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Review

Effect of health insurance on the utilisation of allied health services by people with chronic disease: a systematic review and meta-analysis

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Abstract. Allied health services benefit the management of many chronic diseases. The effects of health insurance on the utilisation of allied health services has not yet been established despite health insurance frequently being identified as a factor promoting utilisation of medical and hospital services among people with chronic disease. The objective of this systematic review and meta-analysis was to establish the effects of health insurance on the utilisation of allied health services by people with chronic disease. Medline (Ovid Medline 1948 to Present with Daily Update), EMBASE (1980 to 1 April 2011), CINAHL, PsychINFO and the Cochrane Central Register of Controlled Trials were searched to 12 April 2011 inclusive. Studies were eligible for inclusion if they were published in English, randomised controlled trials, quasi-experimental trials, quantitative observational studies and included people with one or more chronic diseases using allied health services and health insurance. A full-text review was performed independently by two reviewers. Meta-analyses were conducted. One hundred and fifty-eight citations were retrieved and seven articles were included in the meta-analyses. The pooled odds ratio (95% CI) of having insurance (versus no insurance) on the utilisation of allied health services among people with chronic disease was 1.33 (1.16−1.52; $P < 0.001$). There was a significant effect of insurance on the utilisation of non-physiotherapy services, pooled odds ratio (95% CI) 4.80 (1.46−15.79; $P = 0.01$) but having insurance compared with insurance of a lesser coverage was not significantly associated with an increase in physiotherapy utilisation, pooled odds ratio (95% CI) 1.53 (0.81−2.91; $P = 0.19$). The presence of co-morbidity or functional limitation and higher levels of education increased utilisation whereas gender, race, marital status and income had a limited and variable effect, according to the study population. The review was limited by the considerable heterogeneity in the research questions being asked, sample sizes, study methodology (including allied health service), insurance type and dependent variables analysed. The presence of health insurance was generally associated with increased utilisation of allied health services; however, this varied depending on the population, provider type and insurance product.

Additional keywords: allied health occupations, gatekeeping, primary health care.

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Introduction

Chronic disease can be characterised as a long-term, persistent disease often with gradual onset (at any age during the life span) with complex, multifactorial causality that can result in significant impairment in quality of life, activity limitation and premature mortality (Australian Institute of Health and Welfare 2001). Like acute illness, there may be short periods of severe disease. However, unlike acute illness, chronic disease can be present in subcritical levels over extended periods. Consequently, patterns of utilisation of health services are likely to differ for people with chronic as opposed to acute disease.

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What is known about the topic?

- Health insurance generally increased utilisation of allied health services in people with chronic disease and covariate influence on utilisation varied according to the study population.

What does this paper add?

- Policy decisions regarding allied health services to people with chronic disease are critical and this is the first meta-analysis examining the influence of insurance on utilisation of these services.

People with chronic disease face many barriers in attempting to use health services. An early framework developed for the study of utilisation of health services described an inter-related process where characteristics of the health-delivery system, characteristics of the population at risk, health policies and consumer satisfaction impacted on health service use (Aday and Andersen 1974). Since that time, several investigations have been undertaken using this and other similar frameworks to identify factors promoting or inhibiting utilisation of medical and hospital services. One large recent study grouped the patient-related factors affecting hospital readmission into four categories: social support, health condition, sociodemographic factors and health care utilisation (Hasan *et al*. 2010). Additional studies have reported that factors including race (Crowder *et al*. 2010; Mosen *et al*. 2010), insurance coverage (Kolbasovsky *et al*. 2007), functional co-morbidity including limitations in the performance of activities of daily living (Li *et al*. 2011) and other sociodemographic and psychosocial factors (Iron and Goel 1998) are associated with increased hospital or medicines utilisation.

Allied health service providers (e.g. physiotherapists, occupational therapists and speech pathologists) form an important part of the health system and improve health outcomes for a range of chronic diseases. Examples include the provision of pulmonary rehabilitation for people suffering chronic respiratory disease (Lacasse *et al*. 1996), early speech language therapy for aphasia in people with stroke (Godecke *et al*. 2012) and the provision of education to reduce complications including amputation in diabetes (Malone *et al*. 1989; Rith-Najarian *et al*. 1998). However, in contrast to medical services people with chronic disease are more likely to view allied health services as 'discretionary' or optional components in the management of their condition (Haines *et al*. 2010). Other policy-induced restrictions in different countries, such as the requirement for assessment by a general practitioner (GP) ('gatekeeper') in order to receive publicly subsidised rebates for services (Wolinsky *et al*. 2007; Foster *et al*. 2008; Haines *et al*. 2010) can create systematic differences in how people with chronic disease utilise medical and allied health services. Consequently, factors that might promote utilisation of health services and the nature of associations with utilisation of allied health services differ from primary medical or hospital-based services. The influence of insurance on allied health service use is unclear (Douglas *et al*. 2011). This review aimed to identify how the presence of health insurance compared with either no insurance or varying levels of insurance affects utilisation of allied health services among people with chronic disease. The following questions were addressed: (i) what is the effect of insurance (versus no insurance or versus insurance of lesser coverage) on utilisation of allied health services among people with chronic disease, and (ii) which factors impact on utilisation of allied health services among people with chronic disease independently of health insurance.

