

**Alfred**Health



# **Models of care for people with severe acquired brain injury: A systematic review**

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## Executive Summary

Acquired brain injury (ABI) is a common injury, affecting approximately 1 in 45 Australians and is the leading cause of disability in Australia. The organisation of health care for patients with an ABI presents unique challenges and currently there is no standard model of rehabilitation care. Further, because of a lack of robust research evidence, there is no consensus on the best way to organise health care services for people with an ABI. ABIs differ in severity so although patients with a severe brain injury may experience many of the same symptoms as patients with a mild injury, these may be longer lasting or result in greater disability. The development of Alfred Health's new Victorian State-wide brain injury unit provides a unique opportunity to further understand models of care and their component elements, especially for patients with a severe injury.

The aim of this systematic review was to identify and assess the best available evidence on the organisation and models of health care services for people with a severe ABI. In consultation with key stakeholders, seven research questions were determined. A search of the peer review literature and relevant guidelines published from 1980 to the present day was undertaken. A total of 16 systematic reviews, 43 randomised controlled trials, and two controlled trials were included in addition to four guideline documents. However, participant groups in the included studies comprised mixed groups ranging from people with stroke to people with mild to moderate TBI including those with severe TBI in both acute and chronic phases of recovery. Not only are there differences within and between these groups relating to their condition, in addition each person will have their own unique set of circumstances and rehabilitation requirements.

In summary, the findings and implications of this review are:

- Patients with moderate to severe ABI experience better outcomes from integrated care models in which acute, rehabilitation, and community/ambulatory services are provided by one management team when compared to more fragmented approaches. Care should be provided by multidisciplinary teams.
- There is strong evidence that early supported discharge (ESD) programs benefit stroke patients with mild to moderate severity. However, there were no studies on outcomes for people with moderate to severe TBI.
- The evidence for case management is conflicting; few high quality studies were identified and heterogeneity between studies along with conflicting results means there is insufficient evidence to reach any firm conclusion on this approach. Despite the lack of supporting evidence, case management is consistently recommended in clinical guidelines for TBI.
- The use of integrated care pathways for ABI rehabilitation is not currently supported by the evidence, with the exception of a specific protocol for managing aspects of acute stroke care. However, current guidelines recommend that all patients receive an assessment for the suitability for rehabilitation.
- Quality monitoring interventions may increase the quality of care yet there is a lack of evidence to support any specific quality-monitoring intervention approach.

## Background

The term acquired brain injury (ABI) refers to damage to the brain experienced after birth and may be as a result of trauma, lack of oxygen to the brain (hypoxia), stroke, tumours, infection, poisoning or substance abuse (1). ABI is a common injury, affecting approximately 1 in 45 Australians and is the leading cause of disability in Australia (2). Effects of ABI (from all causes) may include physical symptoms such as paralysis, pain, fatigue, poor balance and reduced sensory function; cognitive symptoms such as poor memory, concentration and ability to plan or problem solve; language difficulties; and emotional symptoms such as depression, irritability and impulsivity (3). A traumatic brain injury (TBI) as a type of ABI is defined as a traumatically induced structural injury and/or physiological disruption of brain function as a result of an external force. ABIs differ in severity so although patients with a severe brain injury may experience many of the same symptoms as patients with a mild injury, these may be longer lasting or result in greater disability (4). Long term prospects for people with brain injuries depend on the severity of the injury. The most widely used index of injury severity is the Glasgow Coma Score (GCS) which classifies injuries into mild, moderate or severe categories based on level of consciousness post-injury (4).

People who experience an ABI often require care and rehabilitation which may last for months and involve multiple health professionals and health care services (5). Intensive rehabilitation programs have been shown to result in improved outcomes for the patient and be cost effective (6-9). It is therefore important to determine the best way to organise health and rehabilitation services for the benefit of all stakeholders. While research into the most effective methods of intervention is increasing, there is a lack of information regarding models of care or the best ways to organise services for people with an ABI (10-12). Within Australia, models of care vary depending on the health care organisation delivering the service. Furthermore, services are often fragmented and funded by different bodies (including state or federal government). It can often be difficult for a person with ABI and their family/carer to navigate the health care systems and services involved (13).

The Evidence-Based Review of Moderate to Severe Acquired Brain Injury published by the ERABI Research Group (12) provides up-to-date information and guidelines on evidence-based models of care for people with ABI. ERABI updates the review as new evidence becomes available and provides information on evidence based interventions for ABI; all research designs are included and appraised. The ERABI review comprises several modules; one of which is related to models of care following an acquired brain injury [Module 3]. As the module addresses all aspects of models of care and includes research of all designs, the ERABI review, and in particular Module 3, is a useful resource and complements this review. The ERABI review can be accessed [here](#) for the information of readers.

