

# Interprofessional education: enhancing the teaching of medication safety to nursing, pharmacy and medical students

## Final Report 2013

Lead institution	The University of Newcastle
Partner institutions	University of Tasmania University of Wollongong
Project leaders	Professor Tracy Levett-Jones Dr Conor Gilligan
Team members	Dr Sue Outram Dr Teresa Stone Associate Professor Rohan Rasiah Ms Joyce Cooper Mr Samuel Lapkin Ms Lyn Ebert Dr Kerry Hoffman Associate Professor Jennifer Schneider Professor Alison Jones Professor Gregory Peterson
Report authors	Professor Tracy Levett-Jones Dr Conor Gilligan Dr Annette Moxey



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Office for Learning and Teaching  
Department of Industry, Innovation, Science, Research and Tertiary Education

GPO Box 9880,  
Location code N255EL10  
Sydney NSW 2001

<[learningandteaching@deewr.gov.au](mailto:learningandteaching@deewr.gov.au)>

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Ms Helen Dowling, Network Director of Pharmacy, Hunter New England Local Health Network

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Emeritus Consultant Edward Stewart-Wynne, Consultant Neurologist, Royal Perth Hospital

## **Project Management**

Mr Kyle Furner, School of Nursing and Midwifery, The University of Newcastle

Dr Annette Moxey, School of Nursing and Midwifery, The University of Newcastle

Ms Beth Innes, School of Nursing and Midwifery, The University of Newcastle

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Ms Alice Burns, School Business Manager, School of Pharmacy, University of Tasmania

Mrs Josie Hughes, Research Pharmacist, School of Pharmacy, University of Tasmania

Dr Helen Bellchambers, Senior Lecturer, School of Nursing and Midwifery, The University of Newcastle

Dr Malcolm Ireland, Conjoint Senior Lecturer, School of Medicine and Public Health, The University of Newcastle

Dr Ben Walker, Senior Lecturer, School of Medicine and Public Health, The University of Newcastle

Dr Andrew Davey, JMO, Hunter New England Health

Dr Peter Pockney, Senior Lecturer, School of Medicine and Public Health, The University of Newcastle

Dr Nicholas Zdenkowski, Advanced Trainee, Department of Oncology, Calvary Mater Newcastle

Ms Katie Frankiewicz, Clinical Nurse Consultant Operating Theatres, Gosford Private Hospital

Ms Rosmarie Lockwood, PhD Candidate (VTE Education) and Medical/Surgical Nurse Unit Manager, Toronto Private Hospital

Conjoint Associate Professor Ian Wright, Senior Staff Specialist Neonatal Medicine, John Hunter Children's Hospital and Associate Professor in Paediatrics and Child Health, The University of Newcastle

Dr Louise Wright, Senior Lecturer Joint Medical Program, School of Medicine and Public Health, The University of Newcastle

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IPE	Interprofessional Education
ISBAR	Introduction, Situation, Background, Assessment, Response
NOTECHS	Non-technical Skills
QUM	Quality Use of Medicines
SSE	Satisfaction with Simulation Experience (Scale)
TPB	Theory of Planned Behaviour
TPB-MSQ	Theory of Planned Behaviour Medication Safety Questionnaire

Medication errors are one of the most common types of adverse events reported in health care. They result from many factors including knowledge and skill deficits, inadequate clinical reasoning skills, ineffective teamwork, and poor communication between health professionals and between health care consumers and health professionals (World Health Organization [WHO], 2007). However, while knowledge and skills related to medication safety are currently addressed in academic programs, interprofessional communication has not been given the same attention.

Interprofessional education (IPE) is believed to enhance learners' understanding of other professionals' roles and responsibilities, while fostering mutual respect and understanding between members of the health care team (Freeth, Hammick, Reeves, Koppel & Barr, 2005). The fundamental premise of IPE is that if students from different health professions learn together, they will develop communication and teamwork skills and be better prepared for collaborative practice, ultimately leading to improved health outcomes (Canadian Interprofessional Health Collaborative [CIHC], 2010). Therefore, IPE approaches that emphasise the importance of teamwork and communication are essential in the preparation of health professionals and in promoting medication safety.

While IPE is recognised as vital for preparing nursing, pharmacy and medical students for their roles in the medication team (WHO, 2007), in Australia IPE is seldom used for teaching the communication skills inherent in medication safety, despite evidence identifying the causal relationship between inadequate communication and medication errors.

The aims of this project were to:

- Scope the pedagogical approaches currently used to teach and assess theory and practices relevant to medication safety in Australia; and examine the needs of nursing, pharmacy and medical programs in relation to the integration of IPE and medication safety into curricula.
- Develop and implement a range of multimedia resources that: engage students with interactive, unpredictable and authentic 'patient journeys', mirror the 'real world' of practice and enhance students' interprofessional communication skills related to medication practices.
- Examine the impact of the learning and teaching resources developed on students' attitudes and intentions to practice in a way that promotes interprofessional communication, collaboration and medication safety; and satisfaction with the learning experience.

The project began with a systematic review (examining the effectiveness of IPE in university-based health professional programs) which provided the foundations for the three subsequent, interconnected stages that addressed each of the above aims.

### **Stage 1. Cross-sectional survey and focus groups**

This 'information gathering' stage of the project used a web-based cross-sectional survey to explore: how theory and practices relevant to medication safety are currently taught in nursing, pharmacy and medical programs across Australia and New Zealand; the strengths and limitations of current IPE and medication safety approaches; and the barriers and facilitators to curriculum integration of IPE for the purpose of enhancing medication safety.

Focus groups with recent nursing, midwifery, pharmacy and medical graduates were also undertaken to further explore the strengths and limitations of current IPE approaches.

Outcomes of this stage of the project included:

- enhanced understanding of the extent to which IPE is used in Australian and New Zealand universities to teach health professional students about medication safety; and clear
- recommendations related to enhanced effectiveness, efficiency and feasibility in using IPE to teach health professional students about medication safety. The findings from this stage of the project have been widely disseminated and are available in a series of publications (see page 56 for details)

### **Stage 2. Development of curriculum modules and learning and teaching materials**

The findings from Stage 1 informed the development of five learning and teaching modules and related facilitator and student guides, which incorporated IPE as a strategy to promote medication safety and interprofessional teamwork. Modules were based on the premise that by observing interprofessional roles and team functioning, students could learn from and about other professions, even if learning with them is not achievable. Materials that complement existing curricula were developed in consultation with an expert panel comprising educators, clinicians and students. These resources provide learning opportunities for students to develop critical thinking skills, reflect on their competency development, and improve their interprofessional communication skills. The modules are available on the project website (<[www.ipeforqum.com.au](http://www.ipeforqum.com.au)>).

### **Stage 3. Pilot testing and evaluation of curriculum modules and learning and teaching materials**

The learning and teaching materials developed during Stage 2 were piloted at selected universities and their effectiveness evaluated. Evaluation occurred through (1) informal feedback on the modules and their use via a survey on the project website; (2) clinical simulations run with groups of pharmacy, nursing and medicine students to assess their performance in a clinical situation and demonstration of key teamwork and communication elements (as assessed with the modified Oxford NOTECHS (Non-technical Skills) Scale); and (3) a Theory of Planned Behaviour Medication Safety Questionnaire (TPB-MSQ) to assess the behavioural intentions of students who had viewed one of the modules, in comparison to those who had not viewed the modules.

The outcomes of this stage of the project included improved interprofessional communication between students and changes in their attitudes and behavioural intentions in relations to medication safety. The findings from this stage of the project are detailed in a series of publications (see page 56 for details).

### **Conclusion and Recommendations**

The findings of this project contribute valuable knowledge to the field of IPE. The systematic review, cross-sectional survey and focus groups all reinforced the need for efforts to improve IPE, and provided some suggestions for appropriate approaches to meet this need. The modules developed through this project offer a starting point for IPE and can be used in a range of contexts and formats to increase students' and health professionals' understanding of the importance of interprofessional teamwork and communication to promote medication safety. Importantly, the TPB-MSQ provides educators with a valid tool for the evaluation of IPE activities. It has long been a challenge for educators to assess the impact of educational efforts on actual behaviour or clinical practice. In recognition of these challenges, the TPB-MSQ uses behavioural intention as a valid proxy for actual behaviour change. Thus, this work has provided not only resources for teaching and learning, but a reliable instrument for assessing learning outcomes in relation to medication safe practice.

While this project cannot answer all of the questions about IPE and medication safety, nor can it fill all the gaps in terms of resource needs, it has gone a long way toward setting an agenda for sustainable and widespread IPE efforts.

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# Introduction

*Interprofessional education occurs when two or more professions learn with, from and about each other to improve collaboration and the quality of care. (Centre for the Advancement of Interprofessional Education [CAIPE], 2002)*

The World Health Organization recognises IPE as an innovative but essential strategy for preparing a collaborative practice-ready health workforce (WHO, 2010a). IPE is reported to enhance students' ability to communicate effectively and collaborate as part of an interprofessional team (WHO, 2010a). The Canadian Interprofessional Health Collaborative (2010) describes interprofessional collaboration as a phenomenon that occurs when learners/practitioners, patients/clients/families and communities develop and maintain interprofessional working relationships that enable optimal health outcomes.

Garling's (2008) recent Special Commission of Inquiry into Acute Care Services in NSW Public Hospitals made clear recommendations related to IPE, stating that:

- Education and training should be undertaken in a manner that emphasises interdisciplinary team-based, person-centred care.
- Each member of the clinical workforce should be prepared to work within a multi-disciplinary environment as a member of, or as a contributor to, an interdisciplinary team responsible for the delivery of person-centred care.

True interprofessional collaborative practice requires a consistent culture between learning and practice that supports the development of interprofessional collaborative competencies (CIHC, 2010). Culture takes time to develop however, so the earlier that a culture of collaboration is initiated, the more likely it is that health professional students will attain the necessary knowledge, attitudes, and understanding to adopt a collaborative culture in their clinical practice. However, the pragmatic constraints inherent in university curricula and contexts limit opportunities for health professional students to learn collaboratively. Not all universities offer concurrent nursing, pharmacy and medicine programs, and even when they do, timetabling restrictions, resource implications and large student cohorts can act as barriers to IPE.

## IPE and Medication Safety

Medication errors are one of the most common types of adverse events reported in health care. The following statistics provide evidence that justifies efforts to improve medication safety:

- More than 50% of all medications globally are either prescribed, dispensed, administered or used inappropriately (WHO, 2010b).
- 30% of hospital patients will experience an adverse drug event (Classen, Pestotnik, Evans, Burke & Battles, 2005).
- Medication incidents remain the second most common type of incident reported Australian hospitals (Roughead & Semple, 2008).
- Medication adverse events cost approximately \$6 billion per year and inappropriate use of medicines \$380 million (National Health and Hospitals Reforms Commission, 2008).
- In any two week period medications have been taken by 70% of the population and more than 90% of older persons (Runciman, Roughead, Semple & Adams, 2003).

Medication errors and adverse patient outcomes result from multiple factors. They are related to knowledge and skill deficits, inadequate clinical reasoning skills (del Bueno, 2005), ineffective teamwork, and poor communication between health professionals and between health care consumers and health professionals (WHO, 2007). However, while knowledge and skills related to medication safety are currently addressed in academic programs, interprofessional communication has not been given the same attention. There is little evidence that education focused on increasing students' knowledge about medications has translated into a reduction in medication errors (Ross & Loke, 2009). Similarly, attention to medication calculation skills without consideration of the broader context of safe medication practices has not resulted in improved outcomes (Armitage & Knapman, 2003).

Research indicates that many medication-related errors are potentially preventable through effective collaboration and communication (Dieleman et al., 2004). Deficiencies in communication between health professionals and recommendations for improvement are major findings in many health care quality improvement investigations (Office of Safety and Quality in Healthcare, 2008) with communication errors identified as the root cause of 70% of sentinel events in health care settings (Leonard, Graham & Bonacum, 2004). Research also indicates that inadequate communication (verbal and written) between health care professionals and with health care consumers and/or family members is the primary issue in the majority of medication errors, adverse reactions, and near-misses (Benjamin, 2003).

The National Medicines Safety and Quality Scoping Study Steering Committee (2009) advocates for the inclusion of safe medication practice in curricula for health professionals. In the Quality Use of Medicines (QUM) team, the four primary stakeholder groups are those who prescribe, dispense, administer and consume (i.e. patients/clients). While each member of the team has unique responsibilities for ensuring medication safety, IPE increases the likelihood of effective communication, safe practice and improved patient outcomes.

IPE is believed to enhance learners' understanding of other professionals' roles and responsibilities, while fostering mutual respect and understanding between members of the health care team (Freeth, Hammick, Reeves, Koppel & Barr, 2005). The fundamental premise of IPE is that if students from different health professions learn together, they will develop communication and teamwork skills and be better prepared for collaborative practice, ultimately leading to improved health outcomes (CIHC, 2010). Therefore, IPE approaches that emphasise the importance of teamwork and communication are essential in the preparation of health professionals. However, in Australia IPE is seldom used for teaching the communication skills inherent in medication safety, despite evidence indicating that inadequate communication between health care professionals is the primary issue in the majority of medication errors. There is a need for Australian research that examines the impact of IPE on medication safety, and more relevant, engaging and authentic IPE experiences.

While true IPE is defined as students from different professions learning with, from, and about each other (CAIPE, 2002), we propose that web-based learning resources may offer an approach to IPE that can overcome some of the pragmatic constraints and enable students to learn from and about each other even when learning together is not possible.

