AUSTRALIAN PRIMARY HEALTH CARE RESEARCH INSTITUTE

USING COMPETENCY-BASED EDUCATION TO EQUIP THE PRIMARY HEALTH CARE WORKFORCE TO MANAGE CHRONIC DISEASE

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POLICY CONTEXT AND BACKGROUND

WORKFORCE SHORTAGES IN THE PRIMARY HEALTH CARE SECTOR MUST BE ADDRESSED FOR THE HEALTH SYSTEM TO DELIVER GOOD OUTCOMES

Australia is highly ranked in international comparisons of global health outcome measures. However, as has been well documented in recent reports,[1] [2] a number of factors are placing significant pressure on the health system and have the potential to adversely impact on the health system's future performance. There are changes in Australia's demographics with an ageing population and longer life expectancies. There is an increasing prevalence of chronic illness and comorbidity. Consumer expectations are rising. There are significant advances occurring in health technologies. All these factors combine to create an increasingly complex and expensive health system.

Another critical factor in maintaining and improving the health outcomes is the health workforce. There needs to be adequate numbers of well trained, future orientated health workers. Yet workforce shortages are identified as the headline indicator of pressure on the health system in the Productivity Commission Research Report "Australia's Health Workforce"[1]. It is imperative to address these workforce shortages.[3]

The general practice and primary health care sector of the Australian health system confronts all these problems. Delivering care to people with chronic illnesses comprises an increasing proportion of the workload of general practitioners.[4] There is an ageing GP workforce with an estimated shortage of GPs in 2002 in the range of 800 – 1300. Between 2007 and 2013 there is an estimated annual shortage of entrants into the general practice workforce of about 400 – 500 Australian trained and overseas trained doctors.[2]

EDUCATION AND TRAINING ACTIVITIES ARE A CORE COMPONENT OF MANY STRATEGIES PROPOSED TO ADDRESS WORKFORCE SHORTAGES

Drawing on the Productivity Commission and Australian Medical Workforce Advisory Committee (AMWAC) reports and similar literature, several strategies can be outlined that aim to relieve pressure on the general practice and primary health care workforce. These are summarised in Table 1 and are grouped according to whether they operate on the "supply side" or "demand side" in seeking to ease workforce shortages. Alongside each of these strategies, one or more examples of directly related education and training activities are listed to demonstrate the fundamental link between potential strategic responses to the workforce shortage and education and training. The activities are provided as illustrations only and not because they are all implemented.

Table 1 Supply and demand side strategies to address primary health care workforce shortages and related education and training activities

Strategies aimed at increasing supply	Educational and training activities
Address uneven distribution[5]	• Ensure education and training programs include early exposure of undergraduate and vocational trainees to areas of need e.g. rural and remote/outer metropolitan[5]
Adopt new models of care	• New models of care incorporated in undergraduate training and vocational training programs • Education and training programs designed to introduce new models of care to existing health workers and make them proficient in their operation of them
Change the skill mix of the existing workforce	• Educational programs designed to equip trainees with the requisite knowledge skills and attitudes for new roles
Create new kinds of workers[6]	• Based on specification of new roles, design and deliver a coherent educational program (including necessary standards and accreditation) to produce new workers
Increase career flexibility to permit professional reinvention[7]	• Modular education and training programs equip workers with new professional skills
Increase numbers • Australian graduates • Overseas trained doctors/health professionals[8]	• Additional training places in relevant university courses • Additional vocational training places • Courses to orientate non-Australian graduates to Australian practice
Increase productivity	• Education and training programs support multidisciplinary team members to perform their roles with greater effectiveness and efficiency[9]
Introduce outcomes-based curricular designs in medical school and post-graduate training[7]	• Strengthen outcomes focus in education and training programs
Maximise participation of current workers	• Continuing professional development educational programs
Shorten training times[7 10]	• Increased outcomes based curricular design in undergraduate and postgraduate training
Strengthen generalist approaches	• Training of primary health care workers to include a focus on generalism
Substitute health professionals[11]	• Educational programs designed to equip trainees with the requisite knowledge skills and attitudes for new roles
Reduce Demand	
Enhance community capacity for self care	• Education and training programs equip members of the multidisciplinary team to deliver effective interventions that enhance the capacity of people with chronic conditions to self care
Health promotion and disease prevention	• Education and training programs equip members of the multidisciplinary team to deliver effective health promotion and disease prevention activities
Make more use of multidisciplinary teams	• Train team members individually and together
Point of Care Testing	• Education and training programs equip members of the multidisciplinary team to make effective use of valid and reliable point of care diagnostic and screening tests reducing follow-up appointments to receive results
The gatekeeper role	• Members of the multidisciplinary team are trained to make the most effective and efficient use of other members of the team

EDUCATION AND TRAINING ACTIVITIES SUPPORT THE GENERAL PRACTICE WORKFORCE TO PREPARE FOR AND MANAGE AN INCREASING BURDEN OF CHRONIC DISEASE

Health related education and training programs are planned, in part, to prepare a workforce for changing burdens of disease. General practice is characterised by an increasing number of services related to the management of chronic illness and comorbidity and education and training programs are important components of strategies aimed at managing these conditions.

WORKFORCE SHORTAGE, CHRONIC DISEASE BURDEN AND EDUCATIONAL INTERVENTIONS IN GENERAL PRACTICE SETTINGS

In Australian general practice, the workforce is under pressure not only through shortages, but also through increasing demands resulting from the epidemic of chronic diseases and comorbidity. How could an educational intervention address these issues? What outcomes could be used to measure change? Indicators relevant to chronic disease management in general practice settings could include measures related to the workforce providing services (e.g. appropriate multidisciplinary teams, professional satisfaction and teamwork), measures relating to the services themselves (e.g. access, integration of services, prevention and early intervention services, community support and involvement in health care) as well as health outcome measures.

OBJECTIVE

To develop policy relevant options that use competency-based education to enhance the ability of the primary health care workforce to address chronic disease management in the Australian context. The scope of this review does not include the development of specific competency-based educational programs, but does include identification of principles for these programs as well as potential topics for programs to focus on.

DESIGN

Systematic review of the literature using a narrative review approach, identification of key grey literature and iteration of options.[12]
In this paper the terms "competency-based education" and "competency-based training" are considered to be the same. "Competency-based education" will be used.

METHOD

A set of initial questions were used to scope the published evidence available on competency-based education, primary health care workforce and the management of chronic diseases in a general practice context. The questions were constructed with competency-based educational activities as the interventions and some workforce related or chronic disease management related factors as the outcomes. Additional questions looked at the cost-effectiveness of competency-based education, sustainability of such programs and factors that hinder or help its implementation.

INITIAL QUESTIONS

1. Could competency-based education:
   - Improve consumer access?
   - Achieve better integration and multidisciplinary care?
   - Achieve better management of chronic disease?
   - Give greater focus on prevention and early intervention?
   - Provide greater community support and involvement in health care? and
   - Give greater professional satisfaction and teamwork?

2. What is known about funding competency-based education?
3. What is known about the cost-effectiveness of competency-based education?
4. How could competency-based education be sustained?
5. What are the facilitators and barriers to the implementation of competency-based education?

FOCUS

The focus of the enquiry was narrowed to chronic conditions/comorbidities, nursing and medical members of the primary health care workforce and the general practice context. Complimentary treatments were not considered.

SEARCH TERMS AND DATABASES

We searched the Cochrane Library and Database of Abstracts of Reviews of Effectiveness (DARE) and bibliographic databases MEDLINE (Ovid and PubMed) and CINAHL. We also searched the economic literature database ECONLIT, and the Informit Australian publications database.

We used snowballing techniques to identify other literature and relevant websites and included searches in Google and Google Scholar. We undertook limited hand searches of articles using the key words "competency-based training" or "competence" or "competency-based education" in individual journal back issues.