Methods

The systematic review protocol as specified in this manuscript was not registered as no systematic review registry existed at the time of finalisation of the protocol.

Studies were eligible for inclusion in this study if they were randomised, quasi-experimental (such as parallel control group trials and pre-post intervention trials) or quantitative observational involving patient populations with one or more chronic disease, or general population studies including a subgroup analysis containing data specific to a patient group with one or more chronic disease, where the health services examined were provided by allied health staff (physiotherapists, speech pathologists, occupational therapists, dieticians, podiatrists, audiologists, kinesiologists, exercise physiologists, chiropractors, Indigenous health workers, diabetes educators and osteopaths). The chronic diseases (Appendix 1) were selected using the Australian Institute of Health and Welfare (AIHW) Focus Conditions; excluding chronic kidney disease, oral disease and the cancers (as per the Chronic Disease and Participation in Work AIHW Report 2008) (Australian Institute of Health and Welfare 2009). Studies required two variables for inclusion: (i) health insurance (the presence of (yes/no); or type (e.g. private *v.* public)); and (ii) utilisation of allied health services as an outcome. Studies were excluded if they were not published in English, did not report data specific to one or more allied health service, if studies reported a sole focus on use of pharmaceuticals or radiology services or if the study focussed on utilisation of mental health services. A checklist used to determine whether studies fulfilled eligibility criteria is presented in Appendix 1.

The electronic databases and libraries searched to 12 April 2011 inclusive were Medline (Ovid Medline 1948 to Present with Daily Update), EMBASE (1980 to April 01, 2011) and the entire holdings of CINAHL, PsychINFO and the Cochrane Central Register of Controlled Trials. Search terms were initially constructed by project investigators but were also subject to review by a project reference committee made up of policy makers, service providers, allied health professional bodies, the insurance industry and consumer representatives (Table 1). Participant, intervention, outcome and allied health terms were combined within-group with the Boolean operator 'OR' and then the 'participant' terms yield was combined between-group with the 'intervention', 'outcome' and 'allied health' terms yields using the Boolean operator 'AND'. See Appendix 2 for the full electronic search strategy for Medline and EMBASE. The reference lists of retrieved articles as well as personal files of the investigators were searched to identify additional relevant citations.

Table 1. Search terms used to build the review
CVA, cerebrovascular accident; EPC, enhanced primary care; HMO, health maintenance organisation; PPO, preferred provider organisation

Participant words	Intervention words	Outcome words	Allied health words
chronic disease[A]	Department of Veterans Affairs	uptake	physiotherapist
musculoskeletal	health insurance	utilization	physiotherapy
heart disease	health premiums	utilisation	physical therapist
stroke	Medicare	occasions of service	physical therapy
cerebrovascular accident	Medicaid	health service	speech therapy
CVA	medical insurance		speech therapists
neurological	private insurance		speech pathology
depression	health plan		speech pathologists
type 2 diabetes	managed care		occupational therapy
non-insulin dependent diabetes	HMO		occupational therapist
arthritis	health maintenance organisation		dietician
osteoarthritis	PPO		dietetics
osteoporosis	preferred provider organisation		nutritionist
asthma	EPC		nutrition therapy
chronic obstructive airways disease	enhanced primary care		nutrition therapist
chronic obstructive pulmonary disease	point of service		podiatry
pre-existing disease			podiatrist
co-morbidity			audiologist
comorbidity			audiology
			multidisciplinary team
			human movement
			kinesiology
			kinesiologist
			exercise physiology
			exercise physiologist
			aboriginal health worker
			indigenous health worker
			chiropractor
			chiropractic
			diabetes educator
			osteopath
			osteopathy

[A]These chronic diseases were selected using the Australian Institute of Health and Welfare Focus Conditions, excluding the cancers, chronic kidney disease and oral disease (as per the Chronic Disease and Participation in Work AIHW Report, 2008 (Australian Institute of Health and Welfare 2009).

Study selection

Article titles retrieved from the searches were independently screened to identify relevant abstracts from which two reviewers (TH, ES) identified potentially relevant full-text articles. These were retrieved and both reviewers (TH, ES) independently compared the full-text articles to eligibility criteria. Discrepancies were resolved by discussion between the two reviewers. The agreement between reviewers in article title and abstract review was moderate (intra-class correlation coefficient = 0.32), therefore an inclusive approach was pursued where full-text articles were reviewed if either reviewer identified it as being potentially relevant. Studies were included in the meta-analysis on the basis of presenting appropriate measures of effect for the interaction between allied health services and the presence of insurance.

Data collection process, data items and appraisal

Data extraction was performed independently by two reviewers (TH, ES). Data items extracted included author, year, geographic location of the study, study design, patient group, database (if relevant), relevant outcome (e.g. number of visits), the presence or absence of health insurance, the levels of insurance and insurance products, the allied health service provided, measures of effect (i.e. odds ratios and 95% confidence intervals) and any covariates described in the analyses (both significant and/or retained in any final models presented and those non-significant and/or excluded from the final models). Corresponding authors were contacted via email for data not included in the original manuscript or for data clarification by ES as required. Studies included in the quantitative meta-analysis were appraised for study quality and risk of bias using the STROBE reporting checklist by two independent reviewers (ES, TH) (Vandenbroucke *et al*. 2007; von Elm *et al*. 2007).