# Project Aims

The aims of this project were to:

- Scope the pedagogical approaches currently used to teach and assess theory and practices relevant to medication safety in Australia; and examine the needs of nursing, pharmacy and medical programs in relation to the integration of IPE and medication safety into curricula.
- Develop and implement a range of multimedia resources that: engage students with interactive, unpredictable and authentic 'patient journeys', mirror the 'real world' of practice and enhance students' interprofessional communication skills related to medication practices.
- Examine the impact of the learning and teaching resources developed on students': attitudes and intentions to practice in a way that promotes interprofessional communication, collaboration and medication safety; and satisfaction with the learning experience.

It is important to note that although the aim of the project was to enhance the use of IPE as a teaching and learning approach, in reality our entire project was an example of an interprofessional collaborative. This was a deliberate strategy to ensure that the research and resources developed would be directly relevant to the professions involved and true to the vision of the project.

## Approach and Methodology

The project began with a systematic review (examining the effectiveness of interprofessional education in university-based health professional programs) which provided the foundations for the three subsequent interconnected stages that addressed each of the above aims (Figure 1). A brief overview of each stage is provided here; further details on the project methods are presented in the following sections.

### Stage 1. Cross-sectional survey and focus groups

This 'information gathering' stage of the project explored:

- how theory and practices relevant to medication safety are currently taught in nursing, pharmacy and medical programs across Australia and New Zealand;
- the strengths and limitations of current IPE and medication safety approaches; and
- the barriers and facilitators to curriculum integration of IPE for the purpose of enhancing medication safety.

Representatives from the professions of nursing, pharmacy and medicine from Australian and New Zealand universities were invited to participate in a web-based cross-sectional survey.

Focus groups with recent (within the last 2 years) nursing, pharmacy and medical graduates were also undertaken to further explore the strengths and limitations of IPE approaches. Graduates were asked about their experiences of and attitudes towards IPE during their health program, and the extent to which their experiences prepared them to work effectively as a member of a health professional team upon graduation. Focus groups were held across three sites (New South Wales, Tasmania and Western Australia) to ensure a range of views and experiences were considered.

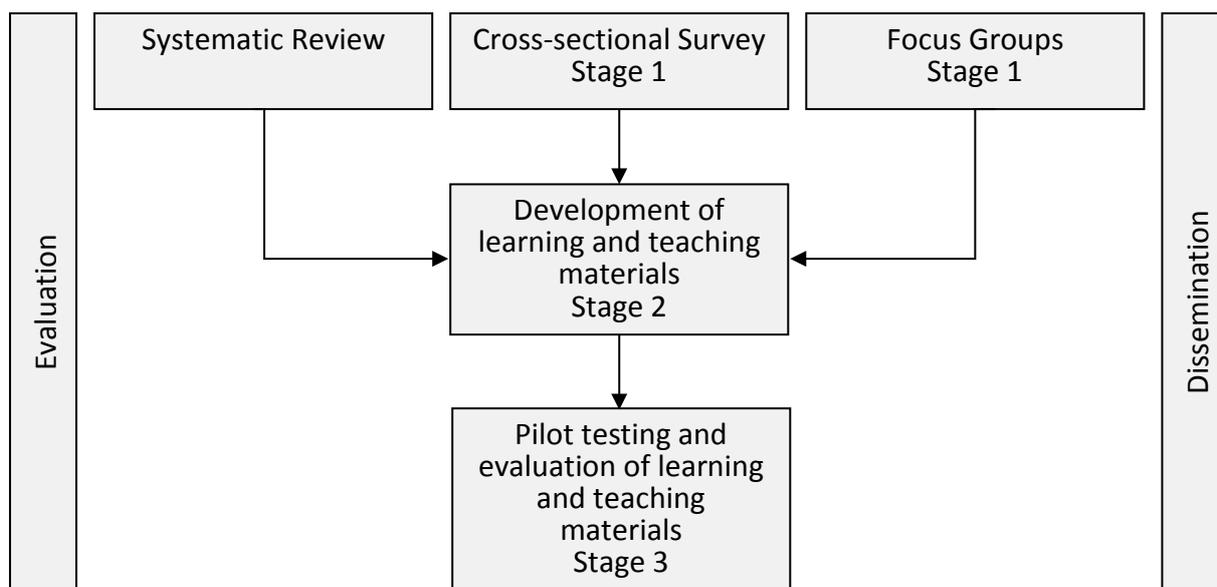


Figure 1. Flowchart Illustrating the Project Design

## Stage 2. Development of curriculum modules and learning and teaching materials

The findings from the cross-sectional survey and focus groups informed the development of the learning and teaching modules, incorporating IPE as a strategy to promote medication safety and interprofessional teamwork. Curriculum modules were developed based on the premise that by observing interprofessional roles and team functioning, students could learn from and about other professions, even if learning with them is not achievable. IPE is incorporated into the modules. Materials that complement existing curricula were developed in consultation with an expert panel comprising educators, clinicians and students. An iterative process was adopted; clinical and academic input was sought on module scripts pre-production, draft modules post-production, and evaluation and feedback provided by users of completed modules informed the development of subsequent ones. These resources provide learning opportunities for students to develop critical thinking skills, reflect on their competency development, and improve their interprofessional communication skills. The modules are designed to capture both positive and negative representations of the communication elements that form the modified Oxford NOTECHS Scale (Mishra, Catchpole & McCulloch, 2009).

The learning and teaching resources are hosted on the project website (see [www.ipeforum.com.au](http://www.ipeforum.com.au)).

## Stage 3. Pilot testing and evaluation of curriculum modules and learning and teaching materials

The learning and teaching materials developed during Stage 2 were piloted at selected universities and their effectiveness evaluated. Evaluation occurred through (1) informal feedback on the modules and their use via a survey on the project website; (2) clinical simulations run with groups of nursing, pharmacy and medicine students to assess their performance in a clinical situation and demonstration of key teamwork and communication

elements (as assessed with the modified Oxford NOTECHS Scale); and (3) a TPB-MSQ to assess the behavioural intentions of students who had viewed one of the modules, in comparison to those who had not viewed the modules.

## Changes to the Initial Proposal

A number of revisions to our initial proposal occurred throughout the project. These added value to the project, and included:

- The inclusion of universities from New Zealand in the cross-sectional survey (Stage 1).
- The addition of a focus group study with recent nursing, pharmacy and medicine graduates (Stage 1).
- A revised approach to evaluating the impact of the curriculum modules and learning and teaching materials (Stage 3). While knowledge, student satisfaction and attitudes to IPE remain important, the impact of the learning resources on the application and translation of knowledge to practice needed to be measured.
- The development and psychometric testing of an instrument designed to measure behavioural intention based on the Theory of Planned Behaviour (TPB-MSQ) (Stage 3).

It was also initially proposed that the project would examine the feasibility of IPE when used for teaching medication safety. This fourth stage of the project was to employ a cost-utility analysis using multi-attribute utility theory. In order to make recommendations regarding the feasibility of IPE for teaching medication safety, the cost-utility analysis would weigh the relative costs between the experimental and control groups against the outcomes measured in Stage 3 of the project i.e. communication competence, attitudes toward interdisciplinary co-operation, knowledge acquisition in relation to medication safety. However, this aspect of the study was not undertaken as it was not feasible to identify appropriate measures for comparison.

# Systematic Review

A systematic review examining the effectiveness of IPE in university-based health professional programs was completed as the foundation to the project. A synopsis of the review is provided below:

## Background

A key responsibility of universities is to prepare health professional graduates for their roles as effective members of the health care team. Currently, most university-based health professional education is delivered in a traditional, discipline specific way. This approach is limited in its ability to equip graduates with the necessary knowledge, skills and attitudes for effective interprofessional collaboration and for working as part of a complex health care team.

## Objective

The objective of this systematic review was to identify the best available evidence for the effectiveness of university-based IPE.

## Inclusion Criteria

The review included all randomised controlled trials and quasi-experimental studies that assessed the effectiveness of IPE in university-based health professional programs. All studies that included two or more undergraduate or post-graduate health professional groups engaged in IPE were considered. Outcome measures included objectively measured or self-reported educational outcomes and/or professional competencies related to IPE as assessed by validated instruments such as the Readiness for Interprofessional Learning Scale and the Interdisciplinary Education Perception Scale.

## Search Strategy

A three-stage comprehensive search strategy was utilised to search across ten electronic databases. English language studies published between January 2000 and February 2011 were considered for inclusion.

## Methodological Quality

Two independent reviewers assessed the methodological quality of each study selected for retrieval using standardised Joanna Briggs Institute critical appraisal tools.

## Data Collection and Synthesis

Data were extracted from studies using the standardised data extraction tool from the Joanna Briggs Institute. A meta-analysis was not possible because of the different outcomes, control groups and interventions of the selected studies; and the findings are therefore presented in narrative form.

## Results

Nine published studies consisting of three randomised controlled trials, five controlled before and after studies and one controlled longitudinal study were eligible for inclusion in this review. Four studies reported significant improvement in attitudes and perceptions of IPE. In addition, five studies reported a mixed set of outcomes related to IPE interventions.

## Conclusions

### Implications for Practice

Students' attitudes and perceptions towards interprofessional collaboration and clinical decision making can be potentially enhanced through IPE. However, the evidence for using IPE to teach interprofessional communication skills and clinical skills such as resuscitation to health professions students is inconclusive and needs further investigation.

### Implications for Research

Future randomised controlled studies explicitly focused on IPE with rigorous randomisation procedures and allocation concealment; larger sample sizes; and more appropriate control groups, would improve the evidence base of IPE.

### Dissemination

This systematic review has been disseminated via publications and a conference presentation:

Lapkin, S., Levett-Jones, T., & Gilligan C. (2011). The effectiveness of interprofessional education in university-based health professional programs: A systematic review. *Joanna Briggs Institute Library of Systematic Reviews*, 9(46), 1917-1970.

Lapkin, S., Levett-Jones, T., & Gilligan, C. (in press). A systematic review of the effectiveness of interprofessional education in health professional programs. *Nurse Education Today* DOI:10.1016/j.nedt.2011.11.006. Available online 22 December 2011.

Lapkin, S., Levett-Jones, T., & Gilligan C. The effectiveness of interprofessional education in university-based health professional programs: A systematic review. All Together Better Health VI (ATBH VI), 5-8 October 2012, Kobe, Japan.

# Stage 1. Cross-sectional Survey and Focus Groups

## Cross-Sectional Survey

### Background

The current status of IPE in Australian and New Zealand universities is largely unexamined despite its generally acknowledged benefit and the international push for IPE as a key area of health professional education. In Australia, several government policy documents and independent reports have specifically advocated for the inclusion of IPE in health professional education programs (Department of Health and Ageing, 2008; Garling, 2008). However, a brief appraisal of IPE activity undertaken in 2006 only identified pockets of IPE activities across Australia such as in rural clinical placement programs and simulation centres (ACT Health, 2006). Further, data is also limited about the use of IPE in teaching medication safety to nursing, pharmacy and medical students. Thus, a scoping study into the use of IPE in Australian and New Zealand universities was considered timely and relevant.

### Aim

The aims of the cross-sectional survey were to explore:

- How theory and practices relevant to medication safety are currently taught in nursing, pharmacy and medical programs across Australia and New Zealand;
- The strengths and limitations of current IPE and medication safety approaches; and
- The barriers and facilitators to curriculum integration of IPE for the purpose of enhancing medication safety.

### Research Design and Participants

A web-based cross-sectional survey was used to gather information from Australian and New Zealand universities offering nursing, pharmacy or medical programs. It was initially agreed that only Australian universities would receive the survey. The sample was extended to include New Zealand universities so that a greater mix of universities with more or less established programs could complete the survey. Ethics approval was obtained from The University of Newcastle Human Research Ethics Committee.

### *Survey Development*

A questionnaire was developed to address the aims of the study. An expert panel of 11 researchers and health professionals reviewed the initial survey items for relevance, clarity, conciseness, ambiguity and overall comprehensiveness. The final instrument included 43 questions grouped into the following sections: university demographics, IPE initiatives, IPE and medication safety, and barriers to and facilitators of IPE. The survey included open- and closed-ended questions; five-point Likert scales were used to measure opinions and beliefs regarding barriers to and facilitators of IPE.

### *Sample*

The target population was all Australian and New Zealand universities offering nursing, pharmacy or medical programs. Heads of schools were identified using the databases of the Council of Medical Deans of Australia and New Zealand, the Council of Deans of Nursing and Midwifery (Australia and New Zealand) and Pharmacy Council of Australia. The contact details of the heads of schools were then verified using university websites. In total, 77 nursing, pharmacy and medical programs within 43 universities were identified.

### *Administration of Survey*

A web-based survey administered through a commercial survey service (SelectSurvey.NET) was used in this study to facilitate ease of response. Electronic mail messages (email) were sent to heads of schools identified in the above process. The email included a cover letter explaining the importance of the research and an information statement with a hypertext link to the web-based survey. The heads of schools were asked to forward the message to a staff member who had the authority and knowledge to report on how IPE and/or medication safety were integrated in their academic program to complete the survey.

To ensure an adequate response rate, a reminder message was sent to non-respondents two weeks after the initial email, and another reminder was sent to the remaining non-responders after a further three weeks.

### *Analysis*

Survey responses were analysed using descriptive statistics.

### **Results**

Responses were received from 31 of the 43 (72%) target universities. Six of the universities were represented by multiple programs in separate responses, with a total of 47 health professional programs represented. Five universities were represented by two programs and one university by three programs. Response rates were similar across nursing, pharmacy and medicine programs. The data below is presented with program as the unit of analysis.