Search terms included: "competencies", "competence", "competency-based education", "competency-based training", "primary health care", "primary care", "primary medical care", "general practice", "family medicine", "chronic disease", "chronic illness", "chronic conditions", "diabetes", "asthma", "COPD" (and other chronic diseases by name), "comorbidity", "workforce", "recruitment", "education" and "training" together with keywords in the initial questions such as "multidisciplinary", "integration", "access", etc.

Table 2 Pilot comparison of the different search strategies outlined on the CRD website: http://www.york.ac.uk/inst/crd/search.htm (October 2005)

Medline1	Medline2.1	Medline2.2	CINAHL
Workforce = 593	Workforce = 150	Workforce = 433	Workforce/ = 20
Recruitment = 108	Recruitment = 32	Recruitment = 77	Personnel Recruitment/ = 66
Training = 327	Training = 91	Training = 247	Physicians/ = 2
Competency = 36	Competency = 13	Competency = 39	Nurs$ = 41
Recruitment = 6968	Recruitment =1599	Recruitment = 2205	Personnel Shortage/ = 1
Training = 1547	Training = 1547	Training = 659	Professional Competence/ = 0
Competency = 96	Competency =19	Competency = 72	Clinical Competence/ = 1
Training = 12959	Training =3602	Training = 6217	Physicians/ = 431
Competency =760	Competency = 284	Competency = 637	Nurs$ = 5715
Training =68	Training =108	Nurses = 214	Personnel Shortage/ = 12
Doctors = 54	Doctors = 14	Workforce = 21	Physicians/ = 1
Shortage = 28	Shortage = 10	Training = 405	Nursing Shortage/ = 71
Nurses = 187	Workforce = 10	Doctors = 28	Physicians/ = 1
Education = 143	Recruitment=14	Shortage = 23	Personnel Shortage/ + Nursing Shortage/ = 0
Training = 118	Doctors = 26	Workforce = 24	Education, Allied Health/ = 55
(E + T) = 94	Shortage = 15	Nurses = 126	Personnel Recruitment/ = 1
Workforce = 17	Nurses = 81	Education = 113	Education, Medical/ = 163
Shortage = 755	Education = 20	Recruitment = 14	Personnel Recruitment/ = 1
Workforce = 78	Training = 47	Shortage = 15	Physicians/ = 11
Recruitment = 31	(E + T) = 34	Workforce = 11	Education, Nursing/ = 668
Doctors = 1858	Workforce = 7	Doctors = 44	Personnel Recruitment/ = 8
Workforce = 53	Shortage = 259	Shortage = 40	Nursing Shortage/ = 21
Recruitment = 9	Workforce = 27	Based training = 23	Physicians/ = 1
Nurses = 2098	Recruitment=13	Nurses = 9	Education, Nursing/ + Education, + Medical/ + Education, Allied Health/ = 2
Workforce = 150	Doctors = 644	Doctors = 2	Professional Competence/ = 151
Recruitment = 48	Workforce = 22	Shortage = 3	Physicians/ = 10
Competency-based training = 3	Recruitment = 5	Shortage = 371	Nurs$ = 52
Doctors = 0	Nurses = 1517	Workforce = 50	Education, Allied Health/ = 4
Nurses = 0	Workforce = 48	Recruitment=24	Education, Medical/ = 12
Shortage = 0	Recruitment=48	Doctors = 924	Education, Nursing/ = 9
	Competency-based training = 11	Workforce = 106	Clinical Competence/ = 326
	Nurses = 2	Recruitment =6	Physicians/ = 15
	Doctors = 3	Nurses = 2616	
	Shortage = 0	Workforce = 106	
		Recruitment=30	
		Competency-based training = 5	

			Nurs$ = 189 Education, Allied Health/ = 1 Education, Medical/ = 11 Education, Nursing/ = 36 Clinical Competence/ + Professional Competence/ = 10

Explanation

We explored the outcomes of searching for relevant literature using different search strategies outlined on the Centre for Reviews and Dissemination website. Generally, the steps in each column begin with a root keyword, identify the number of hits produced and then summarise the results as various additional key words are combined. The different strategies are "devised primarily to be highly sensitive. However, the strategies range from those which could be used by researchers undertaking a systematic review (who aim to locate all potentially useful reviews on a given topic), to those useful for busy clinicians and researchers (who want to locate systematic reviews quickly)."[13] By searching using the same combinations of initial keywords we compared the results obtained using the different strategies. The results obtained using combinations of three terms were very few. Therefore most literature was identified using a single key word rather than combinations of key words resulting in a very large number of hits. Only those with titles and abstracts (if available) suggesting relevance to our focus were retrieved.

EFFECTS OF COMPETENCY-BASED EDUCATION FOR WHICH OUTCOMES HAVE BEEN REPORTED

The initial scan of the literature identified that there were no systematic reviews of controlled studies assessing the effectiveness of competency-based education interventions on consumer access, multidisciplinary care, chronic disease management, prevention and early intervention, community support or teamwork. Furthermore, there were no systematic reviews and very few controlled studies examining the impact of competency-based education on any outcome.

Leung reports: "A recent review of published evaluative studies of competency-based training found an increase in administrative burden but no convincing beneficial effects on motivating students, work performance, or relevance to the needs of industry."[14]

REFINEMENT OF QUESTIONS

Because of the substantial absence of empirical evidence, we added additional questions aimed at informing theory as this amplified theoretical base would be important in proposing answers to the initial questions. The initial questions were retained in order to keep the original focus of this study. The first part of this report addresses these additional questions.

ADJUDICATING RETRIEVED MATERIALS

The search strategy resulted in a large amount of literature being identified on the basis of relevant keyword(s) present in the title or abstract. A total of 365 articles were retrieved.

Table 3 summarises the literature identified using the search strategy and the final weighting given to the literature in this review. All identified titles and abstracts were read by one of two research assistants (AG and SL) and all papers were read by the lead author (NG).

We used the following definition for systematic review: "a review which tries to adhere to a set of 'scientific' methods to limit error (bias) mainly by attempting to locate, appraise and synthesise (attempt to reconcile) all relevant evidence (from research or more widely) to answer a particular question(s). The methods are largely set out in advance."[15]

Reviews were papers that contained an overview of the information available on a topic without a clear statement regarding the method used to identify the literature cited.

Editorials were classed as those articles expressing the clear opinions of the author/s.

Articles containing original research were sub-categorised into descriptive (for qualitative research), quasi-experimental (in qualitative or quantitative papers where an attempt was made to compare cohorts) and randomised controlled trials.

Grey literature was relevant literature not found in the bibliographic databases. It was most commonly identified on the websites of various organisations.

A sample of one hundred articles was independently reviewed by the two research assistants and classified regarding their type, with the classifications assessed for agreement. The research assistants' individual classifications of the literature did not agree in 27/100 articles. Most differences arose for articles that were neither systematic reviews nor reports of original research. As a result of discussing these differences, two changes in the approach to classifications were made:
- Articles that gave an overview or evaluation of a change to training and/or curricular content were re-categorised as reports
- Reviews were distinguished from editorials if it contained more opinion than an overview regardless of the number of references.

Subsequent revision and discussion yielded no further queries or differences of opinion.

As previously noted, the lead author read all articles. As well as providing a third perspective on the literature classification, he also gave it a weighting based on its relevance. Material was assessed on a four point scale (low, moderate, high and very high) according to the lead author's global impression of its contribution to the themes, concepts and issues identified in the final paper. An article was judged to be of very high relevance if it had a major focus on workforce and/or chronic disease and/or competency-based education relevant to general practice settings. An article was dropped if on the basis of the title and abstract with or without the text of the article no direct relevance to these themes in the general practice setting was evident. An article could also be dropped if there was some low level relevance to these themes,

but other articles had already illustrated the point.[16] "High", "moderate" and "low" classifications were assigned according to the degree of relevance.

