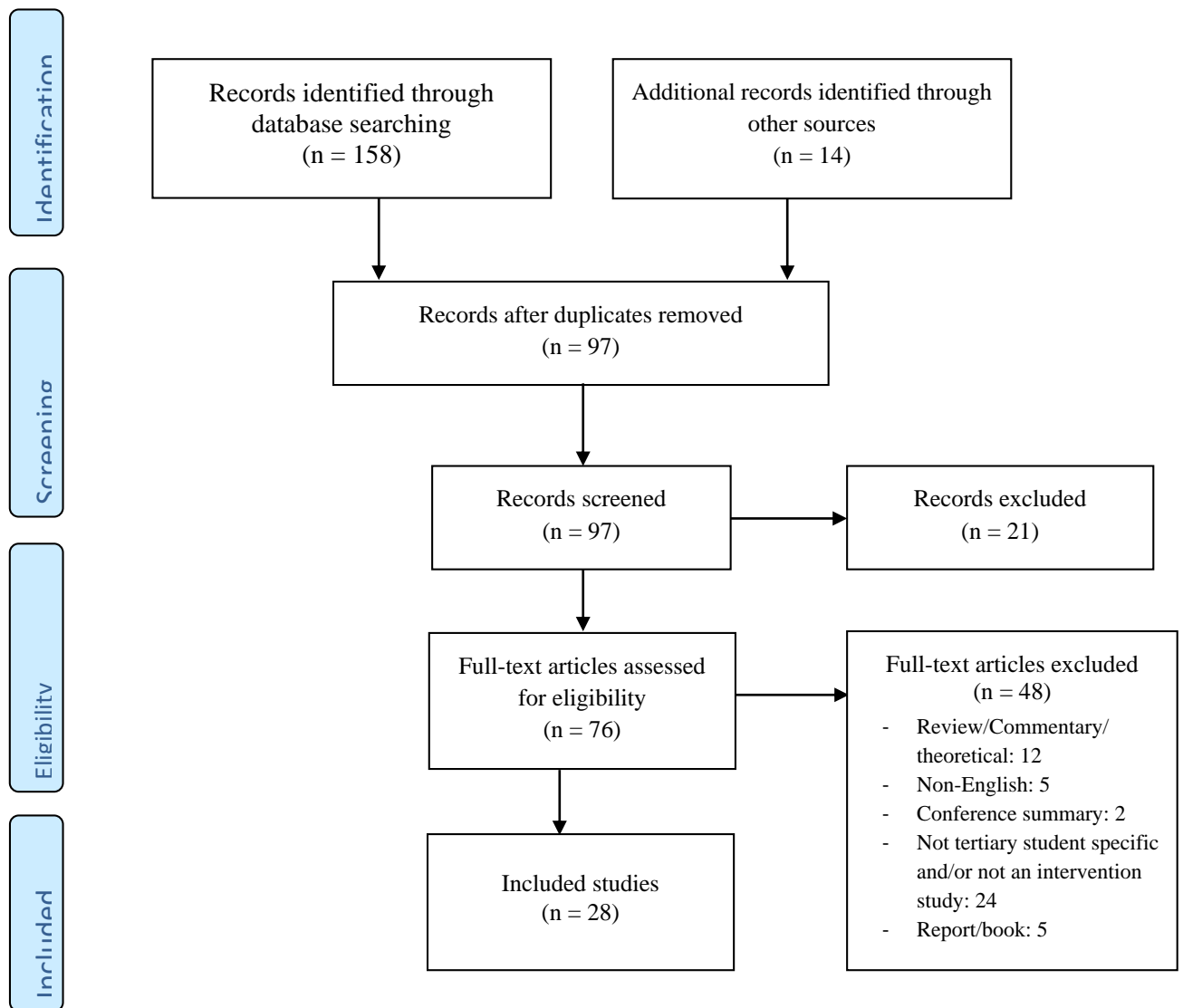


Table 1: Summary of Health Literacy Education Intervention Studies in Higher Education Settings

Study	Study sample and design	Training	Evaluation	Primary outcome/s
Barnett SG and Kaske B (2012)	<ul style="list-style-type: none"> - 2nd year pharmacy students (n= 134) - Single centre - Nil comparator/control group - Researcher designed non-validated evaluation instrument. 	<ul style="list-style-type: none"> - Community based - Experiential practice experience 20 hours over four community pharmacy visits. - Student health literacy presentation. 	<ul style="list-style-type: none"> - Single post activity assessment. - Intermediate term evaluation (six month post education). - 18 item survey to determine changes made to clinical practices related to information presented by the pharmacy student. 	<ul style="list-style-type: none"> - 61% of pharmacists self-reported making at least one change to better identify or care for patients with low health literacy (36% response rate).