#### *IPE Initiatives*

Eighty percent of the participants indicated that they currently offer IPE experiences, but only 24% of these experiences met the accepted definition of IPE i.e. "...occurs when two or more professions learn with, from and about each other to improve collaboration and the quality of care" (CAIPE, 2002). Students involved in the IPE offerings were primarily from nursing (28%), followed by medicine (24%), pharmacy (16%) and midwifery (11%).

For those programs offering IPE experiences, 26% were offered to students in their first year of enrolment and 23% in their third year. The majority of the programs were conducted as face-to-face sessions (46%), with a substantial proportion delivered purely online (22%). IPE experiences involved lectures (16%) or tutorials (16%), clinical placements (15%) and simulation (12%). Twenty-nine percent of respondents who provided a description of their IPE offerings considered lectures or tutorials conducted by staff from human bioscience departments to be an example of IPE. IPE opportunities on clinical placement accounted for 17% of the IPE efforts; however, most of these were ad hoc and occurred without structured opportunities for interaction between students and staff from different health professions.

#### *IPE and Medication Safety*

Of the participants who offered IPE as defined by Center for the Advancement of Interprofessional Education (i.e. <24%), only 50% used it to teach medication safety. Most respondents reported that medication errors were the main focus of the IPE medication safety experiences (19%), followed by patient safety (15%), prescribing (13%), interprofessional communication (12%) and dispensing (8%).

## *Barriers to and Facilitators of IPE*

Timetabling restrictions followed by lack of appropriate teaching and learning resources, and funding limitations were identified as the main barriers to implementation of IPE. Student resistance to IPE, policy or legislative requirements and lack of institutional support were the least reported barriers.

There was widespread agreement that medication errors, teamwork and interprofessional communication should be taught through IPE experiences. All participants reported that staff development, multi-media and e-learning resources would be beneficial to IPE initiatives and the teaching of medication safety.

## Conclusion

This study elucidates the extent to which IPE is currently used to teach medication safety in nursing, pharmacy and medical programs in Australia and New Zealand. While 80% of the respondents indicated that they currently offer IPE experiences, only 24% of these experiences fit the definition of IPE as learning with, from and about other professions. Innovative approaches such as multimedia resources and e-learning activities are essential to overcoming some of the very real barriers to the use of IPE and hold great potential for the integration of IPE into the teaching of medication safety.

## Dissemination

Findings from the cross-sectional survey have been disseminated via a publication and a conference presentation:

Lapkin, S., Levett-Jones, T., & Gilligan C. (2012). A cross-sectional survey examining the extent to which interprofessional education is used to teach nursing, pharmacy and medical students in Australian and New Zealand Universities. *Journal of Interprofessional Care*, 26(5), 390-396.

Lapkin, S., Levett-Jones, T., & Gilligan, C. A cross sectional survey of interprofessional education in Australian and New Zealand health professions programs. All Together Better Health VI (ATBH VI), 5-8 October 2012, Kobe, Japan.

Focus Groups

## Background

Focus groups with recent graduates were not included in our original grant application, and therefore form an additional component of the project. Little is known about how IPE initiatives are received by students and the impact of IPE on graduates' experiences, and performance in early clinical experiences. We sought to explore the reflections of graduates on the IPE experiences they had during their undergraduate education and the impact it had on their subsequent professional experiences. It was anticipated that having completed their education and having spent up to two years working in a clinical environment, recent graduates would be well-placed to provide insights into the value of the IPE opportunities they had, and to suggest approaches for improving these opportunities in undergraduate programs. It was important that the needs, experiences and attitudes of former students towards IPE and medication safety be explored in order to adequately inform the development of the learning and teaching resources.

## Aim

The aims of the focus group study were to explore recent nursing, pharmacy and medical graduates’:

- experiences of IPE strategies relevant to medication safety and other health topics during their health program;
- experiences of working a member of an interprofessional team since graduation;
- attitudes towards IPE, and whether or not these attitudes have changed since entering healthcare workforce; and
- suggestions for achieving effective IPE in health programs.

Findings from this component of the project informed the development of the learning and teaching materials as well as plans for further work and dissemination. The findings also informed the development of the TPB-MSQ used to evaluate the learning and teaching modules.

## Research Design and Participants

Focus groups were used to gather information from recent nursing, pharmacy and medical graduates. Ethics approval was obtained from The University of Newcastle Human Research Ethics Committee, Hunter New England Human Research Ethics Committee, The Tasmania Social Science Human Research Ethics Committee, and The Royal Perth Hospital Ethics Committee.

### *Sample*

Focus groups were held across three sites: NSW (n=6), Tasmania (n=2), and Western Australia (n=4). Alumni, intern and new graduate coordinators distributed information about the study to recent (within the past two years) graduates on behalf of the researchers. Posters were also displayed on relevant notice boards at local teaching hospitals; graduates who were interested in participating made contact with the researchers who then provided information about the study. Written consent was obtained from participants prior to the focus groups.

### *Focus Group Schedule*

Graduates were asked about their:

- experiences of IPE strategies relevant to medication safety and other health topics during their health program;
- attitudes towards IPE, and whether or not these attitudes have changed since entering healthcare workforce;
- experiences in the clinical setting where IPE has or would have been helpful;
- perceptions of how prepared they felt working in an interprofessional healthcare team, and what additional training they would have liked; and
- suggestions for achieving effective IPE in health programs.

At the end of the discussion, participants completed a brief survey that included questions on age, gender, years of study, previous studies and health profession.

## Analysis

Focus group discussions were audio-taped using a digital recorder and transcribed verbatim (identifying information such as names were removed from the transcript). A thematic analysis was undertaken. Transcripts were coded for themes and patterns emerging from the data by two members of the project team independently of one another. Disparities between the researchers in relation to the assigned codes were resolved through discussion until consensus was reached. Analyses were facilitated using the software package NVivo (Version 8, QRS International Pty Ltd, Australia).

## Results

In total, 12 focus groups involving recent nursing (n=28), pharmacy (n=23) and medical (n=17) graduates were conducted. Four of the focus groups included a range of health professionals, the others were discipline specific. The majority of participants were female (75%); participants' age ranged from 21 to 54 years.

Four key themes emerged from the thematic analysis process; IPE at university, interprofessional communication experiences as new graduates, roles, responsibilities, and relationships, and patient wellbeing including medication safety and patient-centred care:

### 1. IPE experiences at university

Experiences of IPE at university varied greatly, with the participants having graduated from a range of universities and programs. A clear trend existed, whereby those who attended universities that only offered a limited range of health professional programs had more limited IPE experiences during their program.

*"It doesn't help that we're at different schools either...we don't really ever see each other, so there's no real opportunity to make it an undergraduate experience."*  
[Interprofessional focus group participant]

While the concept of interprofessional teamwork and multidisciplinary care were familiar to all participants, many struggled to recall IPE experiences from their program.

*"I vaguely remember the lecture that [name] is talking about, and as a student I just went to the allied health meetings of that ward, and just saw what the medical team was seeing. But that was pretty much it."* [Medicine]

*"The multidisciplinary healthcare team comes up in every single lecture, really in clinical and in therapeutics..."* [Pharmacy]

*"...multidisciplinary teams, that was the catchphrase of the whole degree I reckon... on clinical placements, we inevitably have quite a lot of interaction with the other allied health, nursing disciplines, not necessarily formal education sessions..."*  
[Pharmacy]

Most IPE experiences were regarded as positive ones, but those valued most highly were experiences that involved genuine engagement and opportunities to interact, rather than simply a lecture from another professional. Participants struggled to recall the detail of such lectures.

*"...huge lecture theatre filled with 140 students, 80 of us and 60 science students, so there was no real interaction between each other... And that is a lecture situation, so you sit there, you listen to a lecture, you go, it's not interactive at all."* [Pharmacy]

*"...no real interaction, or practical, or even just a tutorial with them or anything. All we've really had are those couple of lectures, where you really don't talk to them,*

*unless you knew a friend that was in that year or whatever. That's it." [Pharmacy]*

*"We have shared lectures with dentistry students, for the first two years, which is fine for us, but it's more they're sitting in on our lectures, it's not really a shared learning." [Medicine]*

Graduates were generally able to describe more interactive, practical experiences in far greater detail.

*"Yeah there was one day where they formed... us into teams that had medical students and pharmacy students, maybe pharmacy students... physio and OT and social work students, and nursing students, in each team. So there was one in each team, and that was good, that was good to sort of see how they approached the same problem..." [Medicine]*

The most memorable IPE experiences seemed to occur in clinical placement settings, but if opportunities for interaction and learning on these placements were not structured, they were often missed. It seems that many experiences occur in an ad hoc fashion, and are not consistent for all students.

*"...it wasn't...part of our practical component to actually find and go and work alongside a physio or an OT." [Nursing]*

Perhaps the most positive reflections were those associated with the Student Training Ward in Perth. Participants perceived key benefits to be the opportunity to learn about the roles of other health professionals and feeling better prepared to ask questions when required. The pharmacy graduates also reflected on the value of learning about the administration of medications via routes other than the oral route, and medical students particularly valued the opportunity to practice writing medication charts.

*"And also it was important that we saw how much stuff the nurses were doing, and it was like "wow they do so much." [Pharmacy]*

*"I think everybody learned off each other, and I think especially when you're working somewhere like the hospital, it's important to know what role everyone plays, and who to go to for more information and that sort of thing." [Nursing]*

## **2. Interprofessional communication experiences as new graduates**

Participants provided rich and detailed descriptions of how ill prepared they were to work as part of an interprofessional team upon graduation and how this impacted their ability to communicate and collaborate effectively with other members of the team. They confirmed the findings from previous health care quality improvement investigations with detailed narratives illustrating the relationship between patient safety and interprofessional communication.

*"When you're at Uni, you don't really learn how to phone a doctor... what information they want; what's relevant; and what they don't want to know. And that's important because when your patient gets really sick, you need to know how to work with a doctor." [Nursing]*

*"It's so scary... I used to get the shakes, pick up the phone to page a doctor and think "do I really need to ring them? I might just wait and see." You work yourself up and the more you think about it the worse it gets. What is there in the undergraduate degree that prepares you to be brave enough to communicate with other disciplines?" [Nursing]*

*"How do I talk to a doctor? I may think a drug dose is ridiculous, but I can't say that*

*to them because that's undermining their professional judgement and their decision.”*  
[Pharmacy]

*“...what is there an undergraduate education that prepares you to be brave enough and to communicate with other disciplines? No, ...you never talk to doctors as a student.”* [Nursing]

*“I had one instance when there was a patient that I couldn't get a cannula in, he was dehydrated, but he was taking in fluids, and his diarrhoea had stopped. I decided we'd go with oral fluids. And the nurse sort of made this face, but she didn't say anything. I said to her “You don't look very happy with that. What do you think? What's the problem?” And so she sort of exploded then and said she thought it was really a bad idea, and that “we really have to get a line into this patient,” and that “he was going to go downhill if we don't.” So after she said that it sort of felt like quite an easy decision... I'd been sitting on the fence and didn't really know what to do. But I wished that she'd said something, and not just sat there and made a face, because if I hadn't seen it, what would have happened to the patient?”* [Medicine]

### **3. Roles, responsibilities, and relationships**

Participants perceived there were gaps in their undergraduate preparation that influenced their preparedness for interprofessional practice and teamwork. In the course of their work, they came to realise they had a limited understanding about the roles of other health professionals. This made it difficult to identify which profession was responsible for different elements of medication practice and how to work with others to ensure safety.

*“I only just realised that pharmacists actually come and review patients and see what's going on with their medications. I thought they just dispensed pills. It didn't occur to me that I could ask a pharmacist about my patient's drugs.”* [Nursing]

*“It's almost like a carpenter having a toolbox that they've never opened, and every now and again somebody tells them that there's a tool that could be useful, might make a certain job easier, but...if you don't know about it you can't use it.”*  
[Medicine]

*“...actually that's one of the things that I've been reflecting on of late, as to how little to nothing I know about what physiotherapists... pharmacists... occupational therapists... social work does, and what they have to offer. Everything I know at the moment is purely through the experience of working, and it's just one of those extra learning curves in the intern year, which maybe could be avoided a bit by having at least discussed, what roles the, all of the health workers have, in the team that provides the healthcare system.”* [Medicine]

Further, professional roles were associated with stereotypes and hierarchies which acted as barriers to effective communication and teamwork.

*“You try not to get on the bad side of the nurses, because you've always been told that's a really bad idea!”* [Medicine]

*“Nursing staff have very little respect for you. We can write how to give a drug on the chart but they'll blatantly ignore it, even when it could potentially be detrimental to the patient.”* [Pharmacy]

#### 4. Patient wellbeing including medication safety and patient-centred care

In respect to medication safety, participants perceived the approach to undergraduate preparation focused on the pharmacotherapy and pharmacokinetics of a wide range of medications. Although staff accepted that theoretical knowledge was necessary to underpin their practice, they felt that they lacked practical knowledge on how to safely prescribe and administer medications, and facilitate patient management or discharge.