Analysis

Aim 1

Meta-analyses were conducted using STATA I/C version 11.0 software (StataCorp LP, College Station, TX, USA). An iterative analysis plan was pursued whereby possible heterogeneity in study results was sought to be partitioned out by subgrouping of studies according to the insurance comparison being made. Study findings were separated into: (i) insurance *v.* no insurance; (ii) insurance *v.* alternate insurance of lesser coverage; and (iii) insurance *v.* mixed insurance (may include

combinations of any insurance condition including no insurance, e.g. a comparison of health maintenance organisations *v.* all others not health maintenance organisations). Where significant statistical heterogeneity remained, study results were further broken down based on the type of allied health service being examined. One study that examined the effect of different levels of insurance (private, Medicare (US) or Medicaid (US)) on utilisation of physical rehabilitation (physical, occupational, speech therapy) services (Elrod and DeJong 2008) was excluded from being pooled with other studies as a post-hoc decision in the analysis plan because the analyses in this study were restricted to people who thought they needed physical rehabilitation services instead of the entire sample of people with a chronic disease. Random-effects meta-analysis models were used due to the differences in insurance products, clinical populations and therapies being considered across the studies. The principal summary measure used was the pooled odds ratio (95% CI).

Aim II

A narrative approach was pursued in preference to meta-analysis of multiple regression estimates of effect in the synthesis and summary of covariates associated with allied health service utilisation, independently of insurance coverage. These covariates were often excluded from the final models in included papers due to their non-significant association with allied health service utilisation, which would have created missing data and subsequent bias in any attempted pooled analyses. Covariates were classified using six construct groupings described in the framework developed by Andersen (1995): (i) demographics; (ii) social structure (e.g. education, occupation, ethnicity); (iii) health beliefs (i.e. attitudes, values and knowledge that people have about health and health services that might influence perceptions of health service need and utilisation); (iv) community enabling factors (i.e. availability of health personnel and facilities where people live and work); (v) personal enabling factors (i.e. income, insurance) and need (functional limitation); and (vi) the need for health services perceived by the individual or assessed by health professionals (Andersen 1995). For the purposes of the review, where the terms Medicare or Medicaid refer to the United States of America health care system they are designated Medicare (US) or Medicaid (US). Where Medicare refers to the Australian context, the term is designated Medicare (AUS). Ethical approval was deemed not required.

Results

Yield from systematic review

The searches retrieved 158 citations. After review of abstracts and full-text articles, seven articles were included in the quantitative synthesis (Fig. 1). The characteristics of the seven articles included in the quantitative synthesis are presented along with a summary of their results (Table 2). All of the included studies were observational; no randomised trials were identified.

Aim I: meta-analyses

Studies were of moderate to high quality; however, consistent limitations in reporting related to lack of sampling approach specifications, clear definitions of the insurance products included (and their comparators), lack of acknowledgement of potential sources of bias and inadequate documentation of the amount of and methods of handling missing data.

Moderate heterogeneity in study findings was identified when pooling the results from all included studies ($n = 13$ effect estimates from seven publications, $I^2 = 46.7\%$, Cochrane's Q $P = 0.03$). Findings from category (i) insurance *v.* no insurance did not demonstrate significant heterogeneity ($n = 7$ effect estimates from five publications, $I^2 = 29.3\%$, Cochrane's Q $P = 0.21$). The pooled odds ratio (95% CI) of having insurance *v.* no insurance on the utilisation of allied health services among people with chronic disease was 1.39 (1.17–1.65; $P < 0.001$) (Fig. 2). Studies placed in category (ii) insurance *v.* alternate insurance of lesser coverage included a comparison of private insurance versus public insurance on physiotherapy utilisation among people with osteoarthritis (Cisternas *et al*. 2009), and a comparison of 'comprehensive' insurance (Medicare (US) with supplement, private, Veterans affairs) versus 'inadequate' insurance (no insurance, Medicare (US) or Medicaid (US) without supplement) on physical, occupational and speech therapy utilisation among people with stroke recently discharged from hospital (Ostwald *et al*. 2009). There was significant heterogeneity in these studies ($n = 4$ effect estimates from two publications, $I^2 = 74.4\%$, Cochrane's Q $P = 0.008$), which were then separated into physiotherapy and non-physiotherapy services for the pooling of results but despite this, still demonstrated moderate heterogeneity for studies examining physiotherapy utilisation ($n = 2$ effect estimates from two publications, $I^2 = 55.7\%$, Cochrane's Q $P = 0.13$) and studies examining non-physiotherapy services ($n = 2$ effect estimates from one publication, $I^2 = 41.4\%$, Cochrane's Q $P = 0.19$). The pooled odds ratio (95% CI) of having insurance *v.* lesser alternate insurance on the utilisation of physiotherapy services among people with chronic disease was 1.53 (0.81–2.91; $P = 0.19$) (Fig. 3). The pooled odds ratio (95% CI) of having insurance *v.* no insurance on the utilisation of non-physiotherapy services among people with chronic disease was 4.80 (1.46–15.75; $P = 0.01$) (Fig. 4). A single study that compared the effect of different insurance levels (private, Medicare (US) or Medicaid (US)) on utilisation of physical rehabilitation (physical, occupational, speech therapy) services among people with neurological disease who felt they needed physical rehabilitation services did not find that utilisation was consistently higher among people on public insurance schemes (Medicaid (US) adjusted odds ratio (95% CI) = 3.30 (1.02–10.70), Medicare (US) adjusted odds ratio (95% CI) = 0.38 (0.64–3.34)) relative to those with private insurance (Elrod and DeJong 2008).