Beyer, C., et al. (2016).	<ul style="list-style-type: none"> - Nutrition students - Single centre - Descriptive summary - Nil comparator/control group - Researcher designed non-validated evaluation instrument 	<ul style="list-style-type: none"> - One online module - Health literacy readings - Two student assignments 	<ul style="list-style-type: none"> - Single post activity assessment. - Short term evaluation (<1month post education) - Rubric based assessment of each student's written work. 	<ul style="list-style-type: none"> - Informal self-reporting by students of positive effects.
Bloom-Feshbach, K., et al. (2016).	<ul style="list-style-type: none"> - 4th year medical students (n=101) - Single centre - Natural comparison group - Use of one pre-existing validated and a study specific evaluation instrument (non-validated) 	<ul style="list-style-type: none"> - Classroom based. - OSCE scenario, including a clinical case for the students and standardized patients - Draft OSCE first piloted with 3rd year students. - Training session provided to OSCE patients (actors). 	<ul style="list-style-type: none"> - Multiple post activity competency-based assessments. - Short term evaluation (<1month post education) - 17-item checklist assess performance - Flesch-Kincaid readability score, SMOG index, and Gunning Fog score used to assess student reading level discharge instructions. 	<p>Students completing workshop first did better than peers on:</p> <ul style="list-style-type: none"> - checklist - reading level of their written instructions - 82% students felt confident communicating with patients of low health literacy after workshop/OSCE.
Cailor, S. M., & Chen, A. M. (2015).	<ul style="list-style-type: none"> - 3rd year student pharmacists n=53 baseline, n=52 students post - Single centre - Pre-post design - Nil comparator/control group - Researcher designed non-validated evaluation instrument and an existing validated instrument 	<ul style="list-style-type: none"> - Classroom (4 hrs), lab (4.5 hrs). - Students practiced the teach-back method for counselling in small groups while receiving peer and instructor feedback. - Create a patient pill card - Evaluate the readability and rewrite written patient materials. 	<ul style="list-style-type: none"> - Multiple post activity assessments. - Short, intermediate and long term evaluation - 23-item researcher designed survey instrument (underwent draft review). - Validated <i>Inventory for Assessing the Process of Cultural Competence among Healthcare Professionals</i>. 	<ul style="list-style-type: none"> - Student perceptions, understanding, application of health literacy principles significant improvements on 17 out of 23 assessment items - Some attrition after first assessments.
Chen, A. M., et al (2013).	<ul style="list-style-type: none"> - Third year student pharmacists 2009 (n = 159), 2010 (n = 144) - Single centre - Post assessment only - Researcher designed non-validated evaluation instrument - Nil comparator/control group 	<ul style="list-style-type: none"> - Classroom based - Students required rewrite a patient medication information sheet from the 12th grade level to a 5th grade reading level). 	<ul style="list-style-type: none"> - Single post activity assessment. - Short term evaluation (<1month post education) - Four-item open-ended self-report questionnaire. 	<ul style="list-style-type: none"> - Greater self-reported understanding of the challenges, importance, and methods of appropriate communication and awareness of the role of pharmacists in presenting clear understandable patient information.