*"I didn't feel prepared as I hadn't had any real scenario's to help appreciate how to be proactive about supporting medication safety. The problem had been highlighted, but there was no context." [Nursing]*

The student training ward in WA provided one exception to this:

*"I got to write the med charts doing the student training ward, but you often don't get that opportunity, or get a chance to write the scripts until the week of (intern) orientation, where you get I think like an hour of "here you go, quick, this is how you do it." And I think a bit more practise in that would be useful..., but the actual act of doing it, over and over, and learning, before you're actually finished..." [Medicine]*

#### Conclusion

Nursing, pharmacy and medical graduates have minimal exposure to IPE at undergraduate level, with the exception of those who were placed in the Student Training Ward. The graduates participating in this study provided many insightful reflections about the value of university-based IPE and their preparedness for clinical practice. Taking into consideration the experiences of graduates in starting professional work, their reflections on university IPE experiences, and their recommendations for improving IPE, we have compiled the following set of suggestions to guide the design of future IPE efforts:

- IPE opportunities should be structured as part of clinical placement, associated with clear tasks and/or learning objectives.
- Opportunities should be provided to work together on common clinical scenarios and problem-solving tasks; whether at university, during placement, or both.
- There should be a focus on developing interprofessional communication skills that are central to practice.
- Begin early in the program with simple concepts about others' roles and responsibility and increase in detail and depth as each program progresses as clinical situations become more relevant.
- Encourage social interaction between students from various programs to promote familiarity for future work and placement interaction, and opportunities to share knowledge and experiences.
- Each professional group should learn what the other professions know; what they are taught about particular topics and what their roles and skills are in particular situations.

## Dissemination

Findings from the focus groups were, or will be, presented at the following conferences:

Levett-Jones, T. How well are we preparing nursing, medical and pharmacy graduates to communicate and work as part of an interprofessional team? Findings from focus groups. Teaching and Learning Week: The University of Newcastle, 9 February 2012, Newcastle, Australia.

Gilligan, C., Levett-Jones, T. Interprofessional education (IPE): Enhancing the teaching of medication safety to nursing, pharmacy and medical students. School of Medicine and Public Health Conference – Qualitative Research: The University of Newcastle, 22 March 2012, Newcastle, Australia.

Levett-Jones, T. Interprofessional communication and medication safety: Workshop for Nurse Practitioners. 24 September 2012, Newcastle, Australia.

Gillman, L., Kidd, H., Hilmi, S., & Stewart-Wynne, E. Interprofessional Education and Medication Safety - Recent graduates experience and future direction. Interprofessional Education for Medication Safety Symposium, 29-30 November 2012, Newcastle, Australia.

Gilligan, C., Outram, S., & Levett-Jones, T. Preparing graduates for work in multidisciplinary healthcare teams – the reflections of graduates. Communicating Health Symposium, 4-5 December 2012, Melbourne, Australia.

Hilmi, S., Gillman, L., Kidd, H., & Stewart-Wynne E. Interprofessional education and medication safety: Recent graduates experience and future direction. 5th International Clinical Skills Conference, 19-22 May 2013, Prato, Italy.

Levett-Jones, T., & Gilligan, C. Preparing students to work as members of interprofessional health care teams – reflections of graduates. 5th International Clinical Skills Conference, 19-22 May 2013, Prato, Italy.

Five publications are in preparation for submission to peer-reviewed journals. Each publication focuses on a different theme or aspect of the data:

- Authenticity of undergraduate IPE experiences with a particular focus on a comparison between graduates who experienced the Perth Student Training Ward with others.
- Exploration of the relationships, teamwork and communication skills between health professional disciplines in the context of social contact theory – stereotypes and hierarchies.
- Exploration of relationships and professional roles through the lens of the Realistic Conflict and Social Identity theories.
- Presentation and analysis of the clinical examples of communication and teamwork provided by the graduates.
- Exploration of IPE experiences at university and presentation of recommendations for future efforts.

## Stage 2. Development of curriculum modules and learning and teaching materials

### Aim

The aim of this stage of the project was to develop and implement a range of multimedia resources that:

- Engage students with interactive, unpredictable and authentic 'patient journeys';
- Mirror the 'real world' of practice; and
- Enhance students' interprofessional communication skills related to medication practices.

### Research Design

#### Theoretical Framework

The approach taken and the resources developed in this project were informed by Canada's National Interprofessional Competency Framework (CIHC, 2010) which provides an integrative approach to describing the competencies required for effective interprofessional communication and medication safety. These competency domains highlight the knowledge, skills, attitudes and values required of health professionals and include:

- interprofessional communication;
- person-centred care;
- role clarification; and
- team functioning.

In order to optimise ways of embedding IPE into curricula in the Australian higher education context, the competency framework was used to identify relevant learning experiences along a continuum from simple to complex and to situate learning within clinically relevant medication related scenarios across a variety of simulated health care contexts.

The communication skills illustrated in the curriculum modules were based on the Oxford NOTECHS Scale. This Scale was originally used to describe the teamwork skills essential to aviation safety, and have since been adapted and used in healthcare settings (Mishra, Catchpole, & McCulloch, 2009). Table 1 presents the key teamwork and communication skills inherent in safe medication practices, structured to align with the Oxford NOTECHS Scale. The elements within each domain have been expanded in the modules to exemplify both positive and negative communication behaviours. The framework provided in Table 1 can be used by educators as prompts for reflection and discussion and/or as a way of assessing students' communications skills in relation to medication safety in virtual, simulated or actual clinical learning environments. The elements in the framework are specific, measurable, achievable, realistic and timely (SMART) (Levett-Jones & Bourgeois, 2011); they are designed to provide clarity to communication processes that are often vague and somewhat difficult to quantify.

Table 1  
*Teamwork and Communication Skills Inherent in Safe Medication Practices Aligned with the Oxford NOTECHS Scale*

<b>Domains</b>	<b>Elements</b>
Person-centred care	Including patient/family in discussion Seeking and considering patient's social and medical history Equipping patients with the skills to identify problems and to play an active role in their medication management
Teamwork and cooperation	Awareness of and respecting the roles of team members Supporting others Understanding needs of the team Managing conflict Asking for help Valuing others' contribution Sharing accountability and responsibility
Communication and interaction	Maintaining eye contact Demonstrating open body language Being polite and friendly Active listening Discussing together Asking questions Coordinating actions Expressing concerns freely Speaking up when unsure Communicating openly – including handover (ISBAR)
Leadership and management	Taking the initiative Maintaining clinical standards Delegating Demonstrating gradated assertiveness Creating a "no-blame" culture
Problem solving and decision making	Collaborative problem solving Shared option generation Shared risk assessment Shared decision making Reviewing outcomes
Situational awareness	Noticing Anticipating – identifying future problems and discussing contingencies Recognising the capabilities of others, cross-checking, and contacting outside sources when necessary
Adherence to guidelines	Being familiar and adhering to relevant guidelines, policies and evidence-based resources
Documentation	Documenting clearly, accurately, contemporaneously and concisely Accessing and clarifying medical records

## Development and Review of Learning and Teaching Materials

An iterative process was used to guide the development of the learning and teaching materials. Curriculum modules were developed collaboratively by members of the project team. The team discussed which topics would be included in each module; a range of settings (e.g. metropolitan, rural), health contexts (e.g. community pharmacies, mental health), and patient characteristics (e.g. age, multicultural background, level of education) were represented. The reference group and expert health professionals reviewed the scenarios for content accuracy, clinical relevance and authenticity. Further, students' evaluation and feedback informed the development of subsequent modules.

## Description of Learning and Teaching Materials

The learning and teaching materials developed for this project comprised:

- Web-based curriculum modules and multimedia resources that illustrate medication safety through a series of patient 'journeys'. The modules are also available on DVD.
- Facilitator and student guides providing supporting materials for the implementation and use of the educational resources.
- User evaluation and feedback survey.

The learning and teaching materials, additional resources and relevant links are currently available for viewing and/or download from the project website: <[www.ipeforqum.com.au](http://www.ipeforqum.com.au)> (Figure 2).

## Curriculum Modules and Multimedia Resources

The curriculum modules were designed to help students learn about medication safety and prepare for interprofessional clinical practice. The resources took into account the barriers to bringing different health professional students together to learn by providing a 'virtual' and 'vicarious' IPE experience. The multimedia resources provide opportunities for students to learn *from* and *about* each other even when they do not have the opportunity to learn *with* each other.

### *Format*

Each module includes a video recording detailing a patient 'journey' that is based on an actual clinical situation; a number are re-enactments or adaptations of coronial inquests or incident reports. The skills inherent in safe and effective medication and communication practices are illustrated with positive and negative examples.

Five modules have been developed; the scenario and learning objectives of each module is presented in Table 2.

### *Critical Thinking*

Although each module is distinct the resources use a consistent pedagogical approach and are supported by critical thinking questions designed to promote reflection and discussion. The critical thinking questions integrated throughout the modules have been designed to reinforce the key concepts and to extend understanding and application. It is anticipated that educators will develop supplementary questions that align with the learning objectives of their own course or unit.

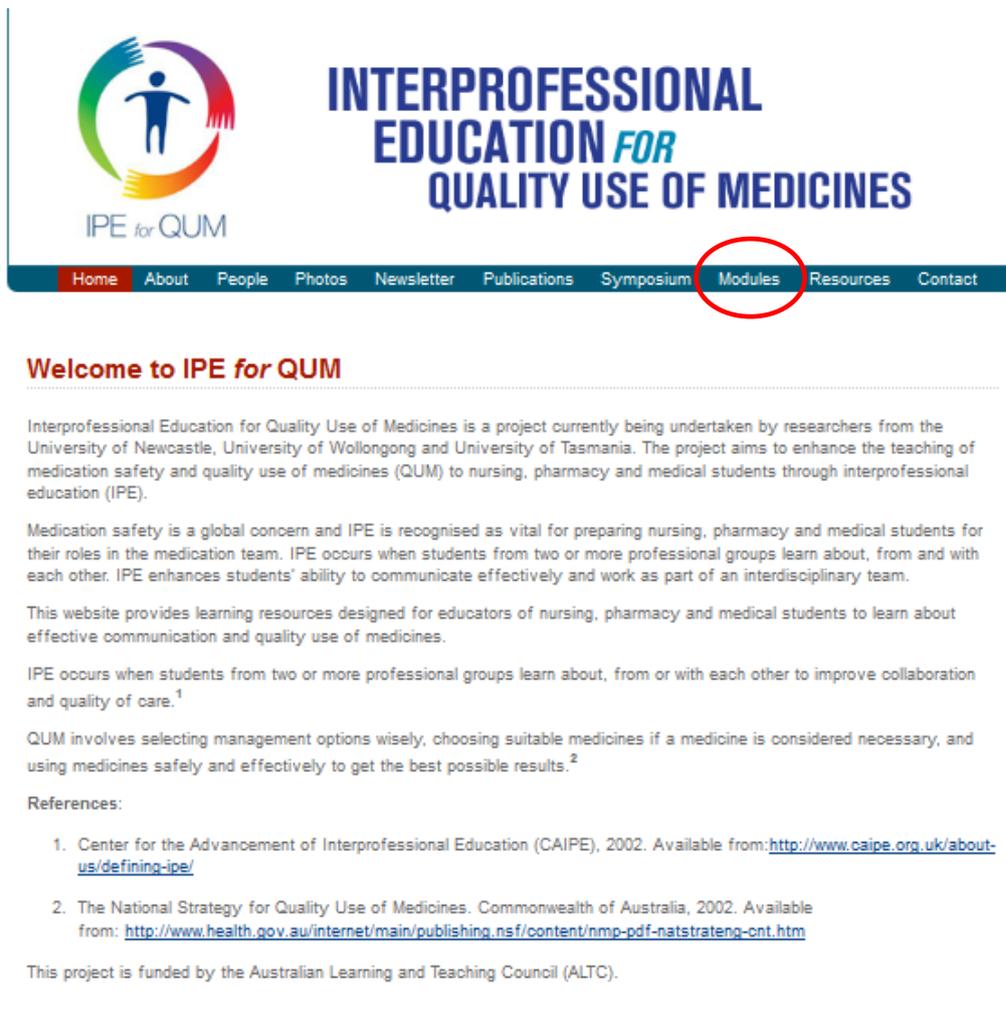


Figure 2. Screenshot from the IPE for QUM Project Website

### Level of Complexity

The modules can be used in ways that vary in complexity. For example, at a basic level students can be guided to observe and discuss communication behaviours. As students progress they have the opportunity to analyse communication factors (human and system) that led to a medication error/adverse drug event; and in this way a deeper understanding of the complexities of each topic and medication area can be developed. A module may be revisited at various stages of a health professional program, gradually increasing in complexity as students progress.