Aim II: covariates associated with utilisation of allied health services independently of health insurance status

Demographics

Despite the frequent inclusion of age as a covariate in regression models, it was not associated with utilisation except in a single study; however, this was not consistent across multiple time points (Montgomery *et al*. 2011). Gender was not found to be a significant covariate in some subgroups (Ostwald *et al*. 2009; Montgomery *et al*. 2011) although males were more likely to utilise occupational therapy following stroke (Ostwald

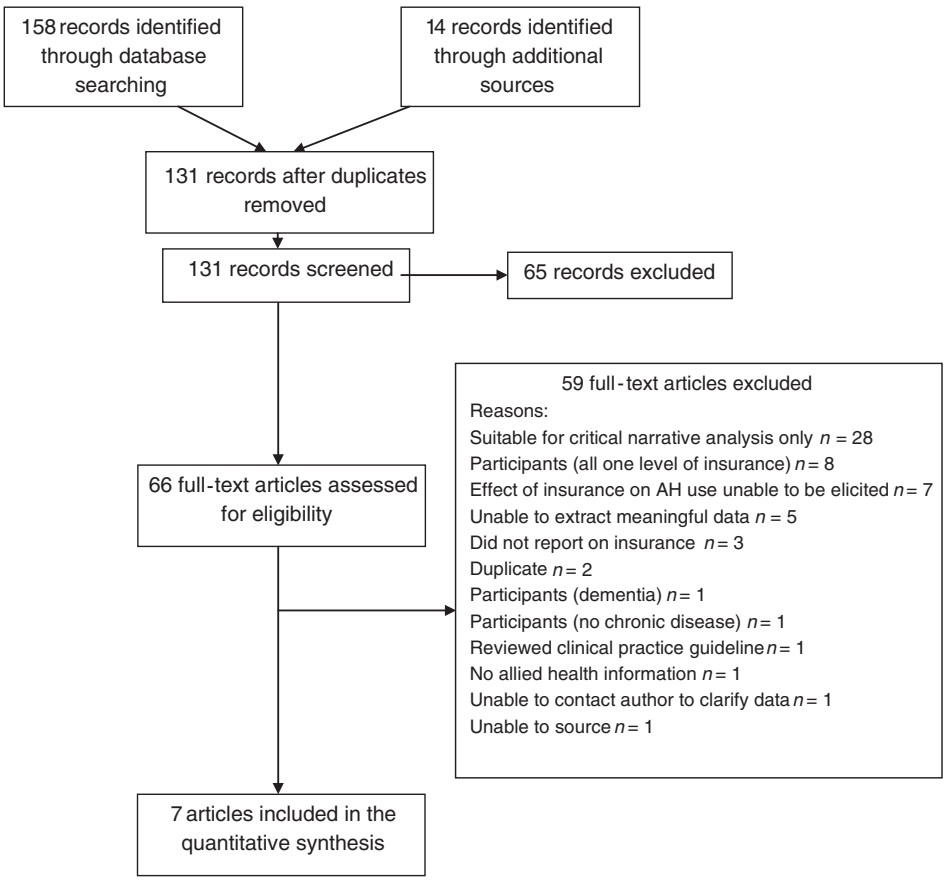

Fig. 1. Flow chart of studies and their selection for the review. AH, allied health.

et al. 2009). Race did influence allied health service utilisation independently of insurance; however, the nature of the relationship varied across clinical populations, for example, one study reported that Hispanics were more likely to use physiotherapy whereas black patients were less likely to use physiotherapy or chiropractic services (Montgomery *et al*. 2011). Contrasting findings were reported where a reduction in physiotherapy utilisation was observed in non-Caucasian races with osteoarthritis (Cisternas *et al*. 2009), findings supported by another study that demonstrated that non-white or minority race was independently associated with lesser of utilisation of allied health services (e.g. physiotherapy, occupational therapy) (Ostwald *et al*. 2009). Body mass index did not influence utilisation in one study (Cisternas *et al*. 2009) and few other demographic factors were reported.