Table 3 Identified literature with final weightings

	Total Retrieved	Weighting				Total used	Dropped
		Very high	High	Moderate	Low		
1. Systematic reviews	46	6	7	8	12	33	13
2. Reviews	67	9	10	8	6	33	34
3. Editorials	10	1	2	2	1	6	4
4. Report/Opinion	115	7	6	22	16	51	64
5. Original research	100	1	5	3	19	28	72
Descriptive	*80*	*1*	*4*	*2*	*16*	*23*	*57*
Quasi-experimental	*15*			*1*	*3*	*4*	*11*
Randomised controlled trials	*5*		*1*			*1*	*4*
6. Grey literature	27	2	5	13	3	23	4
Totals	**365**	**26**	**35**	**56**	**57**	**174**	**191**

ADDITIONAL QUESTIONS TO INFORM THEORY

WHAT IS COMPETENCY-BASED EDUCATION?

Outcome, rather than acquisition of knowledge, is the driving force for competency-based education.[17] [18] Carraccio[17] contrasts structure and process based educational programs with competency-based educational programs using the following table:

A Comparison of the Elements of Structure-and Process-Based Versus Competency-based Educational Programs		
	Educational program	
Variable	**Structure and process-based**	**Competency based**
Driving force for curriculum	Content-knowledge acquisition	Outcome - knowledge application
Driving force for process	Teacher	Learner
Path of learning	Hierarchical (teacher → student)	Non hierarchical (teacher ↔ student)
Responsibility for content	Teacher	Student and teacher
Goal of educational encounter	Knowledge acquisition	Knowledge application
Typical assessment tool	Single subjective measure	Multiple objective measures ("evaluation portfolio")
Assessment tool	Proxy	Authentic (mimics real tasks of profession)
Setting for evaluation	Removed (gestalt)	"in the trenches" (direct observation)
Evaluation	Norm-reference	Criterion-referenced
Timing of assessment	Emphasis on summative	Emphasis on formative
Program completion	Fixed time	Variable time

Barrett[19] describes a competency-based education program as including the following components and characteristics.

Components
• Clearly articulated competency statements
• Curriculum defined in terms of knowledge skills and attitudes
• Criterion referenced assessment guidelines
• Supporting materials to assist workplace implementation (trainer/trainee)
Characteristics
• Program is learner centred
• Program directed at a specific role or setting
• Competencies are verified by expert practitioners and made public in advance
• Training is based in the workplace or similar environment
• Training integrates theory and practice
• Trainees identified their learning needs with the support of the trainer; competencies which have been attained and maintained in other programs need not be repeated
• Teaching methods and educational processes are flexible
• Guidelines for assessing competency in the workplace include assessment criteria and conditions. The standard required for competent performances is made explicit
• Trainees progress through the program at their own rate by demonstrating the attainment of specified competencies
• Satisfactory completion of training is based on the achievement of all specified competencies

In 1985 Mullen suggested the quality of educational interventions could be assessed using six "yes/no" criteria to determine a score. The criteria are:

- Consonance - the intervention is directed toward affecting intended outcomes
- Individualisation - the intervention is based on the individual's cognitive levels of knowledge, attitudes and beliefs
- Relevance - the intervention is geared to student groups' learning needs in relation to individual professional role development
- Feedback - the intervention is designed to show students the extent they are progressing through the course
- Reinforcement - the intervention is assessed to provide students with 'reward' for their work
- Facilitation - the intervention is designed to affect student professional practice by providing them with means to take action and/or reduce barriers to their action[20]

Competency-based educational approaches reflect these quality indicators.

Competency-based education has been championed as the way forward in both health professional[14 21-25]and other vocational educational and training settings[26] for more than two decades.

However, no detailed information is publicly available on the funds committed to competency-based education by these various organisations.

WHY DOES AN OUTCOME FOCUSED EDUCATIONAL APPROACH ATTRACT SUCH INTEREST?

An outcomes focus is a common goal in many health related domains, and this is part of the reason for the appeal of outcomes orientated educational approaches.

From an educational point of view, it is consistent with the principles of adult learning theory and facilitates "deep" rather than "surface" learning. There is better feedback for individual learners, teachers and institutions to guide and improve future activities.[27] There is explicit encouragement for self-reflection and self-remediation.[28] It can enhance curricular coherence[28] and educational flexibility.[14] It encourages the setting of transparent standards.[14 28-31]

Education and training organisations and programs can increase their efficiency through improved selection into vocational training,[32] reduction in training times,[33] and enhanced decision making in regard to access to advanced training.[28] The specification of a common end point allows flexibility in the educational and training paths taken to get there.[19 34]

Public accountability is enhanced through evidence that the health workforce is competent,[2 28 35] through having measures that can demonstrate quality[36] and by allowing quantification of value for public monies invested in training.

Health care organisations can increase their efficiency and effectiveness,[37 38] and have additional objective information to underpin promotion.[28] They can develop their workforce, including teams of workers and define and redesign roles.[36]

Bodies charged with setting standards and/or regulating aspects of the health system can make use of outcomes to commission education and training,[36] certify

achievements,[28] make decisions regarding fitness to practice,[19] and be satisfied regarding re-validation[39] and maintenance of skills.[40]

Entrepreneurs and innovators see opportunities to develop and test new approaches, including the realignment of existing roles/development of new roles.[18 41]

It is a fertile field for research.[28 36]

And, in addition, education is a lever for system change[42] and a bridge to a future orientated quality health system.[43]

COMPETENCY-BASED EDUCATION HAS BEEN AROUND FOR A LONG TIME – WHY THE SLOW UPTAKE?

Three factors contribute to the slow uptake of competency-based education: confusion of terminology, tension between atomistic and holistic views and the human and financial resources necessary to create a program.

Confusion of terminology

Cowan[24] *et al* in their excellent review point out that the literature remains imprecise in terminology. In particular, they note the terms "competence" and "competency" are used by some, interchangeably. Imprecision in terminology was noted 15 years ago. Rethans *et al* observed in 1990 "The fundamental problem of this lack of clarity about competence is that each author means different things when using the word competence."[44] They went on to distinguish "'competence' (what a physician is capable of doing) and 'performance' (what a physician does in his day-to-day practice)". Parsons provides a good discussion of definitional issues.[45]

Variation in language is also evident in terms used to describe types of competency.

Competencies have levels. The Accreditation Council for Graduate Medical Education described six "core" or general competencies for medical residents in 1999.[46] "Core" reflects the fact that these were common for all residents regardless of discipline. These kinds of high level statements are called "domains" by others.[47 48]

Figure 1 ACGME general competencies

> 1. **Patient Care** - that is compassionate, appropriate and effective for the treatment of health problems and the promotion of health;
> 2. **Medical Knowledge** - about established and evolving biomedical, clinical and cognate (e.g. epidemiological and social-behavioral) sciences and the application of this knowledge to patient care;
> 3. **Practice-Based Learning and Improvement** - that involves investigation and evaluation of their own patient care, appraisal and assimilation of scientific evidence and improvements in patient care;
> 4. **Interpersonal and Communication Skills** - that result in effective information exchange and teaming with patients, their families and other health professionals;
> 5. **Professionalism** - as manifested through a commitment to carrying out professional responsibilities, adherence to ethical principles and sensitivity to a diverse patient population; and
> 6. **Systems-Based Practice** - as manifested by actions that demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value

Whether it is a "core competency" or a "domain" is less important than the idea that these high level statements will sit over other statements designed to reduce the competency into units and elements. These will be measurable.

Competencies are also characterised as being "hard" (comprising observable behaviours in specific tasks) or "soft" (encompassing traits and individual style).[45]

Tension between "atomistic" and "holistic" views of competence

Despite the lack of clarity of definitions in the literature, it is clear that the approaches to competency-based education fall into one of two broad categories.