Cotugna, N., & Vickery, C. E. (2003).	<ul style="list-style-type: none"> - Junior & senior dietetics students (n=24) - Single centre - Post assessment only - Student designed evaluation instrument (non-validated) - Nil comparator/control group 	<ul style="list-style-type: none"> - Classroom based - Two instructor led classroom sessions - Students produced and presented a 3-hour health literacy workshop for health practitioners. 	<ul style="list-style-type: none"> - Single post activity assessment. - Short term evaluation (<1month post education) - 14 item student developed assessment tool completed by all 33 health practitioner attendees. 	<ul style="list-style-type: none"> - All attendant health practitioners (n=33) rated the student training session as excellent or good.

Study	Study sample and design	Training	Evaluation	Primary outcome/s
Devraj, R., et al. (2010).	<ul style="list-style-type: none"> - 3rd year pharmacy students (n=76) - Single centre - Pre-post design - No control group. - Researcher designed evaluation instrument (non-validated) - Nil comparator/control group 	<ul style="list-style-type: none"> - Classroom based - Six health literacy sessions 1.5 hr - First 3 sessions provided foundational knowledge. - Final 3 sessions student active learning activities e.g. HL assessment, mock patient counselling, drug information and patient material analysis. 	<ul style="list-style-type: none"> - Multiple post activity assessments. - Short term evaluation (<1month post education) - 20 item survey instrument administered at the beginning and end of sessions. - Pre-test of evaluation instrument on 10 students in fourth year to assess face validity. - 76 students completed the pretest, posttest, and retrospective pretest. 	<ul style="list-style-type: none"> - Almost all comparison scores positive for improvement.
Doyle, F., at al. (2013).	<ul style="list-style-type: none"> - 1st year medical and physiotherapy students' (n=337) - Single centre - Post assessment - Use of pre-existing validated evaluation instruments - Nil comparator/control group 	<ul style="list-style-type: none"> - Interdisciplinary classroom setting - Initial instructor led classroom sessions - Students given a range of PILs selecting one for detailed analysis. 	<ul style="list-style-type: none"> - Multiple post activity assessments. - Short term evaluation (<1month post education) - Flesch-Kincaid readability index and DISCERN instruments were used to assess student capabilities. 	<ul style="list-style-type: none"> - Flesch scores ranged from 52.8–79.7% (fairly difficult to fairly easy). - Students identified components of the Health Belief Model (84–98%), Theory of Planned Behaviour (65–88%) and Transtheoretical Model (37–86%).
Farrell, T. W. (2011).	<ul style="list-style-type: none"> - Medical students (n=10) - Single centre - Post assessment only - Researcher designed evaluation instrument (non-validated) - Nil comparator/control group 	<ul style="list-style-type: none"> - Classroom based - Pre-workshop online module - 2.5 hour workshop (didactic session, case based role-playing included the use of the teach-back method, small group session to critique patient education handouts) - Post workshop clinical observation sessions 	<ul style="list-style-type: none"> - Multiple post activity assessment. - After each case, the “physician” provides feedback to the “physician” using a checklist of communication principles provided during the didactic session. - Review of findings during a 15-minute wrap-up session. 	<ul style="list-style-type: none"> - Author acknowledges that a small sample size limits the ability to posit improvement in trainees’ self-assessment of communication skills in patients with poor health literacy.
Grice, G. R., et al. (2013).	<ul style="list-style-type: none"> - Two consecutive 3rd year student pharmacist 2009 (n=158), 2010 (n=126). - Single centre - Mixed method - Pre-post design - Use of pre-existing validated evaluation instruments - Nil comparator/control group 	<ul style="list-style-type: none"> - Simulation lab - Purpose designed scenarios developed for use with standardised patients - Students practiced the FHM, used the FHM for self and peer assessment, and were formally evaluated on FHM during a standardized patient encounter. 	<ul style="list-style-type: none"> - Comparative pre and post activity assessments and comparative assessments between years. - Validated Four Habits Model used to summative assess communication skills with patients (self and peer assessment). - Rubrics used to assess accuracy and completeness of the patient interview and educational content. 	<ul style="list-style-type: none"> - Significant improvement from baseline found in both groups in 11 of the 15 assessed criteria of FHM (2009 group) and for 15 of the 16 assessed criteria (2010 group).