Table 2  
Description of Curriculum Modules

Module Title	Scenario	Learning Objectives	
Eileen Poole – Introductory Module	72 year old female visiting a medical centre for her 6-monthly diabetes management review. Eileen sees a Practice Nurse and General Practitioner, and then visits a local community pharmacy. This module considers the communication between the health professionals involved and Eileen Poole and how this communication impacts medication safety.	<ul style="list-style-type: none"> <li>• Understand the importance of person-centred care and its impact on patient safety.</li> <li>• Identify positive and negative communication behaviours and opportunities for improved interprofessional communication and handover beyond face-to-face interactions.</li> </ul>	
Vanessa Anderson	16 year old Vanessa died in 2005 as a result of a respiratory arrest due to the depressant effects of opioid medication. The scenario is based upon the findings from the Coroner’s report into her death. Although Vanessa’s death resulted from a combination of human and systems errors, this module focuses primarily on the communication and medication safety issues that occurred during Vanessa’s hospitalisation.	<ul style="list-style-type: none"> <li>• Understand the importance of clear verbal and written communication.</li> <li>• Identify human and system factors that result in adverse patient outcomes.</li> <li>• Recognise the dangers of complacency.</li> <li>• Understand the importance of person-centred care and the inclusion of the family as part of the healthcare team.</li> </ul>	
Mark Green	65 year old male brought to the emergency department following a motor vehicle accident with fractured right neck of femur. A series of errors and oversights through his care, including poor interprofessional communication and a reluctance to speak up about potential errors led to a near miss, with Mr Green narrowly escaping serious venous thromboembolism (VTE).	<ul style="list-style-type: none"> <li>• Communication between staff and during handover.</li> <li>• Documentation and clear identification of decisions.</li> <li>• Use of appropriate guidelines and protocols.</li> </ul>	

Module Title	Scenario	Learning Objectives
Gavin Sinclair	23 year old male who presents to the emergency department at a regional hospital after a minor car accident. A physical examination has cleared him of any physical injuries but Gavin's mental state is of concern to staff. This module explores the interprofessional interactions that occur to help ensure that Gavin's mental illness is managed appropriately.	<ul style="list-style-type: none"> <li>• Teamwork and handover practices.</li> <li>• Interprofessional interactions between staff.</li> <li>• Problem-solving and decision-making in relation to accuracy of diagnosis and treatment options.</li> <li>• Quality use of medications related to prescribing for schizophrenia and bipolar disorder.</li> <li>• Reflecting on the impact of attitudes and stigma on medication safety and communication.</li> </ul>
Young-Min Lee	18 month old male Korean infant who has been suffering from recurrent urinary tract infection and has a suspected urinary tract anomaly. He is mistakenly given IV gentamicin 4 hours after initial dose instead of 24 hours. The error is detected before it causes any harm. The module explores the communication that occurs within the healthcare team in detecting and correcting the problem, the issues associated with communicating with a patient from a culturally and linguistically diverse background, and the correct procedures for open disclosure.	<ul style="list-style-type: none"> <li>• Understand the importance of clear written instructions and speaking up if unsure.</li> <li>• Understanding the importance of open disclosure and being familiar with the best practice guidelines for communicating with a patient or carer (parent) after an error has occurred.</li> <li>• Understanding the importance of cultural competency as well as clear communication with culturally and linguistically diverse patients (steps associated with assessing need for an interpreter and accessing and using an interpreter via telephone).</li> </ul>



## Flexible Delivery

It is recognised that curricula differ substantially across Australian medical, pharmacy and nursing programs, with students learning about interprofessional communication and medication safety at different stages. For this reason the IPE for QUM modules have been flexibly designed so that educators can select the most appropriate resource to align with the particular learning objectives of their program, course or unit. The modules can be used as an e-learning resource or as stimulus materials in face-to-face lectures or tutorials. Both modes of delivery have merit and have been positively evaluated by students. The modules can be used in a self-directed way but also promote vigorous dialogue and debate when used for group work. Although these IPE modules provide an ideal platform for students from two or more professions to learn together, they are also effective when used for teaching single disciplines as they make explicit the roles and contributions of all members of the medication team.

## Facilitator and Student Guides

Two guides that accompanied the learning and teaching materials were also developed. A facilitator guide was designed to support educators in their use and integration of IPE and QUM into their teaching. It outlined the clinical, educational, theoretical and political drivers for IPE and discussed IPE as an ideal platform for teaching medication safety to nursing, pharmacy and medical students. A student guide was designed to support nursing, pharmacy and medical students as they learn about IPE and QUM.

The facilitator and student guidelines:

- Defined IPE.
- Provided a rationale for the integration of IPE and medication safety into curricula.
- Discussed the importance of teaching health professional students communication skills related to QUM.
- Provided guidance on the use of online IPE for QUM modules.
- Provided links to supporting materials and additional readings.

## Evaluation and Feedback Survey

Thirty-five students, academics and health professionals completed an online evaluation and feedback survey after viewing the modules available on the project website (<[www.ipeforqum.com.au](http://www.ipeforqum.com.au)>). A detailed summary of the survey responses is included as Appendix A. The majority of respondents were female (91%) and either had or were working towards qualifications in nursing (51%).

Overall, 46% and 20% of respondents reviewed the “Vanessa Anderson” and “Eileen Poole” modules, respectively. The modules were mostly used as an online self-directed activity (51%), and as an optional subject or course activity (23%). The modules were used by a single professional group (29%), as an interprofessional activity (23%), or both (6%). Seven respondents completed written tasks or activities as part of the module, including questions and answers, role plays and written reflection. Three respondents indicated that these activities formed part of the overall course assessment.

The modules were well received by most respondents. In particular, respondents felt the modules clearly demonstrated key messages about interprofessional communication and medication safety (Table 3). Respondents appreciated that actual cases were presented in the modules, and that they were easy to use:

*“That it was based on an actual case, proving that these things really do happen and that clear and concise IP communication (incl documentation) is essential to patient care.”*

*“I like the step by step way they are set out and the ability to redo them or go back while doing a module.”*

*The personal nature of the modules promotes person-centred care, so that the participants make a connection with the stories; this then links with the reflective questions and learning objectives.”*

*“As a visual learner being able to see a roleplay of how to communicate with patients effectively makes a big difference to how plan to be a future RN. Building up therapeutic communication with my patients will give them the confidence to disclose info.”*

*“Vanessa’s story humanised the problem of communication and medication errors.”*

Respondents provided the following suggestions for improvement:

- Include the thoughts and perceptions of the characters as they interacted with each other in the scenario (e.g. the health professional reflects on how busy they were during the consultation).
- Increase the number of question and answer activities.
- Include more clinical examples.
- Enhance the interactive nature of the modules.

Table 3  
*Evaluation of the Online IPE Modules (n=35)*

<b>Item</b>	<b>Mean (SD)*</b>	<b>N</b>
Easy to navigate and use	3.75 (1.21)	20
Clearly demonstrated key messages about interprofessional communication	4.00 (1.14)	21
Clearly demonstrated key messages about medication safety	4.05 (1.16)	21
Led to greater understanding of the importance of interprofessional communication and teamwork	3.90 (1.09)	21
<i>NOT</i> linked closely to the learning objectives in my course to be useful	2.29 (0.96)	21
I would recommend modules to students / academics	3.95 (0.94)	20
Supporting resources for staff and students were useful	3.94 (0.97)	17

\* Score out of 5; 1 = Strongly Disagree, 5 = Strongly Agree

## Conclusion

There is no end to the possible clinical scenarios that could form the basis of learning modules to demonstrate key interprofessional skills. We are confident though, that the five modules we have developed go some way toward meeting the needs of educators through the use of common clinical scenarios, a range of patient and clinician demographics and cultural and ethnic backgrounds, and illustrate the importance of a range of key communication and teamwork features.

It may be that in the future, these modules will need to be re-developed or modified to meet the demands of a changing clinical environment, new treatments and best practice guidelines. The modules are however, currently accurate and relevant for the clinical practice of all states of Australia.

## Dissemination

A suite of learning and teaching resources is available for viewing and/or download on the project website: <[www.ipeforgum.com.au](http://www.ipeforgum.com.au)>. As of November 2012, the website has had 44,302 hits in total; the modules web page has been viewed 4,581 times.

All attendees at the project symposium were provided with a DVD containing all five modules and were invited to share these with their colleagues and networks. Anecdotal feedback from symposium attendees indicates that several of the modules have already been used in a range of teaching and learning contexts including undergraduate and postgraduate education.

At The University of Newcastle, plans are underway for the development of interprofessional course and units for delivery in a range of health professional programs. The modules will be embedded within these units to provide stimulus material and preparation for tutorial activities and interprofessional activities which will be structured within clinical placements. Further, plans are in place to integrate the modules into interprofessional workshops that are run through the University Department of Rural Health.

The project team is also working with the Universities of Tasmania, Wollongong, New England, and the Sunshine Coast, and others to assist in finding ways to integrate the modules as part of a sustainable approach to IPE. The modules are currently used in a range of contexts and programs at The University of Newcastle and CQUniversity.

Information pertaining to this aspect of the project has also been disseminated via the following publications and conference presentations:

Levett-Jones, T., Gilligan, C., Lapkin, S., & Hoffman, K. (2012). Interprofessional education for the quality use of medicines: Designing authentic multimedia learning resources. *Nurse Education Today*, 32, 934-938.

Levett-Jones (Ed). (in press). *Critical conversations for patient safety: An essential guide for health professionals*. Frenches Forrest: Pearson.

Gilligan, C., Levett-Jones T., & Bellchambers, H. Quality use of medicines, interprofessional education and patient safety. Simulation and Beyond: Creative teaching approaches for improving patient safety symposium, 25-26 November 2010, Hunter Valley, Australia.

Levett-Jones, T., & Bellchambers, H. Interprofessional education: Enhancing the teaching of medication safety to nursing, pharmacy and medical students. Network of Clinical Coordinators Annual Meeting, 3 December 2010, Launceston, Australia.

Levett-Jones, T., Bellchambers, H., & Gilligan, C. Enhancing medication safety through the use of innovative multimedia, interprofessional communication and clinical reasoning. Healthcare Communication Symposium, 6 December 2010, Melbourne, Australia.

Levett-Jones, T., Bellchambers, H., & Gilligan, C. Interprofessional education: Enhancing the teaching of medication safety to nursing, pharmacy and medical students. Poster presentation, International Forum on Quality and Safety in Health Care, 5-8 April 2011, Amsterdam, The Netherlands.

Interprofessional education: enhancing the teaching of medication safety nursing, pharmacy and medical students

Levett-Jones, T., Gilligan, C., & Hoffman, K. Interprofessional education: enhancing the teaching of medication safety to nursing, pharmacy and medical students. 4th International Clinical Skills Conference, 22-25 May 2011, Prato, Italy.

Levett-Jones, T. Reality shows, mini-series, documentaries: A brave new world for nursing education. Invited speaker, The 14th National Nurse Education Conference, 11-13 April 2012, Perth, Australia.

Levett-Jones, T., & Connor, C. Project snapshot: Interprofessional education for quality use of medicines, ALTC project. Interprofessional Education for Medication Safety Symposium, 29-30 November 2012, Newcastle, Australia.

## Stage 3. Pilot testing and evaluation of curriculum modules and learning and teaching materials

Evaluation of the learning and teaching materials was performed through:

1. informal feedback on the modules and their use via a survey on the project website (previously discussed);
2. clinical simulations conducted with groups of pharmacy, nursing and medicine students to assess their performance in a clinical situation and demonstration of key teamwork and communication elements (as assessed with the modified Oxford NOTECHS Scale); and
3. a TPB-MSQ to assess the behavioural intentions of students who had viewed one of the modules, in comparison to those who had not viewed the modules.

A synopsis of points 2 and 3 is presented in this section.

### Aim

The aims of this stage of the project were to:

- Examine the impact of the learning and teaching materials on health professional students' communication competence in a clinical simulation.
- Examine health professional students' satisfaction with the simulation experience.
- Design and psychometrically test a TPB-MSQ to evaluate behavioural intentions in relation to medication safety and collaborative practice.
- Examine the impact of the learning and teaching materials on health professional students' behavioural intentions.

### Overview of Research Design and Participants

Reviews of the literature, discussions with the project reference group, and feedback from conference participants led us to revise the approach to evaluating the impact of the online resources from what was presented in our original proposal. While knowledge, student satisfaction and attitudes to IPE remain important, we recognised the need for measurement of the impact of the learning and teaching materials on application and translation of knowledge to practice.

In order to assess the actual application of skills, an interprofessional simulation was conducted, whereby a trio of students (one from each profession – nursing, pharmacy and medicine) worked together on a clinical problem, communicating with each other and a simulated patient (actor). Students also completed a questionnaire measuring their satisfaction with the simulation experience. The sessions were video recorded and an assessment scale based on the Oxford NOTECHS Scale was used to quantify the students' skills in relation to teamwork and communication (Mishra, Catchpole, & McCulloch, 2009). The simulations were followed by debriefing sessions with the students to explore their experiences.

A questionnaire instrument based on the Theory of Planned Behaviour (TPB) (Ajzen, 1991) was also developed. While the measurement of health professional students' actual clinical behaviour remains difficult, the TPB offers an opportunity to rigorously measure behavioural intentions as a proxy for actual changes in clinical practice. Further, existing

instruments that were considered in the original proposal were found to lack sufficient theoretical and psychometric rigour. While these instruments have been modified for context specific evaluation of other IPE experiences (McFadyen, Webster, Maclaren & O'Neill, 2010; Freeth, Reeves, Koppel, Hammick & Barr, 2005), no instruments exist for the evaluation of practical changes in the clinical behaviour. It is these behaviour changes which are often key objectives of educational initiatives, but which represent the greatest challenges to evaluation. The TPB-MSQ was validated by an expert panel and in a pilot study. It was then used in an intervention study to determine whether the online resources can influence student's attitudes and behavioural intentions in relation to medication safety.

The research was approved by The University of Newcastle Human Research Ethics Committee.

## 1. Clinical Simulations

### Sample and Recruitment

Undergraduate and postgraduate nursing, pharmacy and medicine students from The University of Newcastle were invited to participate via advertisements placed on Blackboard (a web-based learning management system at the University). Students who agreed to participate were randomised to either the experimental or control group.

### Intervention and Clinical Simulation

Students assigned to the experimental group were asked to view and work through one of the modules (Mark Green – VTE prophylaxis) accessed via the internet. The control group did not receive any additional materials; they were given access to the modules after their participation in the project.

Both groups participated in a 20-minute clinical simulation with students from other health professions. An actor played the role of the patient. The scenario introduced Mrs Victoria McKnight, a 73 year old woman presenting with acute post-operative pain following surgical removal of the uterus, ovaries, fallopian tubes and related lymph nodes for ovarian cancer. The therapeutic management of Mrs McKnight's pain and in particular, the communication required by the health professionals involved in her care was the focus of the simulation. All participants received detailed information about the scenario prior to entering the simulation. Their role was to act according to their professional role in dealing with the clinical situation outlined.

### Data Collection and Analysis

Demographic information (e.g. age, gender, country of birth, previous experiences with IPE or the online modules) were collected from each participant.