The first category is reductionist and behavioural in orientation. Writers emphasise specific tasks within a role (e.g. the competencies required of nurses working within a hospital operating room[49]). Competence is understood through breaking occupational roles into measurable elements, defining standards and assessing performance against the standards. Procedural disciplines, because they require the demonstration of observable behaviours, find it easier to define competencies.[50] Definitions of competence reflect this orientation. "Competence is associated with performance, which is defined as the formal exhibition of a skill, ability, or aptitude of a professional nurse"[51] or "Nursing competencies describe the critical behaviours and knowledge required of nurses and other patient care staff to meet clinical performance standards in their roles and the conditions under which the competencies are to be performed"[52] and "Competence can be simply defined as the ability to operate to an adequate, safe standard. Synonymous terms include sufficient, suitable, capable, legally qualified and fit for purpose...Whichever definition is chosen, competence remains fundamentally related to occupational roles and the operational level of expertise expected at the individual practitioner level."[53]

The second category is more holistic and inclusive of theoretical orientations other than the inherent reductionism of the behavioural approach. Writers emphasise the complexity of skill acquisition and application (See Box) and acknowledging the needs for learners to become progressively independent.[54] They draw on theories of knowledge in addition to positivism,[55] seeking to equip graduates with a complex set of skills, knowledge and attitudes and have these appropriately applied in variable contexts.[24] They consider that in professional settings, true notions of competence are difficult to capture. Competence "incorporates professional judgement, is relational and involves complex structuring, bringing together disparate attributes and tasks required for intelligent performance in specific situations."[24] They arrive at more inclusive or holistic understandings of professional competence. For example: "The habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values and reflection in daily practice for the benefit of the individual and community being served"[28] or "The notion of competence was broad and involved a diverse set of qualities including: attitudes, motives, personal interests, perceptiveness, receptivity, maturity and aspects of personal identity."[24] Some introduce the idea of "meta-competencies" as a way of considering these higher order activities.[56][14]

Figure 2 The Dreyfus' model of skill acquisition as summarised by Leach[57]

"They describe five categories: novice, advanced beginner, competent, proficient and expert. In a general sense one can think of a medical student as a novice, a first-year resident as an advanced beginner and graduating resident as competent. The first few years of independent practice and, for many, a lifetime of practice results in proficiency and experts can be recognised because other physicians call them when they are in need of wisdom and experience about a case."

While acknowledging these differences, it is still possible to articulate a useful operational approach. Gibson and Heartfield do this as follows:
"Competency (also competence) - the ability to perform tasks and duties to the standard expected in employment.

Competency standard - an industry-determined specification of performance which sets out the skills, knowledge and attitudes required to operate effectively in employment. Unit of competency - a component of a competency standard. A unit of competency is a statement of a key function or role in a particular job or occupation. Competency standards used by the nursing profession comprise a domain which is the overarching title for a cluster of competency units with a similar theme and the units of competency or competency standard. The Australian Nursing and Midwifery Council's national competency standards include competency elements which are sub-units of the unit of competency. The competency standards for the advanced registered nurse, the registered nurse in general practice and the enrolled nurse in general practice include cues for each of the units of competency and these are designed to assist with understanding the competency standard. The cues included with the competency standards should not be used as a check list although they are a very useful guide to assist with assessing competence i.e. is the standard being met of what is required to demonstrate that the required level of competency is being achieved?"[21]

The trend in medical education is "away from narrow competences towards the specification of broader meta-competences or outcomes."[58]

Human and financial resources

Preparing educational programs can be an expensive undertaking. As Tanner observes in her discussion of professional staff education, "Successful businesses must determine what educational strategy will create a competent, cross-trained workforce at the lowest possible cost. Management must consider internally driven strategies, externally driven ones, or a combination of both. If internally driven education is to be a core strategy, those responsible for staff development must consider whether they have the resources to do it. Clinical nurse specialists, educators, subject matter experts and curriculum designers will be needed, sometimes at great cost. Organisations must ask themselves: 'Is education part of our core business, or should we focus on patient care delivery?'"[59] She also provides a useful summary of the direct and costs for staff development.

Walker et al provide an excellent example of an economic analysis for a midwifery training program.[60] This outlines the many costs associated with a training program. They identified the following cost drivers:
1. Specification of the training program:
   - Training needs assessment of potential trainees and adaptation of program content based on an authoritative guideline
   - Manual produced for trainees
   - Appropriate training centres identified based on their capacity to support competency-based education with a particular emphasis on adequate clinical experience for each participant
   - Trainers selected and attended appropriate courses covering the content and educational skills
   - Regular peer-review visits acquiring evaluative data and information; and
   - Continuing education sessions for trainees informed by the reviews.

2. Identification of the costing method
    - Activities costed included central administration, technical assistance, training needs assessment, site preparation, training of trainers, training of trainees, peer-review, continuing education and fund raising activities. Activities were further classified as "stand alone" or "joint"
    - Costs of expanding the program was considered by excluding technical assistance, central administrative support and all start-up activities were excluded
    - Costs of replicating the program included start-up costs; and
    - Opportunity costs such as using rooms for accommodation, storage and teaching, various supplies and equipment were considered.

Sound educational programs are resource intensive to create and maintain. Lack of sufficient resources contributes to the slow uptake of competency-based educational approaches.

In a different context, Dockery *et al* [61] appraised the costs and benefits of the New Apprenticeships scheme introduced in Australia in January 1998. Drawing on case studies of 60 employers to assess the impact of these reforms, the authors found "that the provisions most enthusiastically embraced by employers include competency-based assessment and flexibility in time spent in training". However, they also found that "these positive indicators of the reform process have not translated into an improved cost/benefit outcome for employers. Comparison with previous findings suggests that the net cost of employing trainees has not really changed while the net cost of apprentices is estimated to be higher than it was in 1996". This reinforces the foregoing argument that competency-based training comes at a cost, and that cost needs to be weighed against any benefits that might arise.

HOW COULD COMPETENCY-BASED EDUCATION IMPROVE OUTCOMES IN THE AUSTRALIAN GENERAL PRACTICE CONTEXT?

For competency-based education to lead to improved workforce and chronic disease management outcomes five different issues need careful consideration. Designers of these programs must:
- Clearly align the objectives of the educational activities with the chronic disease or workforce related outcomes of interest
- Design sound educational programs
- Identify educational programs across the system targeting the same outcomes and seek to maximise synergies between programs
- Be fully aware of and work within the existing complexity of the training environment; and
- Actively manage the process of change.

These five issues are discussed in greater detail in the next sections.

Clearly align the objectives of the educational activities with the chronic disease or workforce related outcomes of interest

The explicit curriculum for a competency-based educational program can align educational objectives with specific outcomes in two ways.

The simplest concept is when an outcome is chosen (e.g. consumer access or multidisciplinary team work or management of diabetes) and objectives of the competency-based education established that directly relate to the outcome. The

theory underpinning this approach is illustrated in the following example. A competency-based educational program is designed to equip members of the general practice team to use a computer based recall and reminder system in order that people with asthma receive a full cycle of care, including proactive anticipatory care. General practitioners and practice nurses complete the program and are assessed as being competent in its use. They apply the knowledge and skills in practice. Access to proactive and anticipatory care is increased for people with asthma.

A second approach occurs when in addition to the alignment of educational objective with outcome of interest, the educational method adds reinforcement. For example, a competency-based educational program might have as its objective improved multidisciplinary team work in delivering care for people with a chronic disease. In addition to aligning objective and outcome, learners are drawn from different professional backgrounds (e.g. practice nurses and general practitioners) and undertake the learning together. Aspects of multidisciplinary team work are reinforced by learning together. This is an example of interdisciplinary learning defined as "when two or more professions learn from and about chatter to improve collaboration and quality of care."[62]) Humphris and Hean provide a recent overview of interdisciplinary learning.[63]

The potential impact of the "hidden curriculum" (observed behaviours, interactions, norms and culture powerfully shape trainees learning)[43] must not be forgotten in considering the likely effectiveness of these approaches, as "hidden objectives" might prove more powerful than any explicit ones.