Ha, H., & Lopez, T. (2014).	<ul style="list-style-type: none"> - 3rd year pharmacy students (n=97). - Single centre - Quantitative - Pre-post design - Researcher designed evaluation test (non-validated) - Nil comparator/control group 	<ul style="list-style-type: none"> - Lab based - 3 hour session - Patient case study approach. - Students formulated and evaluated a care plan for a patient with limited health literacy 	<ul style="list-style-type: none"> - Comparative pre and post activity assessments. - 10-item test consisting of five multiple-choice & 5 true/false questions - Pre-test baseline knowledge and skills. - Post-test on completion of health literacy case exercise/class discussion in week 8. - Student perception on effectiveness of the health literacy case exercise. 	<ul style="list-style-type: none"> - Significant increase in post test scores compared to pre-test. - All students self-reported the patient case effective in teaching the defined learning objectives

Study	Study sample and design	Training	Evaluation	Primary outcome/s
Hadden, K. B. (2015).	<ul style="list-style-type: none"> - Post graduate public health students (n=5) - Single centre - Pre-Post design - Use of pre-existing validated instruments - Nil comparator/control group 	<ul style="list-style-type: none"> - Students trained to assess document readability, confirm and interpret readability results and edit documents under supervision. - Revised documents were re-assessed for readability and approved. 	<ul style="list-style-type: none"> - Multiple post activity assessment. - Short term evaluation (<1 month post education) - Training and evaluation of documents took place simultaneously over 15 weeks. - Training assessed through readability score comparison using Health Literacy advisor and free online readability formulas. 	<ul style="list-style-type: none"> - Pre-intervention readability scores primarily 10th grade to college level. - Post intervention was 6th grade or better for 73% of students. - Students and supervisor self-rated skill levels as proficient post intervention.
Harper, W., Cook, S., & Makoul, G. (2007).	<ul style="list-style-type: none"> - Multicentre - School 1: 1st, 2nd, 3rd year medical students (n=approx 100). School 2: 1st year medical students (n=approx 175). - Post assessment only - Researcher designed evaluation instrument (non-validated) - Nil comparator/control group 	<ul style="list-style-type: none"> - Didactic presentation/video, small group practice translating patient education handout into simpler language. - Students work with 3-4 trained simulated patients Interactions are videoed for students to review. 	<ul style="list-style-type: none"> - Single post activity assessment - Simulated patients provide feedback immediately after working with each student. 	<ul style="list-style-type: none"> - Preliminary results from school 1 indicate an increase in the use of teach-back - from 21% of the 103 year 3 students in 2005 to 31% of the 104 year 3 students in 2006. - No results available from school 2.
Hess, J., & Whelan, J. S. (2009).	<ul style="list-style-type: none"> - 45 medical and 30 adult education students from a not-for-profit agency - Single centre - Post assessment only - Researcher designed evaluation instrument (non-validated) - Nil comparator/control group 	<ul style="list-style-type: none"> - Adult literacy students identified health topics of interest. - Medical students then created presentations on the topics and received critical feedback from adult literacy students. 	<ul style="list-style-type: none"> - Single post activity assessment. - Student self-reported post workshop evaluation 	<ul style="list-style-type: none"> - Eighteen of 30 adult learners and 40 of 45 medical students responded to the post workshop evaluation. - Medical students felt most valuable outcomes were learning the importance of health literacy and the difficulties of communicating in plain language.
Jackson, R. et al. (2010).	<ul style="list-style-type: none"> - Second-year dental hygiene students (n=48). - Single centre - Post assessment only - Use of pre-existing validated instrument. - Nil comparator/control group 	<ul style="list-style-type: none"> - Didactic lecture - Students instructed in the administration of a validated tool to assess clinic patient health literacy level. 	<ul style="list-style-type: none"> - A validated tool used to actively assess patient health literacy level (Short Test of Functional Health Literacy in Adults (S-TOFHLA)) - Students collectively gathered data from 91 dental patients. - Following data collection, students were asked to respond to reflective statements. 	<ul style="list-style-type: none"> - Students found 13% of patients had marginal or inadequate health literacy. - Student opinions evenly divided as to their level of comfort approaching patients and whether they felt the test took an excessive amount of time during the appointment.