Social structure

Education was independently associated with utilisation but varied depending on the allied health service with a single study reporting no relationship between education and utilisation (Ostwald *et al*. 2009). However higher education increased physiotherapy utilisation by people with osteoarthritis and rheumatoid arthritis (Cisternas *et al*. 2009; Iversen *et al*. 2011) and people with intermediate education were more frequent utilisers of physiotherapy for back pain (Latza *et al*. 2004). The differences could be explained by variable selection, for example, some variables were continuous (e.g. number of years of education) or dichotomous (e.g. education or no education). Social networks positively influenced utilisation of physiotherapy in people with rheumatoid arthritis (Iversen *et al*. 2011) whereas marital status was inconsistently associated with utilisation, where people with osteoarthritis were less likely to use physiotherapy if they were widowed, separated or divorced (Cisternas *et al*. 2009). A contrasting study reported that rehabilitation service utilisation was unaffected by marital status in people with neurological disease (Elrod and DeJong 2008). Cultural and community structural factors were not examined in any of the included studies.

Health beliefs

No studies included in the quantitative review examined health behaviours that could be considered to reflect health beliefs.

Community enabling factors

Region of residence was evaluated in a single study, where people with osteoarthritis in the Southern and Western states of the USA were less likely to use physiotherapy (Cisternas *et al*. 2009) though detailed analysis (e.g. if there was a shortage of therapists in these regions) was not performed. This study also reported that residing within the metropolitan area did not influence utilisation (Cisternas *et al*. 2009).

Table 2. Study classifications and outcomes for the quantitative review

AH, allied health; CAN, Canada; CH, chiropractic; CI, confidence interval; OT, occupational therapy; PT, physiotherapy; SP, speech pathology; STROBE, strengthening the reporting of observational studies in epidemiology

	Study details						Effect size estimates		
Author/Year	Study category[A]	Region	Population condition (comparison performed)	Design	AH services	STROBE	Odds ratio	Lower 95% CI	Upper 95% CI
Kramer *et al*. (2000)	i	USA	Stroke	Prospective audit	PT	15	1.39	0.95	2.04
Kramer *et al*. (2000)	i	USA	Stroke	Prospective audit	OT		1.54	1.02	2.32
Latza *et al*. (2004)	i	Germany	Lower back pain	Cross-sectional survey	PT	16	2.54	1.02	6.31
Elrod and DeJong (2008)	iii	USA	Cerebral palsy, multiple sclerosis, spinal cord injury (Medicaid (US) *v.* private insurance)	Cross-sectional survey	PT/OT	14	3.3	1.02	10.69
Elrod and DeJong (2008)	iii	USA	Cerebral palsy, multiple sclerosis, spinal cord injury (Medicare (US) *v.* private insurance)	Cross-sectional survey	PT/OT		1.46	1.15	1.85
Cisternas *et al*. (2009)	ii	USA	Osteoarthritis (private insurance *v.* public insurance)	Cross-sectional survey	PT	14	1.24	1	1.52
Cisternas *et al*. (2009)	i	USA	Osteoarthritis (private insurance *v.* no insurance)	Cross-sectional survey	PT		2.13	1.23	3.69
Ostwald *et al*. (2009)[B]	ii	USA	Stroke	Prospective cohort	PT	14	2.52	1.02	6.24
Ostwald *et al*. (2009)[B]	ii	USA	Stroke	Prospective cohort	OT		3.11	1.25	7.74
Ostwald *et al*. (2009)[B]	ii	USA	Stroke	Prospective cohort	SP		11.2	2.06	60.9
Iversen *et al*. (2011)[B]	i	USA	Rheumatoid arthritis	Prospective cohort	PT	17	1.5	0.99	2.28
Montgomery *et al*. (2011)	i	USA/CAN	Cancer survivors	Retrospective analysis	PT	14	1.3	0.97	1.74
Montgomery *et al*. (2011)	i	USA/CAN	Cancer survivors	Retrospective analysis	CH		1.1	0.88	1.37

[A]Study categories: (i) insurance *v.* no insurance; (ii) insurance *v.* lesser insurance; and (iii) analysis restricted to those who felt they needed physical rehabilitation services.

[B]Data taken from bivariate association, otherwise data taken from multiple regression model.

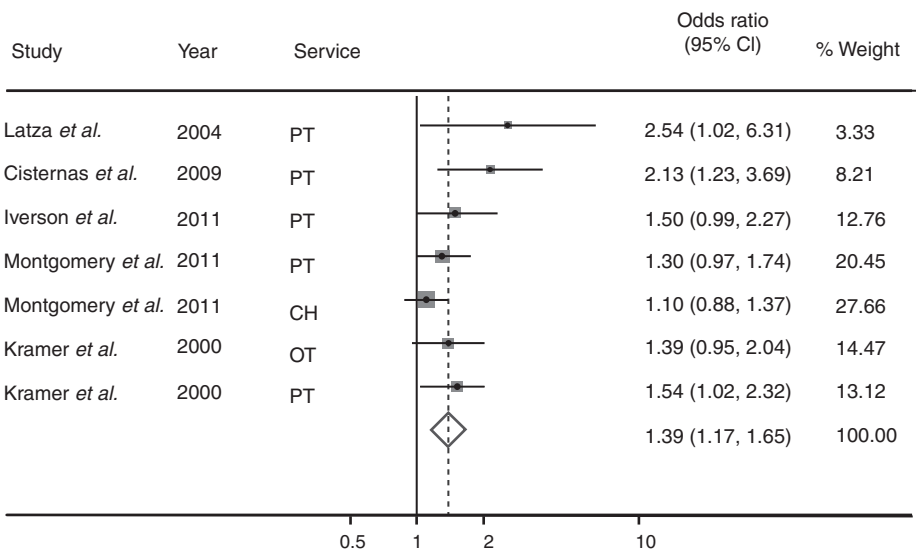

Fig. 2. Pooled odds ratio (random effects model) of insurance versus no insurance on the use of allied health services. CH, chiropractic; CI, confidence interval; OT, occupational therapy; PT, physical therapy.