Satisfaction with the simulation experience was measured using an 18-item questionnaire termed the Satisfaction with Simulation Experience (SSE) Scale. This instrument was developed as part of a previous ALTC project (CG8-679) and has proven validity and reliability (Levett-Jones et al., 2011). It includes items on: de-brief and reflection; communication and teamwork; and clinical relevance and reflection of learning. The items were scored using 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Open-ended questions asked participants if they wished to make any further comments about the simulation, such as the benefits and challenges they experienced.

An experienced facilitator conducted each simulation and debrief. Simulations were video recorded to enable the students' performance in the clinical simulation to be analysed and rated against a set of behavioural criteria based on the Oxford NOTECHS Scale (Table 1).

Students were evaluated on whether or not they exhibited the target behaviours included under each domain. A score was given for each domain based on the number of positive behaviours demonstrated. A debriefing session occurred after each simulation in which the participants discussed and reflected on their experience with the facilitator and actor (patient).

Responses to the SSE and Oxford NOTECHS Scales were analysed using descriptive statistics.

## Results

Nineteen students from nursing (n=8), medicine (n=7) and pharmacy (n=4) participated in the clinical simulations. The majority of participants were female (68%, n=13), younger than 30 years of age (63%, n=12), were born in Australia (84%, n=16), and had some experience learning with other health professionals, mainly while on clinical placement (74%, n=14).

### *Students' Performance*

Students in both the experimental and control groups performed well in the domains of teamwork and cooperation, leadership and management, and situational awareness on the Oxford NOTECHS Scale (Table 4). Students on average received scores above 80% in these domains (i.e. over 80% of the target behaviours were displayed). Students performed least well in the domain of communication and interaction. Nursing students appeared to perform better than both pharmacy and medicine students in a number of domains including person-centred care and problem solving and decision making (Table 5). However, due to the small sample size, it was not possible to conduct any meaningful comparisons between groups.

Table 4  
*Students' Score on Each Domain of the Oxford NOTECHS Scale According to Intervention (n=19)*

<b>Domain</b>	<b>Control Group (n=7)</b>	<b>Experimental Group (n=12)</b>
Person-centred care	68.3%	71%
Teamwork and cooperation	90%	86.6%
Communication and interaction	64%	57.6%
Leadership and management	81.7%	84.6%
Problem solving and decision making	88.3%	72.2%
Situational awareness	94.3%	86.6%
Total (mean)	79.3%	74.4%

Table 5  
*Students' Score on each Domain of the Oxford NOTECHS Scale According to Profession (n=19)*

Domain	Nursing (n=8)		Medicine (n=7)		Pharmacy (n=4)	
	Mean Score*	%	Mean Score*	%	Mean Score*	%
Person-centred care	2.75/3	92	1.71/3	57	1.33/3	44
Teamwork and cooperation	4.88/5	97.5	3.86/5	77	4.34/5	87
Communication and interaction	6.13/8	76.6	3.43/8	42.8	4.75/8	59.4
Leadership and management	2.87/3	96	2.14/3	71	2.67/3	89
Problem solving and decision making	2.88/3	96	1.57/3	52	2.5/3	50
Situational awareness	2/2	100	1.57/2	79	1.75/2	88
Total (mean)	23/25	92	15/25	60	19.25/24	77

\* Mean score out of the total possible score for each domain

#### *Students' Satisfaction with Simulation Experience*

Overall, students were very satisfied with the simulation experience. Mean SSE scores ranged from 4.13 to 4.84 across the questionnaire items (Table 6). There were no differences in SSE scores in the experimental and control groups, or for nursing, pharmacy and medicine students.

From the participants' open-ended responses it is evident that they highly valued the simulation experience. They described it as "excellent", "very positive" and that it "should be a compulsory part of the curriculum". Students felt that the experience enhanced their understanding of each other's roles and responsibilities in the medication team, and the importance of teamwork. It also led them to view the other professions as a valuable knowledge source.

*"Good to learn with other professionals, physically, not just in tutorials. It gave us experience about the role the other health professionals play."*

*"Effectively communicating with the nurse and utilising them as valuable resource in clinical setting."*

*"Really beneficial to start regarding other disciplines as resources, as usually the faculties are very separate."*

Table 6  
*Students' Satisfaction with Simulation Experience Scores (n=19)*

<b>Item</b>	<b>Mean (SD)*</b>
<b>De-brief and Refection</b>	
The facilitator provided constructive feedback during the debriefing	4.79 (0.42)
The facilitator summarised important issues during the debriefing	4.74 (0.45)
I had the opportunity to reflect on and discuss my performance during the debriefing	4.68 (0.48)
The debriefing provided an opportunity to ask questions	4.37 (0.68)
The standardised patient provided feedback that helped me to develop my communication skills	4.42 (0.84)
Reflecting on and discussing the simulation enhanced my learning	4.84 (0.37)
The facilitator's questions helped me to learn	4.63 (0.50)
I received feedback during the debriefing that helped me to learn	4.74 (0.45)
The facilitator made me feel comfortable and at ease during the debriefing	4.63 (0.50)
<b>Communication and Teamwork</b>	
The simulation developed my communication skills	4.63 (0.50)
The simulation developed my ability to work as part of an interprofessional team	4.53 (0.51)
The simulation enabled me to demonstrate my therapeutic communication skills	4.37 (0.60)
The simulation helped me to recognise the relationship between effective communication skills and medication safety	4.68 (0.48)
This was a valuable learning experience	4.79 (0.42)
<b>Clinical Relevance and Application of Learning</b>	
The simulation caused me to reflect on my communication skills	4.68 (0.58)
The simulation tested my ability to communicate with other health professional students	4.74 (0.45)
The simulation helped me to apply what I learned from the online modules	4.13 (1.88)
The simulation helped me to recognise my communication strengths and weaknesses	4.74 (0.56)

\* Score out of 5; 1 = Strongly Disagree, 5 = Strongly Agree

Students also felt that the simulation helped them to identify their own strengths and areas on which to improve. In particular, it gave students the opportunity to practice their communication skills with other health professionals.

*“I found this simulation to be very helpful in identifying my own strengths and weaknesses. I think it is beneficial having the different disciplines and hearing about the experience from their point of view.”*

*“It was good to be able to practice interprofessional communication so that it will be easier to do when I graduate.”*

Further, students commented on the authenticity of the clinical scenarios:

*“It enhances learning in ‘real life situation’. Presents challenges that can be present in the real world.”*

*“Benefits – experience/proactive in situation closer to working life.”*

*“Understanding of the dynamics of the multidisciplinary team. Testing medical skills and knowledge in a life like scenario.”*

## Limitations

A number of factors impacted on our ability to recruit sufficient numbers of participants into the simulation study. These included timetabling clashes which made it difficult to identify appropriate times common to each group of students, and a lack of willingness from students in participating in a non-compulsory activity. With heavy workloads and assessments, it was particularly difficult to recruit pharmacy students, resulting in some simulations running without this third professional group. To improve participant numbers, an additional site at the University of New England was included in the study but similar pragmatic constraints prevented any recruitment at this site. Therefore the simulations are unable to provide evidence for the effectiveness of the modules.

## 2. Theory of Planned Behaviour Medication Safety Questionnaire

### Survey Development

#### *Theory of Planned Behaviour*

The TPB posits that behavioural intentions are the main determinants of actual behaviour, and that these intentions are in turn determined independently by three domains: attitudes; subjective norms (e.g. perceptions of social pressure); and perceived behavioural control (Ajzen, 1991). The assumption behind TPB is that aggregating these variables provides a valid measure of underlying behavioural disposition. As a general rule, the more favourable the attitude and subjective norm, and the greater the perceived control, and the stronger will be the person’s intention to perform the behaviour in question. Given a sufficient degree of actual control over the behaviour, people are expected to carry out their intentions when the opportunity arises. The TPB has emerged as one of the most robust conceptual models for the study of human behaviour across behavioural and social domains, including social and cognitive psychology, advertising, marketing, healthcare, and communications (Alt & Lieberman, 2010). A review of Medline and PsycINFO scholarly databases between 1985 and 2004 identified over 800 studies that used the TPB as the theoretical basis (Francis et al., 2004).

## Questionnaire Items

A stepwise approach was used to develop the TPB-MSQ. It involved both qualitative and quantitative methods based on guidelines for the construction of the TPB questionnaires (Francis et al., 2004) and the essential elements of questionnaire design and development (Streiner & Norman, 1995). The steps included:

- Focus groups with recent nursing, pharmacy and medicine graduates (as described in Stage 1 of the project) to identify the beliefs underlying their motivations for interprofessional practice and medication safety.
- Content validity assessment of the questionnaire by an expert panel. Members were asked to judge each scenario for clinical relevance and each item for accuracy, reliability, and ability to measure what was intended. A rating tool designed for this purpose was utilised to ensure consistent and focused feedback.
- Pilot testing. A web-based version of the questionnaire was pilot tested with a convenience sample of 50 nursing, medicine and pharmacy students. The reliability for the entire questionnaire was 0.889. The reliability of the TPB components showed coefficient alphas of 0.659 for attitude, 0.816, for behaviour control, and 0.650 for subjective norm.

The final version of the TPB-MSQ consisted of four scenarios and 41 items that measured behavioural intentions, including attitudes (n=15), perceived behavioural control (n= 14), and subjective norms (n= 12), in relation to medication safety and collaborative practice. The four scenarios focussed on behaviours related to medication safety issues such as managing medication errors, open disclosure, managing interruptions, and person-centred care, drawing on key elements of the Oxford NOTECHS Scale. The items were scored using 7-point Likert scale from 1 (strongly disagree) to 7 (strongly agree) with higher scores indicating a stronger intention to perform the target behaviour.

## Sample and Recruitment

Nursing, pharmacy and medical students in at least their second year of enrolment in Australian and New Zealand universities were eligible to participate in the study. Electronic mail messages (email) were sent to heads of schools of the universities. The email included a cover letter explaining the importance of the research and an information statement including a link directing participants to a secure survey website. Reminder messages were sent after two weeks to those heads of schools who did not respond the initial invitation, and further reminders were sent approximately three weeks following that.

A quasi-experimental approach was employed to enable comparison between an experimental and control group. The universities were divided into two groups based on their geographical location.

## Intervention

Participants in the experimental group were asked to work through a multimedia medication safety IPE module (Mark Green – VTE prophylaxis) before completing an online questionnaire. Students were also provided with supporting documents including: VTE prevention guidelines and risk assessment and the coroner's report on which the module was based. Those in the control group completed the same questionnaire without viewing the module; these participants were given access to the learning resources once data collection was complete.

## Data Collection and Analysis

Demographic information (e.g. gender, previous experiences with IPE) were collected from each participant. Participants' behavioural intentions in relation to medication safety were measured using the TPB-MSQ as described above.

Statistical analyses were conducted using the Statistical Package for the Social Sciences statistical software package version 20.0 for Mac OS X (SPSS Inc., Chicago, IL, USA). Independent *t*-tests were used to compare the groups for discrepancies. Demographic data relating gender and previous IPE experience were analysed using the chi-square test. A *p*-value of less than 0.05 was considered statistically significant for the outcome variables.

## Results

A total of 320 undergraduate health professional students from 11 universities participated in the study. Most of the participants were from nursing (89%; *n*= 284), with smaller numbers from medicine (6%; *n*=16) and pharmacy (5%; *n*=15). No significant differences existed in relation to gender and previous IPE experience between the groups at baseline.

The effect of the module on behavioural intentions in relation to medication safety is described in Table 7. Participants in the experimental group reported a statistically significant greater intention to practice in a way that enhances medication safety [*t* (290) = -4.723, *p* = 0.000], and had a more positive attitude towards performing the target behaviour [*t* (290) = -4.203, *p* = 0.000]. Although not statistically significant, the results also indicate that students in the experimental group had higher mean scores in perceived behavioural control [*t* (290) = -1.616, *p* = 0.107] and subjective norm [*t* (290) = -1.579, *p* = 0.115]. Gender and previous interprofessional education experiences did not have statistically significant effects on any outcomes.

Table 7  
*Effects of Module on TPB-MSQ Variables*

Variable	Control Group ( <i>n</i> =144) Mean (SD)*	Experimental Group ( <i>n</i> =148) Mean (SD)*
Intention	2.93 (1.15)	3.47 (0.77)†
Attitude	5.27 (0.61)	5.55 (0.51)†
Perceived behavioural control	5.11 (0.73)	5.25 (0.67)
Subjective norm	5.36 (0.64)	5.48 (0.63)

\* Score out of 7; 1 = Strongly Disagree, 7 = Strongly Agree

† Statistically significant, *p*=0.000

## Future Directions and Further Research

Our intention is to explore clinical placement-based IPE opportunities and to integrate the online modules as part of a blended approach in this way. We have identified logistical challenges of face-to-face on campus IPE experiences but recognise clinical placements as potential settings for engaging IPE experiences. A blended approach, using the online modules to establish base understanding of professional roles and the key factors associated with interprofessional communication and patient safety could help to ensure students better engage with IPE opportunities during placement to achieve learning objectives.

Following this project, the team will work towards the development of an interprofessional course for health professional students at The University of Newcastle (as part of a University of Newcastle Teaching and Learning Grant led by Dr Conor Gilligan). Arising from the recommendations of graduates and the identification of gaps in IPE opportunities, the project leaders, along with a number of other Faculty members have obtained funding for a project in 2013 which will identify opportunities for IPE in clinical placements and seek to structure IPE activities within the learning objectives and activities outlined for students. These activities will both provide opportunities for the IPE modules to be embedded in student learning.