McCleary-Jones, V. (2012).	<ul style="list-style-type: none"> - Nursing students' (n=89) - Single centre - Pre-post intervention design - Researcher designed non-validated evaluation test - Content validity partially established through re-use testing. - Nil comparator/control group 	<ul style="list-style-type: none"> - Asynchronous online educational intervention - Case study 	<ul style="list-style-type: none"> - Single pre-post activity assessments. - 5-item test to assess students' knowledge of health literacy. 	<ul style="list-style-type: none"> - Mean score for participants (n = 89) on the pre-test = 60.9. - Significant improvement in the post-test mean score 92.8 (n=53)

Study	Study sample and design	Training	Evaluation	Primary outcome/s
Milford, E., et al. (2016).	<ul style="list-style-type: none"> - First and second year medical students (voluntary program) (n=12) - Single centre - Pre-post intervention design - Researcher designed evaluation test (non-validated) - Nil comparator/control group 	<ul style="list-style-type: none"> - Academic yearlong, community-based, service learning experience - Weekly didactic sessions over two months prior to the intervention. - Students as educators/mentors using health literacy training in staff and parent education sessions (2 h per week). - Use of validated evaluation instruments to assess HL in clients. 	<ul style="list-style-type: none"> - Non-validated 17-item pre-survey administered after acceptance into the project and before the didactic sessions. - Survey given again approx. 7 months after the pre-survey. - Student self-reflection and experience journals analysed for emergent themes. 	<ul style="list-style-type: none"> - No change was found in the students' ability to define health literacy and identify health literacy issues on multiple choice questions pre- and post-intervention. - Statistically significant increases found in self-reported knowledge, skills and confidence pre and post intervention.
Mnatzagani an, C.,et al. (2017).	<ul style="list-style-type: none"> - First year pharmacy students' (n=60) - Single centre - Pre-post intervention design - Researcher designed evaluation test (non-validated) - Nil comparator/control group 	<ul style="list-style-type: none"> - One hour didactic session and a two-hour workshop nine days later - The validated <i>Newest Vital Sign</i> health literacy tool used on two volunteers for training purposes. - Flesch-Kincaid tool used to reduce the reading level of drug information by at least one grade level. 	<ul style="list-style-type: none"> - Single pre-post activity assessments. - Non-validated 21-item online survey instrument assessed knowledge and confidence before and after training. - Fifty-three students (88%) completed a pre-training survey, and 60 (100%) completed post-training survey. 	<ul style="list-style-type: none"> - Students' confidence improved in six of seven areas. - Students' knowledge improved in many areas however only significantly in three of fourteen areas
Pearce, K. L., Birbeck, D., & May, E. (2014).	<ul style="list-style-type: none"> - Fourth year pharmacy students (n-103) - Single centre - Post intervention design - Researcher designed evaluation instrument (non-validated) - Nil comparator/control group 	<ul style="list-style-type: none"> - Initial 1 hr didactic and 2 hr tutorial sessions. - Students surveyed community members to assess knowledge. - Students developed 3 minute multimedia resource or animation - Used 'teach-back' method to resurvey/re-evaluate understanding. 	<ul style="list-style-type: none"> - Students individually graded based on a marking rubric based on Observed Learning Outcome (SOLO) taxonomy. - Students given cumulative scores for the initial and final surveys, the literature review, story boards and voice overs and the students' personal evaluation. 	<ul style="list-style-type: none"> - Over 90% of students showed relational reasoning or extended abstract reasoning (av. score 4.4+0.6 using a SOLO 'scale') correlated significantly for the cumulative grade for the 4 part assessment of 75%+12.1%. - Students rated sessions highly positive.