Design sound educational programs

It is beyond the scope of this study to produce a sound competency-based education program for use in Australia. It is within scope to outline principles and domains of activity that underpin sound programs.

Educational programs are more effective when there is coherence throughout the curriculum. A curriculum is "A statement of the intended aims and objectives, content, experiences, outcomes and processes of a programme, including a description of the structure and expected methods of learning, teaching, feedback and supervision. The curriculum should set out what knowledge, skills, attitudes and behaviours the learner will achieve."[64] Curriculum coherence is enhanced when:

- Standards for trainees and training programs are explicitly related to the curricular philosophy and objectives
- High level competency statements are directly and explicitly related to competency components and performance levels at different stages of training
- Appropriate educational approaches are selected to develop the specified competencies in the trainees
- Assessment instruments are valid and reliable, used for both formative and summative purposes, aligned with learning objectives and chosen according to the type of competency being assessed
- Trainers are trained to deliver the program; and
- The whole educational program has inbuilt continuous quality improvement with feedback actively used for enhancements.[19 65 66]

Each of these steps requires a substantial amount of work.[67] We limit our discussion to approaches used to determine competencies and provide some references in respect of both educational methods and assessment approaches.

Getting to competencies
Various professional organisations, including Colleges, Academies and similar
organisations, make statements on competencies.[46 68-75]These may be derived in
various ways including consensus among members and consultation with wider
relevant groups, in particular patients. The extent to which patients are engaged in the
process impacts on the extent to which the stated competencies are orientated around
the professional or orientated around the patient.

Expert groups make statements on competencies. For example, The Pew Commission
(an impartial advisory body composed of leaders from health professions education,
state and federal government, professional associations, business, the care delivery
system and the public and supported by the Pew Charitable Trusts) identifies "Twenty-
one Competencies for the Twenty-First Century".[68 76]These are summarised in the box
on the following page.

Figure 3 Pew Commission 21 competencies for the 21st century[68]

1. Embrace a personal ethic of social responsibility and service.
2. Exhibit ethical behavior in all professional activities.
3. Provide evidence-based, clinically competent care.
4. Incorporate the multiple determinants of health in clinical care.
5. Apply knowledge of the new sciences.
6. Demonstrate critical thinking, reflection and problem-solving skills.
7. Understand the role of primary care.
8. Rigorously practice preventive health care.
9. Integrate population-based care and services into practice.
10. Improve access to health care for those with unmet health needs.
11. Practice relationship-centered care with individuals and families.
12. Provide culturally sensitive care to a diverse society.
13. Partner with communities in health care decisions.
14. Use communication and information technology effectively and appropriately.
15. Work in interdisciplinary teams.
16. Ensure care that balances individual, professional, system and societal needs.
17. Practice leadership.
18. Take responsibility for quality of care and health outcomes at all levels.
19. Contribute to continuous improvement of the health care system.
20. Advocate for public policy that promotes and protects the health of the public.

The National Academies envision five core competencies "that all clinicians should
possess regardless of their discipline, to meet the needs of the 21st-century health
system." These are to provide patient centred care, work in interdisciplinary teams,
employ evidence based practice, apply quality improvement and utilise informatics.[43]

In the workplace, health service organisations and facilities may specify competencies
based on analysis of specific occupational roles.[45 49]

Researchers provide insights into the competency definition.[77 78] For example,
Patterson *et al* use different methodological approaches to triangulate information
gathered from three sources - patients, general practitioners and practice observation -
to develop valid competency statements for general practitioners. They found five
competencies were elicited from all three sources (empathy and sensitivity,
communication skills, clinical knowledge and expertise, conceptual thinking and
problem solving, personal attributes). Three competencies were elicited from two

sources - GPs and patients (professional organisation and administrative skills, professional integrity, coping with pressure). Three competencies were elicited from one source - solely the GPs (managing practice and team involvement, legal, ethical and political awareness, learning and professional development).[79]

Rivo *et al*[80] make use of three different sources of data in order to define the competencies needed for generalist practice:

1. Drawn from national surveys that identify leading causes of morbidity and mortality that could be reduced by primary or preventive care (e.g. substance abuse, nutrition and exercise counselling and cardiovascular and cancer screening)
2. The most common presenting conditions, diagnoses and other encounters (e.g. preventive screening and counselling) that broadly trained generalist physicians could be expected to manage; and
3. Expert reports.

Carricco *et al* outline four steps in specifying competency based programs. Research and evaluation methods are highlighted within some of these steps.[17]

1. Competency identification. Delphi technique, nominal group technique, task analysis, critical incidents survey, behavioural event interview, surveys. (An example of this is found in the paper by Alahlafi and Burge.)[81]
2. Determination of competency components and performance levels. This involves identifying the tasks (sequential or in sum) that make up the competency. They are the benchmarks or performance indicators. They must be measurable. There must be a threshold set which represents achievement of the competency. Linked to this aspect is the selection of the appropriate educational approach to develop the competency in learners. (See also Yuen *et al*) [82]
3. Competency evaluation. This requires the selection of the appropriate assessment tools that will be used for a particular competence.
4. Overall assessment of the process. This is the continuous quality improvement cycle that should be built into the process.

Once the competencies are defined, educational programs can be developed, including training for the trainers.[83] There are tools that assist in conceiving programs such as the Dundee Model.[56] Reports on approaches used to develop other programs also provide a useful starting point.[84-86]

A variety of data sources (e.g. morbidity and mortality data and forward projections based on modelling such data, existing curriculum documents) together with information from key informants (e.g. recognised authorities), informant groups (e.g. trainees, trainers, clinicians and patients), informant organisations (e.g. professional colleges, the Divisions network, consumer organisations) and critical stakeholders (e.g. government funders) all have contributions to make in the development of competencies.

Assessing competencies

Competencies should "be learner-orientated, behaviourally described and measurable."[49] The nature of the competencies in focus will determine particular approaches to assessment.

There are a variety of resources available to assist. For example the ACGME assessment tool box which has thirteen assessment tools that can be used to measure the six ACGME competencies (already outlined at Figure 1):

Figure 4 ACGME Assessment Toolbox

- 360 degree evaluation
- Checklist evaluations
- Objective structured clinical examinations
- Patient surveys
- Record reviews
- Standardised oral examinations
- Written examinations

- Chart stimulated recall
- Global ratings
- Procedure or operative logs
- Portfolios
- Simulations and models
- Standardised patient examinations

Morgan and Cleave-Hogg provide more detail on the use of simulation for assessment.[87]

Usually learner performance is judged "successful" or "not successful". On occasions additional categories of performance are assigned - for example "superior performance".

Davis and Harden provide an excellent opinion piece on the issues associated with competency based assessment, including drawing attention to the costs of assessment. The four levels of Miller's pyramid (knowledge, application, simulation and performance) all need to be assessed. Assessment will be criterion-referenced. Profiling of candidates is important to consider. If a student is found to have an isolated weakness, then it is logical to use conjunctive approaches to standards to ensure the student meets the standard, rather than a compensatory approach in which the student uses high scores from one part of the assessment to compensate for a low score in another part. Assessment should support learning. Examiners should be drawn from a range of backgrounds (e.g. not just medical, but including peers, other health care professionals). New assessment tools appropriate for workplace assessment need to be developed. Staff development is essential to make it all work. [58]

Educationalists designing assessment in competency-based education programs can learn from approaches others have taken. Norcini relates Millers triangle to assessment,[88] as do Epstein and Hundert who provide a useful grid mapping clinical tasks against Miller's levels of assessment and the context of care.[28] Duffy *et all* provide insights through their work on assessment options in communications skills.[89] Hobbs *et al* discuss computer competency assessment.[90] Meretoja provides a review of assessment tools used in nursing practice "to help nurse administrators locate and evaluate existing instruments to assure safe and qualified nursing care*.*"[51]

Identify educational programs across the system targeting the same outcomes and seek to maximise synergies with these programs

Various organisations have roles that impact on education and training activity in general practice settings including a focus on chronic disease. These activities may occur in different parts of the vertical continuum of education within a discipline (e.g. undergraduate[91], postgraduate, continuing professional development[92][93]) or may occur "horizontally" with training occurring at the same stage, but across health groups (e.g. undergraduate pharmacy, nursing and medical students all participate in a pharmacology educational program). As has already been noted, there is inconsistency in terminology used in the literature. Different programs use different terms. Outcomes may be improved if the degree of consensus about "core" or general competencies relevant to Australia's primary health care system and chronic disease were common

across programs. This would provide a foundation to improve synergies and realise efficiencies.[94] Programs that are endorsed by several key organisations may lead to greater uptake and improved outcomes.