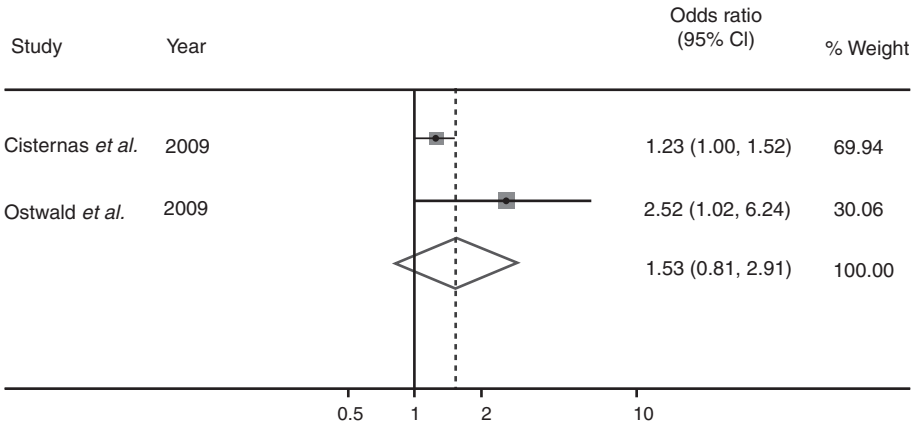

Fig. 3. Pooled odds ratio (random effects model) of insurance versus alternate insurance of lesser coverage on the use of physiotherapy services. CI, confidence interval.

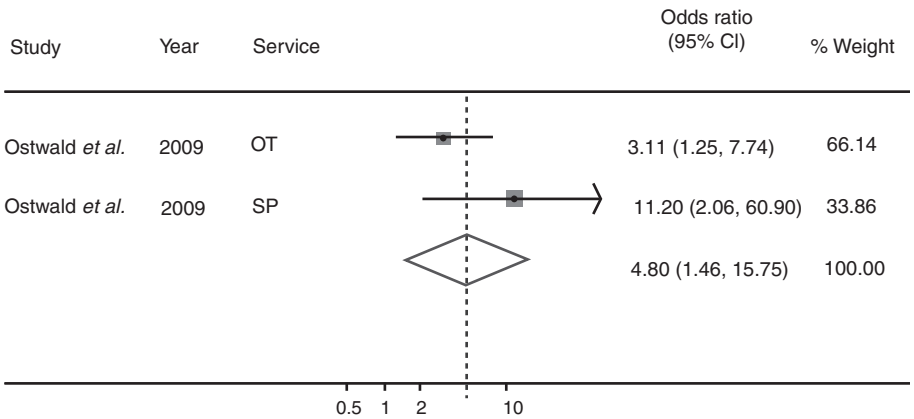

Fig. 4. Pooled odds ratio (random effects model) of insurance versus alternate insurance of lesser coverage on the use of non-physiotherapy services. CI, confidence interval; OT, occupational therapy; SP, speech therapy.

Personal enabling factors

Income was inconsistently associated with utilisation of allied health services, independent of insurance, across several studies including diverse populations, chronic conditions and subgroups. Respondents with higher household incomes (>US$60 000) were generally more likely to receive services, for example, people with spinal cord injury, cerebral palsy or multiple sclerosis were more likely to receive physiotherapy (Elrod and DeJong 2008). However, socioeconomic status was not associated with utilisation of allied health services in people who had suffered a stroke 1 month following hospital discharge (Ostwald *et al*. 2009). The ability to drive and access to transport as a personal enabling factor was not examined as a covariate in any study.

Need for health services (perceived or evaluated)

The presence of co-morbidities and activity or functional limitations as a flag for the need for specific allied health services was consistently included as a covariate. The presence of co-morbid conditions and activity limitations while receiving a disability support payment and functional impairment positively influenced utilisation of physiotherapy in people with osteoarthritis (Cisternas *et al*. 2009) and rheumatoid arthritis (Iversen *et al*. 2011) respectively. Although co-morbidities did not affect the utilisation of allied health services in people who had suffered a stroke, the presence of measured deficits likely amenable to these services positively influenced their resumption following hospital discharge (Ostwald *et al*. 2009). In that study, people who had suffered stroke with neglect or visual or spatial-perceptual problems were more likely to resume all therapies after hospital discharge and aphasia was independently associated with resumption of speech therapy (Ostwald *et al*. 2009). However, the presence of multiple other impairments did not change utilisation except for people with hemiparesis or hemiplegia who had an increased utilisation of physiotherapy on bivariate analysis (Ostwald *et al*. 2009). Having a chronic disease classified as severe, life-threatening or disabling was associated with increased utilisation of physiotherapy but not chiropractic (Montgomery *et al*. 2011), indicating differences in the severity of patients seen by these different professional groups.