One of the limitations of the ERABI review (12) is that the definition of ABI does not include stroke and does not integrate the large amount of stroke-related research into the guideline. In clinical practice, patients with stroke and other types of ABI are often co-located or treated by the same health care team. For example, in the Alfred Health Severe ABI Rehabilitation Unit, both TBI and stroke patients who suffer severe impairments will be co-located. This review therefore has included a number

of studies with mixed populations, including stroke patients. It should also be noted that stroke typically occurs in older adults whereas TBI is more common in young adults; and while many people make complete or near-complete recovery from TBI, approximately 10-15% of people experience more severe injuries and require specialist input (14). This means that each individual has a unique set of needs and will likely need different programmes of rehabilitation at different stages in their recovery; those with the most severe injury are likely to require much longer rehabilitative care (10).

In summary, there is a growing body of research related to the care of people with ABI but there is a lack of synthesised information regarding the best way in which to organise health services for this patient group. There is a need to understand the evidence underpinning and effectiveness of models of rehabilitation care for people with severe ABI, including those with TBI.

## Research Questions

The objective of this systematic review was to identify recent, high quality research on the organisation and models of health care services for people with a severe ABI. Following consultation with key stakeholders seven research questions were determined. Studies and findings addressing each question separately are in the Results section of this report.

1. Does having to pay a 'fee for service' result in improved outcomes for ABI patients and efficiencies for health care providers when compared to no 'fee for service'?
2. Does an integrated care model improve outcomes for patients with ABI compared with care provided by separate management teams?
3. Does the use of an integrated care pathway result in improved outcomes for ABI patients or their health care organisation compared to care those which do not routinely adhere to an integrated care pathway?
4. Does enhancing continuity of care through follow-up or case management improve outcomes for patients with ABI in comparison to care where these services are not provided?
5. Does engaging consumers in governance of health care organisations improve outcomes for patients with ABI in comparison to models where there is no consumer participation in governance?
6. Do quality monitoring systems improve outcomes for patients with ABI or health care organisations?
7. In what ways has the World Health Organisation (WHO) International Classification of Functioning, Disability and Health (ICF) affected funding or delivery of care for patients with ABI?

A further ten questions determined through consultation but not of direct relevance to this review are included as Appendix A.

## Discussion

### Implications for Practice

A synthesis of findings from each of the seven research questions is discussed below in relation to the implications for clinical practice:

- From the acute care setting to discharge destination, patients with moderate to severe ABI experience better outcomes from integrated care models when compared to more fragmented care approaches. Integrated care provides enhanced continuity of care and allows input from a specialised team of health professionals. Although studies that conclude this involve patients with stroke, it is likely that this also applies to people with severe ABI.
- People with mild to moderate severity of stroke benefit from early supported discharge (ESD) programs. ESD is well supported by evidence and should be considered as a method of reducing hospital length of stay for these groups. However, no studies investigating the feasibility of ESD for people with a moderate to severe TBI were identified and it is not appropriate to extrapolate the aforementioned research to people with severe TBI. Providing ESD to people with severe TBI may not be feasible as many need longer-term care from doctors and medical staff. They may also need specialised nursing care, are likely to require assistance with transfers and activities of daily living, and are likely to need an array of complex and expensive aids and equipment which suggest longer, not shorter, lengths of stay.. Australian data shows that people with TBI (particularly younger males) experience barriers to discharge including lack of suitable accommodation or delays while awaiting home modifications, equipment or supportive care services (15). Therefore, given the potential benefits associated with ESD for both the organisation and the person with TBI it is recommended that the feasibility of ESD for both compensable and non-compensable people with severe TBI is studied
- The evidence for case management following traumatic brain injury (TBI) is not definitive. There are few well-designed studies, limited recent evidence, heterogeneity between studies, and conflicting results. Although there is a lack of high quality evidence, clinical guidelines included in this review consistently recommend a case management approach. Furthermore, as these were found to be based on expert opinion or low-level studies caution is suggested when considering a case management approach.
- Despite numerous systematic reviews and randomised controlled trials, there is little evidence that case management after stroke results in significantly improved outcomes for the patient, caregiver or reduced costs for health services. While it may appear logical to provide patients with options for follow-up after discharge there is no robust evidence to support significant investment in case management services for stroke.