With their basis on design principles of flexible delivery, varied complexity, clinical authenticity and consistent pedagogy, as well as their accessibility, the learning modules are ideally placed to be used and embedded in a wide range of health professional education programs and contexts, and in a variety of locations.

## Conclusion

While we cannot draw evidence for the effectiveness of the modules from the simulation process, we gained a great deal of rich data from this process. Feedback from the students who participated indicated that the opportunity to learn alongside other students was an invaluable learning experience, anecdotally reinforcing for them, the importance of interprofessional communication and providing an opportunity for learning about other professional roles and levels of knowledge. The apparent benefit gained from such a simple face-to-face experience raises the question of whether the online modules can in fact mirror a simulation experience. These findings reinforce that the most effective use of the modules may be as stimulus material to sensitise students to the learning opportunities that present in clinical placement and other face-to-face contexts.

The online modules are demonstrated to impact positively upon behavioural intentions, and are well-received by students. While online modules may not achieve all of the desired learning outcomes, given the challenges of face-to-face IPE and the flexibility of online approaches, it is likely that blended approaches will be much more feasible for sustainable IPE efforts.

## Dissemination

Findings from this stage of the project were presented at the following conferences:

Lapkin, S., Levett-Jones, T., & Gilligan, C. Measuring health professional student's intention to behave in a way that promotes medication safety using the Theory of Planned Behaviour. All Together Better Health VI (ATBH VI), 5-8 October 2012, Kobe, Japan.

Lapkin, S., Levett-Jones, T., & Gilligan, C. The effectiveness of web-based interprofessional learning resources on health professional student's behavioural intentions in relation to medication safety – A quasi-experimental study. Interprofessional Education for Medication Safety Symposium, 29-30 November 2012, Newcastle, Australia.

Two publications are under review in peer-reviewed journals:

Lapkin S, Levett-Jones T, Gilligan C. Development and psychometric testing of the Theory of Planned Behaviour Medication Safety Questionnaire. *Journal of Interprofessional Care*.

Lapkin S, Levett-Jones T, Gilligan C. The effectiveness of web-based interprofessional learning modules on health professional student's behavioural intentions in relation to medication safety: A quasi-experimental study. *Journal of Interprofessional Care*.

## Collaboration and Linkages

It is important to note that although the aim of the project was to enhance the use of IPE as a teaching and learning approach, in reality our entire project was an example of an interprofessional collaborative. The commitment and expertise of an interprofessional project team and the reference group was invaluable to the project. Specifically, linkages were made with the professions of nursing, midwifery, medicine, pharmacy, communication, multimedia production and information technology. Importantly, the project processes facilitated several connections made with groups (including educators, clinicians and researchers) with shared goals for IPE and the establishment of systemic and sustainable IPE efforts across Australia and New Zealand. For example, the project leads contributed to the project “Curriculum Renewal for Interprofessional Education in Health”, through an interview with the project team, a case study report to share our experiences and taking part in their workshop “Towards Interprofessional Health Education” in Sydney in July 2012. The project has also enabled a strong connection and resource sharing with the Australasian Interprofessional Practice and Education Network (AIPPEN). These connections have not only alerted us to knowledge and information that has enhanced our project, but they also represent a key channel for the dissemination of our outcomes, and in particular the dissemination and use of the learning modules.

## Reference Group

The project team was supported by a reference group with 13 members from peak nursing, pharmacy and medicine groups. Members provided input into the project through expertise in their professional fields, medication safety, interprofessional communication, clinical reasoning, instructional design and survey methods.

The reference group met three times during the project to provide constructive feedback on the design and development of the project and to ensure that the project had maximum impact across the sector. The reference group also provided advice and support via teleconferences and e-mail as required.

## Newsletters

Nine bi-monthly newsletters were distributed to health professionals, academics and students with an interest in IPE and medication safety. The newsletters provided regular updates on the progress of the project, publications and presentations by the project team members, current news and events. Some 142 individuals are currently listed on our mailing list to receive these newsletters.

## Collaborations

The collaborations established through this project have led to:

- The development of the Research Centre for Health Professional Education (see [www.newcastle.edu.au/research-centre/health-professional-education/](http://www.newcastle.edu.au/research-centre/health-professional-education/)).
- A partnership between The University of Newcastle (involving the project leaders Professor Tracy Levett-Jones and Dr Conor Gilligan and team member Associate Professor Rohan Rasiyah), The University of NSW, Australian Catholic University, the University of Technology Sydney, the University of Western Sydney and Smart Sparrow web developers. The project “Interprofessional Communication in Healthcare (InCH)” is funded by Health Workforce Australia as part of their Simulated Learning Environments Program.

- Links with researchers at the University of Technology Sydney involved in the OLT funded project “Curriculum Renewal for Interprofessional Education in Health”.
- Links with international scholars. Professor Debra Humphris (University of Southampton) and Dr Simon Forest (Durham University) visited The University of Newcastle and were engaged in a number of activities designed to enhance research opportunities and collaboration related to IPE. Professor Humphris was a key note speaker at the “Interprofessional Education and Medication Safety Symposium” and facilitated the ‘Fringe Event’ prior to the symposium.

## Project Symposium

A symposium for the project “Interprofessional Education for Medication Safety Symposium” was held 29-30 November 2012, in Newcastle NSW. The symposium was open to academics educators from all health professions and 57 people attended. The symposium focused on the contemporary issues of IPE and medication safety. The following themes were chosen to reflect current research, practice, and teaching and learning innovations:

- The impact of IPE on patient safety.
- Integration of IPE into curricula.
- Medication safety and IPE.
- Teamwork and interprofessional communication.

The symposium provided an opportunity for the project team to share our findings with other academics and educators in this field, and to share in the IPE and QUM research or teaching and learning experiences of others. The symposium showcased the teaching and learning and research activities occurring nationally in this important and growing field. Plenary and concurrent sessions were given, and international and nationally renowned experts were invited to present on topics such as learning and working in teams, implementing IPE, and curriculum renewal. The symposium program is available on the project website <[www.ipeforqum.com.au](http://www.ipeforqum.com.au)>.

The symposium was described as “high quality”, “extremely valuable” and “well-pitched”. A summary of the evaluation scores are provided in Table 8.

Table 8  
*Symposium Evaluation Scores (n=18)*

<b>Item</b>	<b>Mean (SD)*</b>
The symposium enabled me to reflect upon the challenges and opportunities that I face implementing IPE initiatives	4.50 (0.62)
The symposium enabled me to reflect upon the challenges and opportunities that I face implementing medication safety initiatives	4.35 (0.70)
I identified strategies for collaboration and networking with my colleagues that are likely to enrich my work and enable me to progress IPE initiatives	4.06 (0.73)
I identified strategies for collaboration and networking with my colleagues that are likely to enrich my work and enable me to implement medication safety initiatives	4.00 (0.71)
The symposium helped to provide some possible solutions to challenges I face in my own work	4.00 (0.59)
The symposium was logically structured	4.39 (0.50)
There was adequate time for discussion and exchange	4.39 (0.50)
Guest speaker and symposium dinner presentations (relevant, engaging and interesting)	4.63 (0.53) 4.40 – 4.80†
Symposium organisation, facilities and catering	4.68 (0.58) 4.53 – 4.88†
I intend to follow up with colleagues I met at the symposium	4.11 (0.83)
Outcomes from the symposium will help contribute to my future work	4.39 (0.61)

\* Score out of 5; 1 = Strongly Disagree, 5 = Strongly Agree

† Range of means for included items

# Summary of Project Outcomes

A summary of the project outcomes, deliverables and dissemination is presented in Table 9.

## Critical Success Factors

### Interprofessional Approach

The commitment and expertise of an interprofessional project team and reference group was beneficial to the project. Each stage of the project was underpinned by transparency and inclusion of all team and reference group members. Input and advice was sought throughout the project to ensure that genuine interprofessional collaboration was achieved, and ensure that the learning and teaching materials were authentic and relevant to all professions involved. In this way, the process of conducting the project was itself an example of a successful interprofessional endeavour.

### Reference Group

The project team was fortunate to have a committed and engaged reference group involved in the project. Feedback from the reference group has been particularly important in the design of the cross-sectional survey instrument and the quasi-experimental study, and in critiquing the proposed content and format of the learning and teaching materials. The reference group also highlighted and provided links with a number of important organisations and stakeholders to which the outcomes of this study should be disseminated.

### Communication

As the project was conducted by a large project team, effective communication processes were implemented to assist the progress of the project. The project leaders met fortnightly and regular meetings with the project team (both face-to-face and via teleconference) were held each month. In addition, good relationships with external services involved in producing the multi-media resources ensured that a quality product was received in timely manner.

Early and ongoing dissemination of the project was also important to the project success. A bi-monthly newsletter for the project team, reference group members and other interested stakeholders was produced to ensure that they were kept appraised on the progress of the project and provided with information that was appropriate for dissemination. Further, presenting the project at a number of conferences, seminars and workshops provided opportunities for peer feedback.

Table 9

*Summary of Project Outcomes, Deliverables and Dissemination*

Planned Outcomes	Actual Outcomes / Deliverables	Dissemination
<p><b>Outcome 1:</b> Enhanced understanding of the extent to which IPE is used in Australian and New Zealand universities to teach health professional students about medication safety.</p>	<ul style="list-style-type: none"> <li>• Cross-sectional survey of Australian and New Zealand universities</li> <li>• Focus group study of recent nursing, pharmacy and medical graduates</li> </ul>	<ul style="list-style-type: none"> <li>• Publications (n=1)</li> <li>• Presentations (n=8)</li> </ul>
<p><b>Outcome 2:</b> Recommendations related to enhanced effectiveness, efficiency and feasibility in using IPE to teach health professional students about medication safety.</p>	<ul style="list-style-type: none"> <li>• Systematic review examining the effectiveness of interprofessional education in university-based health professional programs</li> </ul>	<ul style="list-style-type: none"> <li>• Publications (n=2)</li> <li>• Presentations (n=1)</li> </ul>
<p><b>Outcome 3:</b> Improved interprofessional communication in students involved in the pilot study.</p> <p><b>Outcome 4:</b> Improved knowledge of medication safety in students involved in the pilot study.</p>	<ul style="list-style-type: none"> <li>• Learning and teaching materials comprising: <ul style="list-style-type: none"> <li>- Web-based (and DVDs) curriculum modules and multimedia resources that illustrate medication safety through a series of patient 'journeys'</li> <li>- Facilitator and student guides providing supporting materials for the implementation and use of the educational resources</li> </ul> </li> <li>• Web site providing information about the project and hosts the learning and teaching materials developed</li> <li>• Quasi-experimental studies</li> <li>• Instrument developed to assess behavioural intention in relation to medication safety (TPB-MSQ)</li> </ul>	<ul style="list-style-type: none"> <li>• Publications (n=2)</li> <li>• Publications under review (n=2)</li> <li>• Presentations (n=9)</li> <li>• Curriculum modules (n=5)</li> <li>• Facilitator and student guides (n=2)</li> <li>• Website &lt;<a href="http://www.ipeforqum.com.au">www.ipeforqum.com.au</a>&gt;</li> </ul>
<p><b>Outcome 5:</b> Enhanced interprofessional collaboration between members of the project team and reference group. This will provide ongoing opportunities for working together on projects designed to improve students' medication practices.</p>	<ul style="list-style-type: none"> <li>• Reference group meetings (n=3)</li> <li>• Project symposium "Interprofessional education for medication safety symposium" 29-30 Nov 2012, Newcastle NSW</li> </ul>	<ul style="list-style-type: none"> <li>• Bi-monthly project newsletters (n=9)</li> <li>• Project symposium (n=57 attendees), presentations are available on the project website</li> </ul>

## Intellectual Property and Confidentiality

As with similar projects with which we have been involved, working with a large team and a large reference group required issues such as management of intellectual property, authorship guidelines and confidentiality to be clarified from the outset. Through discussion consensus was reached on these issues. The project team followed an Authorship of Research Policy. Further, a memorandum of understanding for each team member was drafted, outlining the contributions and outcomes (e.g. publications) for each of the individuals involved. Terms of Reference for the reference group were developed, and a Confidentiality Agreement to prevent premature dissemination of 'work in progress' and untested instruments was signed by all reference group members. A shared commitment and collegiality to project activity and publication contributed to the success of the project.

## Inclusion of a PhD Candidate

A PhD student formed part of the team. The candidate's roles and responsibilities, and the elements of the project that would comprise their PhD studies were clearly defined at the commencement of the project and were discussed with the project team. Overall, his contributions to the project were invaluable; the aspects in which he was involved were completed on schedule and have been published in peer reviewed journals.

## Organisational Support

An important factor contributing to the success of the project was the provision of adequate support from the organisation (school, faculty and university). For example, access to the simulation unit for filming, IT support in designing the project website, and administrative assistance. A number of the members of the project team have been fully funded by The University of Newcastle to attend conferences and this has ensured ongoing dissemination. Organisational support for promoting IPE resulted in the development of the Research Centre for Health Professional Education at The University of Newcastle. We also found that having team members with positional authority and professional credibility was important for the progress the project, accessing the required support, recruiting participants, and ensuring practice change.

## Unexpected Successes and Future Research

Engaging colleagues both within our organisation(s) and across the sector was essential to the uptake of the learning and teaching initiatives and to education practice and change. As such, an unexpected success of the project was the development of the Research Centre for Health Professional Education at The University of Newcastle, under the lead of Professor Tracy Levett-Jones (see [www.newcastle.edu.au/research-centre/health-professional-education/](http://www.newcastle.edu.au/research-centre/health-professional-education/)).

The project also led to success in gaining funding in 2012 to develop an interprofessional course for health professional students at The University of Newcastle (University of Newcastle Teaching and Learning Grant led by Dr Conor Gilligan).