Pain may contribute to both individual-perceived need for allied health services and need as evaluated by health professionals. The presence of pain along with the use of pain medication and muscle relaxants was independently associated with utilisation of physiotherapy and chiropractic in survivors of childhood cancer (Montgomery *et al*. 2011). Inpatient hospital length of stay did not affect post-discharge utilisation of allied health in people with stroke (Ostwald *et al*. 2009). The frequency of physician visits within the past 2 years (which could be considered to influence perception of need by the individual or evaluated need) was associated with utilisation of physiotherapy and chiropractic in survivors of childhood cancer (Montgomery *et al*. 2011). The perception of need from the perspective of the individual was associated with utilisation of allied health services in one study, where people with spinal cord injury, cerebral palsy or multiple sclerosis who reported their health as excellent or very good were more likely to receive needed rehabilitation services (Elrod and DeJong 2008). In contrast, Cisternas and colleagues (2009) reported that perceived overall health was not associated with the utilisation of physiotherapy in people with osteoarthritis. Depression (which could also negatively affect the perceived need) was not associated with allied health service utilisation (Ostwald *et al*. 2009) and health resource use (possibly representative of the evaluation of need by health professionals) was not studied as a covariate in any of the studies.

Discussion

The presence of insurance generally increases the utilisation of allied health services by people with chronic disease. Factors related to the insurance product, particularly stipulations relating to the role of gatekeepers and eligibility requirements, the quantity of services publicly subsidised rebates are available for, and the presence of gap payments, also appear to influence utilisation. Beyond the insurance product, the role of gatekeepers, usually GPs, in informing the individual with a chronic disease of the availability of the publicly subsidised rebate and the potential benefits of the allied health service for the individual, appear central in ensuring people with chronic disease and insurance use allied health services. Ensuring that allied health providers were willing to provide services under the insurance scheme was also identified as an issue under some schemes and other schemes provided 'abbreviated' services that may have questionable therapeutic benefit. Consequently, policy makers seeking to devise insurance policies that enhance utilisation of allied health services by people with chronic disease may need to address a range of issues both in the policy and its implementation to ensure that remaining key elements are considered, including the individual, gatekeeper and allied health service provider. The problem of allied health providers delivering abbreviated services in response to reimbursement they believe to be insufficient was a clear concern in this respect arising from this review. Although policies may effectively enhance utilisation of allied health services, there is little guarantee that these will deliver improved health outcomes if the services provided are only a fraction of those delivered in the research that underpins the policy. For example, if the program used in the research demonstrated benefit with 10 therapy sessions, there is no guarantee that providing five sessions only will lead to the same improvement. In the process of conducting this review, we encountered no experimental studies where an insurance product to provide an allied health intervention was investigated to determine if either utilisation was increased or health outcomes were improved. An issue that has received little scrutiny in this area thus far is the potential for the provision of rebates to inflate the market price of allied health services. If policy makers set rebate levels too low, allied health service providers may not provide services or provide abbreviated services that are not clinically effective, whereas if they set reimbursement levels too high, they create inflationary pressures on the market price of allied health services.

The scope of this review was limited to the relationship between insurance and utilisation of allied health services; however, consideration should also be given to whether enhancing utilisation is indeed worthwhile. There is no guarantee that increased utilisation of health services results in improved care and patient outcomes as it is possible that increased provision of services is unnecessary, although there is some evidence that ensured individuals access more care and sustain better health outcomes than the uninsured (Hadley 2007). We have previously referred to research demonstrating that allied health services have improved outcomes for people with chronic disease. However the clinical effect seen in studies such as these is often not reproduced to the same magnitude in real-life situations for a variety of reasons (Glasgow *et al*. 2003) and future randomised controlled trials examining the benefit of allied health on health outcomes of people with chronic disease are necessary.

The discussion pertaining to the covariates and their interaction and influence on utilisation of allied health services may under-represent the body of literature in that area as this review included studies on the basis that they included insurance. Therefore, papers that examined the influence solely of other covariates may have been excluded. Other factors not investigated in the review could influence the utilisation of allied health services, as it could be expected that access to and benefit from allied health services will vary by medical condition, type and details of the insurance product and reimbursement policy as well as patient sociodemographics, along with other factors outlined in the Andersen framework. It is important that future studies aiming to quantify the influence of insurance and other covariates on the utilisation of allied health clearly measure and define these variables. The generalisability of the review results is also limited by the difficulty in the synthesis and interpretation of this body of literature. A majority of data in the meta-analyses were drawn from the USA, where the health care context is considerably different than other international health systems. The details of group-based insurance (e.g. government, privately subsidised insurance) vary widely internationally and this made it difficult to compare the results of studies in a meaningful manner. There was significant and considerable heterogeneity across studies in selection of research questions, population groups, sample sizes, methodological design (time points and follow-up periods), allied health services studied, selection of the dependent variables and insurance product details. Where insurance was provided as a variable, there were clear gaps and a lack of consistency in reporting the