In order to get a sense of the extent of related educational activities, we undertook a brief survey of the websites of key organisations with a focus on postgraduate training relevant to general practice settings in medical and nursing programs.

Australian General Practice and Training (AGPT) provide the Collaboration for Online Medical Education and Training (COMET) portal to "Improve the quality of educational exchange, development and support available to the Australian Primary Medical Care Community through the development of a collegiate on-line environment…"[95] This is a useful starting point to identify educational activities focused on general practice vocational trainees.

At the time of writing, the Royal Australian College of General Practitioners (RACGP) had undertaken a review of its curriculum for Australian General Practice.[96] The review was comprehensive and sought coherence between the curriculum and general practice training standards. It had a chapter focusing on chronic disease.

The Australian College of Rural and Remote Medicine (ACCRM) has twenty-two curriculum statements on its website. Each of these documents "…defines overall educational outcomes and specific learning objectives [which reflect] what rural doctors need to be able to do in that discipline".[97] References to chronic disease are in sections relating to adult internal medicine, rehabilitation, aged care and palliative care.

Australian Divisions of General Practice (ADGP) is working in conjunction with the Australian Practice Nurses Association (APNA) and the Australian Nursing Federation (ANF) to develop a National Resource for Nursing in General Practice. This project is funded by the Australian Government.[98]

Australian has several courses aimed at developing the nursing workforce to manage chronic diseases. A research assistant (DR) conducted a web search restricted to the institutions mentioned on the APNA website.[99] This website has a clear focus on primary health care, displaying names of educational institutions with a brief description of the programs offered. Those with a focus on chronic disease were identified. Twenty-eight programs were identified; 12 at postgraduate level, one at undergraduate level, 12 short courses and three workshops. There was a trend in postgraduate education towards off campus (online) delivery. Almost half of postgraduate courses are offered online, some have a mixture of online delivery and few face-to-face interactions. The University of Adelaide seems to have a special interest in general practice and chronic disease. This institution offers four graduate diplomas with the combined PHC/CD perspective whereas other universities mostly feature one program each with this focus. As can be expected, short courses and workshops are offered by entities with a focus on a particular chronic disease like diabetes or asthma (e.g. Diabetes Australia, the Asthma Foundation, etc). These courses are often delivered onsite lasting between one and three days. It is of note that the APNA website was under development so many of the State-based links for diabetes, asthma and cardiovascular have not been populated yet. Similarly, information about courses offered in Tasmania was not available.
Tables summarising this information.

Be fully aware of and work within the existing complexity of the training environment

The Australian general practice educational environment is complex. It would be naive to implement competency-based education programs without carefully accounting for this complexity.[100] The following diagram summarises the environment.
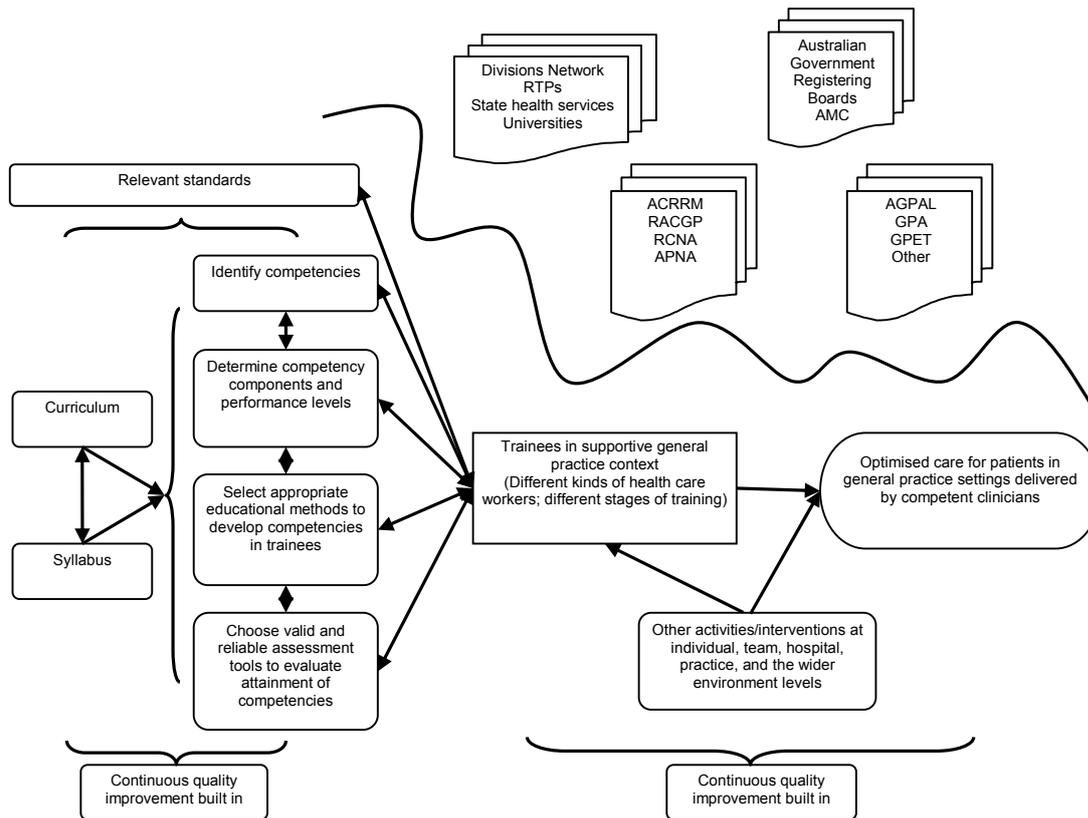
Figure 5 Australian general practice training environment and intended outcomes

It shows the connections between standards, a curriculum with its syllabus, the steps relevant to a competency-based education program within that curriculum, the operation of that "intervention" on trainees in an appropriate general practice setting and the ultimate goal of enhanced health outcomes that result. The outcomes of interest in terms of the focus of this study (consumer access, integration and multidisciplinary care, better management of chronic disease, greater focus on prevention and early intervention, greater community support and involvement in health care and professional satisfaction and teamwork) are all intermediate outcomes relevant to health outcomes.

Above the wavy line are examples of various organisations with roles that impact to a greater or lesser extent on aspects of this environment. It is not an exhaustive list.

The diagram also shows that educational activities do not take place in isolation from other activities in the health system. For example, changes in funding relating to the Medical Benefits Schedule may increase the number of practice nurses working in general practice, but decrease the number of practices with sufficient physical space to take trainees. A gain in terms of present health service delivery may have an unintended consequence of reducing the pool of training practices impacting adversely on medium terms workforce supply. These kinds of system factors can operate at the level of the individual, team, practice and/or the wider environment.

The important issue of health professional accreditation and registration is acknowledged. This has particular relevance if new roles or tasks within existing roles are being contemplated.[101]

Actively manage the process of change
Grol [102] outlines key stages in the process of change and strategies required in each stage in the context of improving the quality of health services. These are reproduced in the following table. The same kind of approach is relevant in implementing a competency-based educational program which can be considered a complex intervention aimed at behavioural change.