Plomer, K., et al. (2001).	<ul style="list-style-type: none"> - 132 second-year medical students. - Single centre - Post intervention design - Researcher designed evaluation instrument (non-validated) - Comparative study (half the student group served as a control group). 	<ul style="list-style-type: none"> - Classroom based - Small group problem based learning activity. - Two standardised patient cases developed and tested. - Half (n = 66) students randomly assigned health literacy case study, remaining given an unrelated case. - Students in intervention group also received supplemental readings. - Standardised patients trained. 	<ul style="list-style-type: none"> - Single post activity assessment. - All cases pre-tested and modified as required. - After a total of 12 hours training, case assessments were conducted and key elements evaluated. 	<ul style="list-style-type: none"> - 91% students in the intervention groups identified patient problems with literacy and most adjusted their language accordingly, with some using analogies and pictures to support understanding.
Riley, J., Cloonan, P., & Rogan, E. (2008).	<ul style="list-style-type: none"> - 14 Healthcare management/policy students - Single centre - Pre-post intervention design - Student self-report evaluation - Nil comparator/control group 	<ul style="list-style-type: none"> - Students engaged in classroom based didactic teaching on health literacy; performed health literacy healthcare environmental assessment; interviewed healthcare administrators; analysed patient healthcare materials; and - Students self-documented reflections on their experiences. 	<ul style="list-style-type: none"> - Students' thematically self-analysed their reflective journaling - This formed the basis of whole-class presentations at the end of the semester. 	<ul style="list-style-type: none"> - Students self-reported the project provided a meaningful way to directly experience the difficulties encountered by patients with low health literacy.

Study	Study sample and design	Training	Evaluation	Primary outcome/s
Roberts, D. et al. (2012).	<ul style="list-style-type: none"> - 3rd-year medical students (n=68). - Single centre - Pre-post intervention design - Researcher designed evaluation instrument (non-validated) - Nil comparator/control group 	<ul style="list-style-type: none"> - Didactic session - Case study and practice with standardised patients - Small group sessions - Facilitated discussion board - Professional rotation 	<ul style="list-style-type: none"> - Multiple assessments types. - Student evaluation post orientation session - 8 item pre-test of students' knowledge of health literacy - Content validity for pre/posttest and curriculum established via literature review. - Blackboard discussion board evaluation - Follow-up survey with students the following year on some health-literacy-related indicators. 	<ul style="list-style-type: none"> - Over 90% of students improved knowledge - Students self-rated abilities above 4 (5-point Likert scale) on all skills-related items. - 48% of students judged the discussion board to be a useful tool for investigating problems of health literacy.
Ross, P. T., et al. (2013).	<ul style="list-style-type: none"> - Single centre - Second-year medical students (n=262) - Researcher designed evaluation instrument (non-validated) - Nil comparator/control group 	<ul style="list-style-type: none"> - Written case study - Small group discussion - Ad-hoc knowledge assessment 	<ul style="list-style-type: none"> - Single pre-post activity assessment. - Non-validated two item questionnaire - Thematic content analysis 	<ul style="list-style-type: none"> - 61.5% of students recognised health literacy as a barrier to sound health outcomes. - 66.8% of students failed to identify how health literacy serves as a social determinate of health.
Sand-Jecklin, et al. (2010).	<ul style="list-style-type: none"> - Beginning level nursing students (n=103) - Single centre - Pre-post intervention design - Researcher designed evaluation instrument (non-validated) - Nil comparator/control group 	<ul style="list-style-type: none"> - Classroom based - 20 minute didactic session followed by a single case study. - Health literacy assessment added to care planning document - students required to complete while caring for a hospitalized patient (n=94 hospitalised patients). 	<ul style="list-style-type: none"> - Single pre-post activity assessment. - 10 item non-validated survey instrument. - Pre-test given to assess student knowledge just before presentation of the content 	<ul style="list-style-type: none"> - 43% patients found to be at health literacy risk. - Reported increase in student knowledge.