details of the insurance coverage, which could prove very relevant to enabling the utilisation of health services (Andersen 1995) and may explain why under some models of care, insurance was associated with utilisation and not in others. It is important to note that there is not necessarily any relationship between the extent of coverage and the provider (e.g. public or private) or the quality of the service, its provider and its subsequent effects on health outcomes. Furthermore other variables associated with the insurance product, such as copayments, policy inclusions and exclusions, waiting periods may influence utilisation and the review did not examine the effects of variation in these parameters. Outcomes ranged from minutes of therapy to number of visits to prediction of resuming therapy following discharge or likely utilisation over a future period of time. Finally, there was a lack of consistency in the inclusion of variables that may influence allied health utilisation along with insurance and where there was consistency in content, there was often inconsistency in definition or reporting (i.e. education was presented in different ways, including primary school education *v.* not (Zhang *et al*. 2007) or the presence of higher or academic education or not (Fleming *et al*. 2007; Niskar *et al*. 2007)).

Future studies should investigate whether the provision of insurance coverage (and variations in the specifications of insurance coverage) for allied health services results in improved health outcomes for people with chronic disease in a cost-effective manner. Consequently, further work should be continued to increase understanding of the factors that facilitate and inhibit utilisation to allied health services, to enable optimal health service delivery.

Conclusions

The presence of health insurance was generally associated with increased utilisation of allied health services; however, the observed effects varied depending on the patient population, allied health provider and type of insurance product. Other covariates were inconsistently associated with allied health utilisation and there was significant heterogeneity across patient population type, methodology and variability in the selection and classification of independent and dependent variables included in regression models. Covariates influencing utilisation were investigated along the Andersen framework, which considers demographics, social structure, health beliefs, community and personal enabling factors and the perceived and evaluated need for health services; however, there was still little consistency in description of factors influencing utilisation. There were significant limitations to the review including heterogeneity, variability in sample size and the lack of quantitative studies investigating the research question. No studies examined the effect of provision of health insurance and subsequent utilisation of allied health services on overall health care costs or clinical patient outcomes and future research should focus on providing answers to these questions.

Conflicts of interest

None declared.

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Appendix 1. Criteria for considering studies for this review

		Yes	No
Type of study	1. Randomised controlled trial		
	2. Quasi-experimental trial		
	3. Observational study		
	4. Published in English		
Types of participants	5. Patient populations with one or more chronic disease		
	6. Subgroup analysis including people with one or more chronic disease		
Type of intervention	7. Presence of health insurance. Insurance may be publicly subsidised (e.g. Government public subsidy schemes), funded by the individual, or by another third party payer (e.g. Employer health insurance schemes)		
Type of outcome	8. Utilisation of allied health services (type of service used)		
	9. Health service costs attributable to allied health services		
Data provided	10. Utilisation of allied health services		
	Paper included? (if yes to all)		

Appendix 2. Full search strategy for Medline and EMBASE

Medline (Ovid Medline 1948 to Present with Daily Update) and EMBASE (1980 to 1 April 2011). CVA, cerebrovascular accident; EPC, enhanced primary care; HMO, health maintenance organisation; PPO, preferred provider organisation

Search	Category	Terms	Limits	Hits
1	Participant	Chronic disease OR Musculoskeletal OR Heart disease OR Stroke OR Cerebrovascular accident OR CVA OR Neurological OR Depression OR Type 2 diabetes OR Non-insulin dependent diabetes OR Arthritis OR Osteoarthritis OR Osteoporosis OR Asthma OR Chronic obstructive airways disease OR Chronic obstructive pulmonary disease OR Pre-existing disease OR Co-morbidity OR Co-morbidity	Humans English	1 810 005
2	Intervention	Department of veterans affairs OR Health insurance OR Health premiums OR Medicare OR Medicaid OR Medical insurance OR Private insurance OR Health plan OR Managed care OR HMO OR Health maintenance organisation OR PPO OR Preferred provider organisation EPC OR enhanced primary care OR Point of service	Humans English	163 142
3	Outcome	Utilisation OR Occasions of service OR Utilisation OR Utilisation OR Health service	Humans English	558 244
4	Allied health	Physiotherapist OR Physiotherapy OR Physical therapist OR Physiotherapy OR Speech therapy OR Speech therapists OR Speech pathology OR Speech pathologists OR Occupational therapy OR Occupational therapist OR Dietician OR Dietetics OR Nutritionist OR Nutrition therapy OR Nutrition therapist OR Podiatry OR Podiatrist OR Audiologist OR Audiology OR Multidisciplinary team OR Human movement OR Kinesiology OR Kinesiologist OR Exercise physiology OR Exercise physiologist OR Aboriginal health worker OR Indigenous health worker OR Chiropractor OR Chiropractic OR Diabetes educator OR Osteopath OR Osteopathy	Humans English	113 884
5	Combined	S1 AND S2 AND S3 AND S4		113