Different Strategies Needed at Different Stages in the Process of Change	
Stage	**Strategies**
Orientation	
• Being aware of change proposal	Speeding change proposal through variety of media, personal approach of target group, opinion leaders
Interest, commitment	
Insight	
• Knowledge, understanding • Insight into own performance	Good instructions, CME, self-assessment, peer review, feedback
Acceptance	
• Positive attitude to change • Decision to change	Local consensus, presenting evidence, using opinion leaders, modelling new performance by peers, analysing barriers to change and finding solutions
Change	
• Adoption, try out in practice • Confirmation of feasibility and benefit	Skills training, extra resources, redesigning practice processes, extra staff, support and facilitation
Maintenance	
• Integration into routines • Embedding into organisation	Monitoring, feedback and reminder systems, integration into care pathways, leadership and management support, incentive

Shaw *et al* report on the relative lack of high quality evidence underpinning the effectiveness of tailored interventions to overcome identified barriers.[103] Extrapolating from this to a competency-based educational application emphasises the importance of building evaluation into any program.

WHAT TOPICS COULD BE THE FOCUS OF COMPETENCY-BASED EDUCATION PROGRAMS AIMED AT ENHANCING CHRONIC DISEASE MANAGEMENT IN AUSTRALIAN GENERAL PRACTICE SETTINGS?

It is possible to propose topics for competency-based educational programs by considering aspects of various models for chronic disease care. The review by Singh and Ham[104] and related literature[38 105-109] provides an excellent overview of these models.

One way to select a topic focus would be to identify prevalent chronic conditions prevalent in general practice settings (e.g. diabetes[105 110], asthma,[111] COPD, chronic heart failure,[112] arthritis[113] etc). The focus could be further narrowed according to the professional group they are designed for such as nurses or doctors.[38 105 110]

An alternate approach would be to focus on common elements in chronic disease management irrespective of any particular condition. The following list identifies potential candidates based on the literature reviewed.

- analysis and planning[114]
- behaviour modification and patient eduction[115]
- clinical audits[108]
- clinical practice guidelines and clinical pathways[108]
- communication skills[89 116 117]
- critical appraisal[38 118]
- cross cultural issues[119 120]
- disease registers[108]
- generalism[80]
- informatics and computer knowledge[38 90 105 108 114 121-125]
- leadership[38 126]
- patient self-management[124 127]
- prescribing[128]
- prevention, screening and early intervention[108]
- quality improvement;[108 129] and
- team work.[130]

AT WHAT STAGE OF TRAINING SHOULD COMPETENCY-BASED EDUCATION PROGRAMS AIMED AT ENHANCING CHRONIC DISEASE MANAGEMENT IN AUSTRALIAN GENERAL PRACTICE SETTINGS BE IMPLEMENTED?

GENERAL PRACTICE VOCATIONAL TRAINING IS KEY

Competency-based education is designed to occur in real work place settings.[19] For general practitioner vocational training in Australia, the network of training consortia linked through contracts with Australian General Practice Training provides the most developed platform of training general practices. The trainees in this network are all working to become vocationally registered general practitioners.

UNDERGRADUATE STUDENT TRAINING

Early experience impacts positively on self selected students.[131] "Early experience helps medical students learn, helps them develop appropriate attitudes towards their studies and future practice and orientates medical curriculums towards society's needs." Early exposure of medical and nursing students to people with chronic diseases in general practice settings is an appropriate objective for undergraduate education.

CONTINUING PROFESSIONAL DEVELOPMENT

There is evidence of the effectiveness of various educational interventions in the context of continuing professional development in terms of physician performance and some health outcomes.[132-135]

EVIDENCE LINKING COMPETENCY-BASED EDUCATION AND THE ATTAINMENT OF IMPROVED OUTOMES

In this section, we return to the original research questions and summarise the evidence we identified for each question.

COMPETENCY-BASED EDUCATION AND IMPROVED ACCESS

We identified one study assessing the effectiveness of competency-based education programs on improving access in a third world setting. Basnet *et al* report that competency-based education solved an access problem in Nepal with respect to post abortion care. They did not include a cost-effectiveness assessment.[136]

Elements of competency-based education formed part of a successful multifaceted intervention addressing late life depression in residential aged care settings. Access to effective care was improved.[137]

COMPETENCY-BASED EDUCATION AND IMPROVED INTEGRATION AND MULTIDISCIPLINARY CARE

Internationally, there are many different health professionals involved in delivering care, including chronic disease care, but very little empirical evidence regarding outcomes associated with this care.[138] We did not identify any direct evidence regarding competency-based education as an intervention aimed at improving either integration or multidisciplinary care in the setting of general practice although there was one positive study in the setting of a pathology laboratory.[139] Some groups report educational activities bringing different medical disciplines together –e.g. family medicine, internal medicine and paediatric trainees.[140] Zwarenstein *et al* note the lack of good quality studies evaluating the effects of interprofessional education on health outcomes.[141]

In their systematic review looking at the evidence base for interdisciplinary learning (rather than a specific focus on competency-based education), Cooper *et* al conclude "Student health professionals were found to benefit from interdisciplinary education with outcome effects primarily relating to changes in knowledge, skills, attitudes and beliefs. Effects upon professional practice were not discernible and educational and psychological theories were rarely used to guide the development of the educational interventions."[20]

COMPETENCY-BASED EDUCATION AND IMPROVED MANAGEMENT OF CHRONIC DISEASE

We did not find any direct evidence assessing the impact of competency-based education programs on improved chronic disease management. Educational activities are necessarily part of complex interventions that are effective. Most literature with some relevance considered diabetes care. For example, Hampson *et al* found that adolescents with Type 1 diabetes improved their ability to self-manage with educational and psychological interventions.[142] In an evaluation of the effects of an educational program for nurses, Louwagie et al report that formal training was "marginally associated with better care for acute respiratory tract infections ($p = 0.06$) but not for diabetes ($p = 0.47$)"[143]. In a systematic review examining interventions that improve the management of diabetes in primary care, Renders *et al* conclude

"Multifaceted professional interventions can enhance the performance of health professionals in managing patients with diabetes."[144] Educational materials and educational meetings in combination with other intervention components contributed to these results.

In osteoarthritis, an educational intervention with some elements of competency-based education improved general practitioners joint injection techniques.[113]

COMPETENCY-BASED EDUCATION AND GREATER FOCUS ON PREVENTION AND EARLY INTERVENTION

We identified no direct evidence assessing the effectiveness of competency-based education programs on prevention and early intervention.

Thompson *et al* summarise the barriers to the provision of clinical prevention services as:

- the health care system and its culture limit flexibility for physicians and the intention to help alone is inadequate justification for change
- time constraints and patient demand make a physician's job one of responding to complaints and not one of initiating action
- feedback from preventive care is negative or neutral (e.g. the physician does not receive feedback regarding the late-stage breast cancer averted by promoting mammography); and
- adequate resources are not available."[145]

They say that evidence supports improved health outcomes from preventive activities in the following areas: breast cancer screening, childhood immunisations, influenza vaccination for the elderly, smoking cessation, detection and management of depression, cholesterol screening and increased use of bicycles safety helmets by children. Competency-based training in these domains may increase focus on them, but would not necessarily overcome the barriers they identify.

Although not stated as being a competency based program, an interdisciplinary undergraduate rural health professional educational program achieved increased "availability of health promotion, screening and illness prevention programs as well as clinical preventive services.."[146].

There is evidence of a contribution from educational interventions in adolescent diabetes care with improvements in home glucose monitoring and injection technique.[142] This is secondary prevention.

COMPETENCY-BASED EDUCATION AND GREATER COMMUNITY SUPPORT AND INVOLVEMENT IN HEALTH CARE

Again, there was no direct evidence identified to address this question. There is some evidence supporting the role of lay health workers providing immunisations and some minor acute care.[147] These workers must be trained to perform these roles.