Arising from the recommendations of graduates and the identification of gaps in IPE opportunities, the project leaders, along with a number of other Faculty members were successful in obtaining funding for a project for 2013 to be led by Professor Tracy Levett-Jones which will identify opportunities for IPE in clinical placements and seek to structure IPE activities within the learning objectives and activities outlined for students (The University of Newcastle Teaching and Learning Grant). This will then inform the development of a subsequent OLT grant.

The University of Newcastle (involving the project leaders Professor Tracy Levett-Jones and Dr Conor Gilligan, as well as project team member Associate Professor Rohan Rasiah and other Faculty of Health representatives) is a partner in a project funded by Health Workforce Australia as part of their Simulated Learning Environments Program. The project (Interprofessional Communication in Healthcare; InCH) is a partnership between the University of NSW, Australian Catholic University, The University of Newcastle, The University of Technology, Sydney, the University of Western Sydney and Smart Sparrow web developers.

Further, the project led to the development of an instrument measuring behavioural intention in relation to medication safety and collaborative practice, based on the TPB. While the measurement of health professional students' actual clinical behaviour remains difficult, the TPB-MSQ offers an opportunity to rigorously measure behavioural intentions as a proxy for actual changes in clinical practice.

Finally, a book entitled "Critical conversations for patient safety – an essential guide for health professions" will be published by Pearson in 2013. The need for and relevance of this book became apparent as a consequence of this project.

## Factors Impeding the Success of the Project

### Personnel Changes and Workloads

We experienced a number of unexpected personnel changes within the project management position and the project team. These had impacted upon productivity, with time taken for hand-over procedures and for each new person to become familiar with the project, the processes and tasks involved. The project leaders took on additional roles to minimise the impact of these challenges on the productivity of the project and have kept the project on track in terms of deliverables and timelines. In addition, we invited additional team members onto the project with methodological expertise applicable to conducting quasi-experimental studies in teaching and learning, and in the assessment of IPE.

### Participant Recruitment

As mentioned previously, a number of barriers to recruiting students into the pilot study were experienced. To improve participant numbers, an additional site at the University of New England was included in the study but similar pragmatic constraints prevented any recruitment at this site. This issue reinforces the challenges associated with face-to-face IPE, particularly in 'on-campus' settings. These issues and challenge serve to strengthen our resolve to achieve IPE through a combination of web-based or multimedia resources and opportunities on clinical placement.

## Evaluation

Formative feedback on each stage of the project was provided by the reference group at face-to-face meetings and by email communication. Individual members of the reference group also met with the project team to address specific stages of the research and provided valuable insights and critical feedback. The insights of the members of the reference group, all experienced health professionals and researchers in the fields of interprofessional communication and medication safety, has helped to ensure that our project adds to this body of work in a substantial way without replicating previous work. The advice and support of a reference group who believed in the worth of the project and who were committed to its success was an ongoing source of encouragement and contributed to the quality and dissemination of the project outcomes.

Presenting the project at a number of conferences, seminars and workshops provided opportunities for peer feedback. Submitting our work for publication also allowed for blind review and feedback. Feedback from peers at our respective universities has been encouraging and helped us to appreciate the potential impact of our project on teaching and learning approaches in undergraduate nursing and other health professions. Widespread adoption at The University of Newcastle, as well as other universities, further affirms this.

Meetings with the project evaluators have been conducted and email communication maintained. This enabled the evaluators to monitor progress and to provide feedback to the team. Feedback from the project evaluators caused us to carefully consider aspects of the project that may present potential risks to the project's success and to develop appropriate risk management strategies. A summative project evaluation was conducted and is available as Attachment 1 in Part 2 of the report.

Of significant importance was the ongoing feedback we received from students. Their feedback provided via anonymous surveys (as previously described) and as unsolicited feedback has been consistently positive and affirms the importance of not only our project but also the importance of investing in and continuing to examine interprofessional education experiences.

## Impact of the Project

The findings of this project contribute valuable knowledge to the field of IPE. The systematic review, cross-sectional survey and focus groups all reinforced the need for efforts to improve IPE, and provided some suggestions for appropriate approaches to meet this need. The modules developed through this project offer a starting point for IPE and can be used in a range of contexts and styles to increase students' and health professionals understanding of the importance of interprofessional teamwork and communication to promote medication safety. Importantly, the TPB-MSQ provides educators with a valid tool for the evaluation of IPE activities. It has long been a challenge for educators to assess the impact of educational efforts on actual behaviour or clinical practice. In recognition of these challenges, the TPB-MSQ uses behavioural intention as a valid proxy for actual behaviour change. Thus, this work has provided not only resources for teaching and learning, but a tool for assessing learning outcomes in relation to medication safe practice.

While this project has not and cannot answer all of the questions about IPE and medication safety, nor can it fill all the gaps in terms of resource needs, it has gone a long way toward setting an agenda for sustainable and widespread IPE efforts.

# Publications from the Project

## Publications

Lapkin, S., Levett-Jones, T., & Gilligan, C. (2011). The effectiveness of interprofessional education in university-based health professional programs: A systematic review. *Joanna Briggs Institute Library of Systematic Reviews*, 9(46), 1917-1970.

Lapkin, S., Levett-Jones, T., & Gilligan, C. (in press). A systematic review of the effectiveness of interprofessional education in health professional programs. *Nurse Education Today* DOI:10.1016/j.nedt.2011.11.006. Available online 22 December 2011.

Lapkin, S., Levett-Jones, T., & Gilligan, C. (2012). A cross-sectional survey examining the extent to which interprofessional education is used to teach nursing, pharmacy and medical students in Australian and New Zealand Universities. *Journal of Interprofessional Care*, 26(5), 390-396.

Levett-Jones, T., Gilligan, C., Lapkin, S., & Hoffman, K. (2012). Interprofessional education for the quality use of medicines: Designing authentic multimedia learning resources. *Nurse Education Today*, 32, 934-938.

Levett-Jones (Ed). (in press). *Critical conversations for patient safety: An essential guide for health professionals*. Frenches Forrest: Pearson.

## Conference, Workshops and Symposium Presentations

Gilligan, C., Levett-Jones, T., & Bellchambers, H. Quality use of medicines, interprofessional education and patient safety. Simulation and Beyond: Creative teaching approaches for improving patient safety symposium, 25-26 November 2010, Hunter Valley, Australia.

Levett-Jones, T., Bellchambers H. Interprofessional education: Enhancing the teaching of medication safety to nursing, pharmacy and medical students. Network of Clinical Coordinators Annual Meeting, 3 December 2010, Launceston, Australia.

Levett-Jones, T., Bellchambers, H., & Gilligan, C. Enhancing medication safety through the use of innovative multimedia, interprofessional communication and clinical reasoning. Healthcare Communication Symposium, 6 December 2010, Melbourne, Australia.

Levett-Jones, T., Bellchambers, H., & Gilligan C. Interprofessional education: Enhancing the teaching of medication safety to nursing, pharmacy and medical students. Poster presentation, International Forum on Quality and Safety in Health Care, 5-8 April 2011, Amsterdam, The Netherlands.

Levett-Jones, T., Gilligan, C., & Hoffman K. Interprofessional education: enhancing the teaching of medication safety to nursing, pharmacy and medical students. 4th International Clinical Skills Conference, 22-25 May 2011, Prato, Italy.

Levett-Jones, T. How well are we preparing nursing, medical and pharmacy graduates to communicate and work as part of an interprofessional team? Findings from focus groups. Teaching and Learning Week: The University of Newcastle, 9 February 2012, Newcastle, Australia.

Levett-Jones, T. Reality shows, mini-series, documentaries: A brave new world for nursing education. Invited speaker, The 14th National Nurse Education Conference, 11-13 April 2012, Perth, Australia.

Lapkin, S., Levett-Jones, T., & Gilligan C. The effectiveness of interprofessional education in university-based health professional programs: A systematic review. All Together Better Health VI (ATBH VI), 5-8 October 2012, Kobe, Japan.

Lapkin, S., Levett-Jones, T., & Gilligan C. A cross sectional survey of interprofessional education in Australian and New Zealand health professions programs. All Together Better Health VI (ATBH VI), 5-8 October 2012, Kobe, Japan.

Lapkin, S., Levett-Jones, T., & Gilligan C. Measuring health professional student's intention to behave in a way that promotes medication safety using the Theory of Planned Behaviour. All Together Better Health VI (ATBH VI), 5-8 October 2012, Kobe, Japan.

Gilligan, C., Outram, S., & Levett-Jones, T. Preparing graduates for work in multidisciplinary healthcare teams – the reflections of graduates. Communicating Health Symposium, 4-5 December 2012, Melbourne, Australia.

Gilligan, C., & Levett-Jones, T. Interprofessional education (IPE): Enhancing the teaching of medication safety to nursing, pharmacy and medical students. School of Medicine and Public Health Conference – Qualitative Research: The University of Newcastle, 22 March 2012, Newcastle, Australia.

Levett-Jones, T. Interprofessional communication and medication safety: Workshop for Nurse Practitioners. 24 September 2012, Newcastle, Australia.

Levett-Jones, T., & Connor, C. Project snapshot: Interprofessional education for quality use of medicines, ALTC project. Interprofessional Education for Medication Safety Symposium, 29-30 November 2012, Newcastle, Australia.

Lapkin, S., Levett-Jones, T., & Gilligan C. The effectiveness of web-based interprofessional learning resources on health professional student's behavioural intentions in relation to medication safety – A quasi-experimental study. Interprofessional Education for Medication Safety Symposium, 29-30 November 2012, Newcastle, Australia.

Gillman, L., Kidd, H., Hilmi, S., & Stewart-Wynne, E. Interprofessional Education and Medication Safety - Recent graduates experience and future direction. Interprofessional Education for Medication Safety Symposium, 29-30 November 2012, Newcastle, Australia.

Hilmi, S., Gillman, L., Kidd, H., & Stewart-Wynne E. Interprofessional education and medication safety: Recent graduates experience and future direction. 5th International Clinical Skills Conference, 19-22 May 2013, Prato, Italy.

Levett-Jones, T., & Gilligan C. Preparing students to work as members of interprofessional health care teams – reflections of graduates. 5th International Clinical Skills Conference, 19-22 May 2013, Prato, Italy.

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# Appendix A

## Evaluation of Online Modules

Table 1  
*Participant Characteristics (n=35)*

<b>Characteristics</b>	<b>N (%)</b>
<b>Gender</b>	
Female	32 (91)
Male	3 (9)
<b>Age Group</b>	
Age < 20 years	1 (3)
21 – 30 years	5 (14)
31 – 40 years	6 (17)
41 – 50 years	10 (29)
51 – 60 years	12 (34)
Ages > 61 years	1 (3)
<b>University represented</b>	
The University of Newcastle	10 (29)
The University of Sydney	2 (6)
LaTrobe University	1 (3)
The University of Western Australia	1 (3)
Other	4 (11)
Not specified	17 (49)
<b>Role in organisation</b>	
Nursing student (undergraduate)	11 (31)
Nursing student (postgraduate)	3 (9)
Academic (nursing)	4 (11)
Pharmacy student (postgraduate)	2 (6)
Medical student (undergraduate)	1 (3)
Other	12 (34)
Not specified	2 (6)

Note: Percentages may not add to 100 due to rounding

Table 2  
*IPE Modules Reviewed and How they were Used (n=35)*

<b>Item</b>	<b>N (%)</b>
<b>Module viewed*</b>	
Eileen Poole	7 (20)
Vanessa Anderson	16 (46)
Mark Green	5 (14)
Not specified	14 (40)
<b>How the module was used*</b>	
Online self-directed activity	18 (51)
Preparation for a tutorial	4 (11)
Part of a face-to-face lecture	1 (3)
Part of a face-to-face tutorial	1 (3)
Preparation for a simulation session	1 (3)
Not specified	13 (37)
<b>Completion of modules*</b>	
Optional subject / course activity	8 (23)
Required component of a subject / course	5 (14)
Extracurricular	5 (14)
Recommended by employer	1 (3)
Workplace learning	1 (3)
Voluntarily	1 (3)
Not specified	16 (46)
<b>Groups involved</b>	
Single professional group	10 (29)
As an interprofessional activity	8 (23)
Both	2 (6)
Not specified	15 (43)
<b>Professional groups involved</b>	
Nursing	12 (34)
Midwifery	1 (3)
Medicine	1 (3)
Pharmacy	1 (3)
Law	1 (3)
Not specified	19 (54)
<b>Level / year of students using the modules</b>	
Year 1 (undergraduate)	4 (11)
Year 2 (undergraduate)	5 (14)
Year 3 (undergraduate)	1 (3)
Year 4 (undergraduate)	1 (3)
Postgraduate	8 (23)
Not specified	16 (46)
<b>Module completion</b>	
Completed	12 (34)
Sections completed	6 (17)
Varied	1 (3)
Not specified	16 (46)

<b>Item</b>	<b>N (%)</b>
<b>Written tasks or activities completed as part of the module</b>	
Yes	7 (20)
No	10 (29)
Not specified	18 (51)
<b>If yes, nature of the task (n=7)*</b>	
Questions answered as module viewed	5 (71)
Role plays with other students	2 (29)
Written reflection	1 (14)
Pre-reading	1 (14)
Not specified	1 (14)
<b>If yes, part of overall assessment of course (n=7)</b>	
Yes (task marked and contributed to grade)	3 (43)
No (task set but no marks towards grade)	3 (43)
Not applicable	1 (14)

\* More than one response could be selected

Note: Percentages may not add to 100 due to rounding