Sicat, B.L., & Hill, L.H. (2005).	<ul style="list-style-type: none"> - 1st year pharmacy students (n=108). - Single centre - Pre-post intervention design - Researcher designed non-validated evaluation instrument - Nil comparator/control group 	<ul style="list-style-type: none"> - Classroom based - Didactic session - Small group session which involved three active-learning activities. 	<ul style="list-style-type: none"> - Single pre-post activity assessment. - 20-item pre-test and 24-item post-test assessments 	<ul style="list-style-type: none"> - Scores for items increased between pre-test and post-test with the change in most items being statistically significant. - The majority of students agreed that analysing patient education brochures and role-playing helped them learn.
Trujillo, J. M., & Figler, T. A. (2015).	<ul style="list-style-type: none"> - First-year pharmacy students (N=162) - Single centre - Post intervention design - Researcher designed evaluation instrument (non-validated) - Nil comparator/control group 	<ul style="list-style-type: none"> - Five weeks (4 hours per week) - Self-study and didactic sessions - Interactive group discussion - Laboratory sessions - On-site introductory pharmacy practice experiences (IPPEs). - Assess patient HL using a validated HL screening tool; assess the readability of educational materials; develop patient-friendly written education materials; counsel a patient with low HL. 	<p>Multiple post activity assessments:</p> <ul style="list-style-type: none"> - Two written knowledge quizzes - Simulated patient OSCE - Verbal evaluation question HL screening tools - Group assessment of abilities to develop user-friendly information - IPPE self-reflection assessed ability to determine the HL friendliness of a pharmacy practice. - Grading rubric based evaluation used for patient counselling OSCE and group work. 	<ul style="list-style-type: none"> - All students "met or exceeded expectations" on OSCE. - Average score on group project was 89.9% (range 78-99%) - Verbal quest.= 67% full credit - Average scores on the 2 quizzes were 77% and 80% - Students had significant increases in confidence levels regarding HL

Study	Study sample and design	Training	Evaluation	Primary outcome/s
Weekes CV, Phillips TM.	<ul style="list-style-type: none"> - Second year student nurses (n=39) - Single centre - Post intervention design - Researcher designed evaluation instrument (non-validated) - Nil comparator/control group 	<ul style="list-style-type: none"> - Classroom based simulation activity - Students administered a quiz with jargon designed to simulate what a patient with inadequate HL experiences in health care. - Post quiz, students responded to a self-reflection activity. 	<ul style="list-style-type: none"> - Single post activity assessment. - Data obtained from written reflections on the simulation (narrative responses to four open-ended questions) 	<ul style="list-style-type: none"> - Five themes identified: (a) empathy, (b) nervousness, (c) embarrassment, (d) helplessness, and (e) communication.
Wilcoxon, K et.al. (2013).	<ul style="list-style-type: none"> - Pharmacy students Third year (n=40) Second year (n=42) - served as controls. - Single centre - Pre-post intervention design. - Researcher designed non-validated evaluation instrument - Second year student group served as control group. 	<ul style="list-style-type: none"> - Classroom based - Session 1 (50 min didactic presentation). - Session 2 (50 min discussion, in-class demonstrations, small group learning). - Two health literacy assignments. 	<ul style="list-style-type: none"> - Intervention and control groups surveyed two weeks before and two weeks post intervention. - 26 item survey tool adapted from previous studies assessing the health literacy tested with ten fourth professional year pharmacy students to assess face validity. - Impact assessment based on selected Theory of Planned Behaviour constructs. 	<ul style="list-style-type: none"> - Significant improvements found at post-test for intervention group compared to control for attitudes toward health literacy and perceived behavioural control with regard to patient communication. - No significant changes observed for intentions to communicate with patients possessing inadequate health literacy.

Figure 2. Health Literacy Training in Higher Education Conceptual Framework

Guiding Principles

- Health professions agree and collectively develop a common curriculum framework for health professions students in the higher education organisation.
- Opportunities for multi and interdisciplinary professional instruction, learning and collaboration.
- Health literacy learning is fully integrated with other content areas across the full health professional degree course.
- Connected health literacy learning from undergraduate through to the healthcare workplace.
- Strong emphasis on real-world learning practice.
- Design, delivery and assessment of health literacy education is supported by student input and appraisal.