COMPETENCY-BASED EDUCATION AND GREATER PROFESSIONAL SATISFACTION AND TEAMWORK

We found no direct evidence relating to this question.

EVIDENCE INTO THE FUNDING, COST-EFFECTIVENESS, SUSTAINABILITY AND IMPLEMENTATION OF COMPETENCY-BASED TRAINING

WHAT IS KNOWN ABOUT FUNDING COMPETENCY-BASED EDUCATION?

We found no direct evidence considering alternate approaches to funding competency-based educational programs in general practice settings. In Australia, competency-based educational activities in these settings are most often funded by means of substantial contributions from various arms of the Australian Government (e.g. DoHA, DEST), often in combination with funds or in kind contributions from professional bodies and their members (e.g. RACGP, ACCRM, APNA etc), universities and related organisations (e.g. AGPT).

In the context of reforms to vocational educational and training for apprentices, Dockery *et al* [61] found that employers were favourably disposed to competency-based assessment and flexibility in time spent in training but also found that this type of training increased the net cost of apprentices, placing a question over the cost-benefit result of the New Apprenticeships scheme within which these changes were embedded. Blake,[148] in assessing the development of units of competence in the context of vocational education and training in Australia, asks whether they have provided demonstrable returns to investment. He concludes that they have not, arguing that there has been a proliferation of units of competency and that a "massive rationalisation" need to occur. While not directly dealing with competency-based training for the health professions in general or for general practice in particular, these studies do suggest it is not self-evident the costs of such training exceed the benefits.

WHAT IS KNOWN ABOUT THE COST-EFFECTIVENESS OF COMPETENCY-BASED EDUCATION?

Walker[60] provides a useful framework for identifying the costs associated with developing and delivering a competency-based educational program. Tanner provides a useful checklist for the direct and hidden costs of in house staff development.[59]

HOW COULD COMPETENCY-BASED TRAINING BE SUSTAINED?

We found no evidence evaluating factors that enhance the likelihood of competency-based educational programs being sustained. By extrapolation from the literature it could be argued that the following factors facilitate competency-based educational programs being sustained:

- Structured orientation of new workers into the general practice context including a specific focus on chronic disease management and educational programs to support maintenance of appropriate skills[149]
- Peer review activities in chronic disease management being linked to appropriate educational resources[150]
- Incorporating a specific focus on aspects of chronic disease management into the routine and required activities of relevant organisations.[45] For example, continuing professional development programs for GPs could focus on relevant issues and link to appropriate educational resources; bodies charged with accrediting general practices could highlight aspects relevant to chronic disease

management and provide links to educational resources; educational activities could be built into programs such as the National Collaboratives.

Volland and Berkman identified the essential elements of a sustained program targeting social workers in geriatric aged care as being: "1. a university-community partnership; 2. competency-driven education; 3. an integrated field-rotation internship across multiple programs and diverse aging populations; 4. an expanded role for field instructors and 5. focused recruitment to geriatric social work supported by student scholarships."[151] These elements could inform the design of particular proposals.

One concern with implementing competency-based education is that resources need to be provided to support trainees being remediated if they do not achieve competency. If there are large numbers of trainees in this circumstance, the costs could be large. This concern is ameliorated to an extent by the fact that, in medicine, the proportion of trainees needing additional educational input because they fail to meet specific competencies may be very small in comparison to the proportion meeting specific competencies.[152]

WHAT ARE THE BARRIERS AND FACILITATORS TO THE IMPLEMENTATION OF COMPETENCY-BASED EDUCATION?

Any consideration of the barriers and facilitators to implementation of competency-based education needs to be preceded with the cautionary note that competency-based education is not any kind of "magic bullet" solution for either the pressured primary health care workforce or achieving improved chronic disease outcomes in general practice settings. Specification of competencies must not dominate curricular development, [153] nor discussions as to how both workforce and chronic disease issues may be addressed. It may be part of complex interventions designed to achieve these outcomes. The barriers and facilitators have been derived from the reviewed literature and are presented in alphabetical order, not a rank order of importance.

Barriers
- Adequate numbers of individual patients with the condition of interest to allow a valid and reliable assessment of performance to be made[35]
- Complex environment including multiple players with competing agendas
- Complex nature of multifaceted interventions
- Cost
- Determination of acceptable levels of performance for defined competencies, including the permissible range of deviation from that level at different stages of training[35]
- Dynamic nature of knowledge – e.g. for an educational program aimed at supporting an intervention aimed at computer competency, the "world" may have moved on by the time the results of an evaluation are known
- Key participants are not engaged[154]
- Lack of evidence supporting effectiveness of competency-based education. "A recent review of published evaluative studies of competency-based training found an increase in administrative burden but no convincing beneficial effects on motivating students, work performance, or relevance to the needs of industry."[14]
- Patient factors (e.g. socio economic status) may impact on trainee performance and needs to be considered[35]
- Representativeness of the competencies selected for assessment of the larger professional role; and

- Uncertainty about the best type of chronic disease model.

Facilitators
Carraccio identifies the following as key considerations for success:[17]
- engaging faculty and other stakeholders in the program
- making competency based curriculum an integral part of the organisation's strategic plan
- using accreditation requirements to facilitate change
- administrative support for developing, managing and assessing the curriculum
- assurance that the planning process is clearly linked to an assessment plan
- development of a suite of assessment tools that incorporate observations taken in many situations including the actual work place
- keeping faculty close to the assessment process; and
- designing a competency based curricular review process.

WHAT THEN ARE THE OPTIONS?

The possible options include options that can be implemented with educational policy interventions alone and options that in additional to the educational policy interventions, require regulatory changes to be made. In both cases, adequate financing of the approaches is essential. Interventions that also involve changes to the regulatory framework are more complex than interventions that involve educational programs alone, and therefore are likely to be more difficult and time consuming to implement and evaluate.

Because the review of the literature does not provide evidence of effectiveness for any of the options, including a lack of evidence to inform the likely balance between costs and benefits, it is essential that implementation is through appropriate pilot programs with careful evaluation of the outcomes before wider implementation.

The potential for entrepreneurs to play a role in proposing and developing innovative solutions should be encouraged. They may be found among the many universities, training consortia and colleges working in this area.[7 155]

EDUCATION POLICY OPTIONS

Selection into training
Selection of trainees into university or professional training programs is a difficult area. There is some evidence that this selection process can be made more effective. There should be a continuing focus on developing better selection tools to identify trainees for training programs (e.g. general practice, practice nursing) based on desirable competencies.[32] Better selection processes should lead to better retention both in training and in subsequent careers.

University Medical School Training / University Nursing School Training
Increase the focus on chronic disease management in general practice settings in both undergraduate medical and nursing curriculum, including early exposure to people with chronic disease in these settings. This could be achieved by raising the awareness of the institutions running these programs, as well as by increasing the emphasis within the standards of the relevant accrediting.

Vocational training and continuing professional development
Introduce specific training in relatively non-controversial areas. For example, a focus on learning how to make best use of software packages in general practice settings including disease registers, recall and reminders systems and decision support systems is likely to result in less controversy between nursing and medical trainees, than a focus on prescribing. By choosing non-controversial areas, the interventions designed to achieve improved workforce and chronic disease management outcomes are less likely to be blocked.

Specific education focused on particular chronic diseases should continue.

An increased focus on interdisciplinary learning in these topic areas should contribute to increased familiarity with multidisciplinary teams on the part of the trainees. Chronic disease management is a very appropriate domain for interdisciplinary learning. There is a well established network of training general practices in the various Regional

Training Providers across the country. These provide a platform on which new programs can be built and evaluated.

EDUCATION AND REGULATION POLICY OPTIONS

Adopt some of the changes in the regulatory framework proposed by the Productivity Commission. For example, a variation on the physician assistant could be developed and implemented into Australian general practice settings with a specific focus on chronic disease management.[156] This would require appropriate regulations to be implemented and a training and certification program developed for the purpose.

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