- With the exception of a specific protocol for managing aspects of acute stroke care (16), current evidence does not support the use of integrated care pathways. Based on information from studies with stroke survivors, it is unclear whether findings are transferable to other forms of ABI. Apart from literature specific to ABI, the use of checklists and care pathways has been shown to reduce variability in clinician practices. The use of integrated care pathways in the ABI population should therefore be considered together with the use of other quality monitoring interventions.
- Quality monitoring interventions may increase care quality. Unfortunately there is no evidence to support one particular quality-monitoring intervention approach. However, there is some evidence from low-level studies in other settings that quality monitoring interventions such as ‘continuous quality improvement’, ‘total quality management’ or ‘plan-do-study-act’ interventions can improve surgical care, and these findings may apply to brain injury rehabilitation settings (17). The use of audit and feedback is also a potential way to change professional practice (18).
- At present there is a lack of information regarding the impact of fee-for service care for any condition.
- There are few high quality studies evaluating the effect of engaging consumers in the governance of health care organisations or services. This finding was found across all patient groups and is not specific to ABI. There has been a strong focus on consumer participation in the National Health Service (NHS) in the United Kingdom in recent years; this initiative is purported to lead to developments or changes in patient services but there is little evidence that demonstrates whether this consumer engagement led to improved outcomes for service users or changes in costs (19). Other studies have suggested that consumer participation can improve the perceived quality of the service (20) but in general engagement strategies are untested in a brain injured population.
- There is some evidence for involving consumers in the development of patient and carer written resources as this has been shown to result in educational material that is more relevant and readable (21). Findings on consumer engagement are specific to the stroke population, with no findings for the severe TBI population.
- This review found no studies that investigated whether or not the introduction of the WHO International Classification of Functioning model has changed thinking or improved service provision or outcomes.

Specific to the development of the new ABI unit currently under development at Alfred Health, this review has highlighted the scarcity of studies providing definitive guidance on models of care. To address this lack, it is suggested that:

- (i) An international survey of staffing and organisational factors is undertaken with ABI units and disseminated worldwide. This could

include a specific focus on units which admit mixed ABI populations (TBI, stroke and other), and patients with severe impairment.

- (ii) The planned new ABI unit collect both outcome and process data in its first three years. Data of high quality and discussion on decision-making processes and establishing a data collection system to monitor the new ABI unit would boost the currently limited published information on models of care.

This review has found that there are still many questions that need to be answered with respect to appropriate models of care for people with ABI. In particular, no studies met the inclusion criteria to determine: whether the presence of a 'fee for service' improves outcomes; whether engaging consumers in governance of a health care organisation improves outcomes for patients with ABI; and, the ways in which the publication of the WHO ICF has impacted on funding or delivery or care of patients with ABI. Most available evidence relates to people with stroke and much of this relates to patients with mild and moderate levels of disability (as classified by severity indicators in each study). Substantially more research will be required to determine the most effective models of care for people with severe TBI (22).

## Implications for further research

In the absence of high quality studies, there are opportunities for the unit at Alfred Health to contribute to the limited body of evidence for people with a severe brain injury. While it may not always be possible to conduct randomised controlled trials, the unit may want to consider the use of interrupted time series studies and studies which incorporate health economic analyses of outcome data. At the same time, any data collection could be integrated into clinical practice and methods to ensure long term data is collected explored. This could involve routine collection of data at one and five years post injury, and the investment of a dedicated research position within the new ABI unit.

## Limitations of the review

While this review includes the highest levels of evidence, other study designs which could provide information useful for guiding future research were not included. It is acknowledged that this means that interventions used in this review can be difficult to measure but these study designs were chosen to ensure results were robust and results of the highest quality.

Participant groups in the included studies tended to comprise mixed groups ranging from people with stroke or people with mild to moderate TBI and included people with severe TBI in both acute and chronic phases of recovery. There will be differences within and between groups relating to their condition. In addition, each person will have their own unique set of circumstances and rehabilitation requirements. Despite any differences, the reality is that services are often streamed into 'neurological rehabilitation' and it is likely that patients with these conditions will be treated consistently in the same settings and/or by the same team. Furthermore, pooling relevant research ensures that a larger body of evidence can be drawn upon.

## Conclusions

Based on the evidence identified in the review, a number of implications for the organisation of health care services for people with severe ABI have been made. Also identified are areas in which there is conflicting evidence and others where more evidence is required. Despite this, findings do suggest that:

- Care should be provided by multidisciplinary teams;
- Better outcomes, including a shorter length of stay, are achieved under an integrated care model in which acute, rehabilitation, and community/ ambulatory services are provided under one management team;
- Adherence to acute care guidelines may result in improved patient outcomes and reduced mortality;
- Case management for patients with TBI has not been well studied yet is consistently recommended in guidelines; and
- Use of quality monitoring approaches may lead to improved patient outcomes although no particular quality monitoring approach can be recommended.

## Results

A total of 16 systematic reviews, 43 randomised controlled trials and two controlled trials were identified as eligible for inclusion in this review. Results are presented for each of research question in turn with relevant tables attached as Appendix B.

### Research question 1

Does having to pay a ‘fee for service’ result in improved outcomes for ABI patients and efficiencies for health care providers when compared to no ‘fee for service’?

#### Findings for research question 1

There were no studies which met the eligibility criteria and which addressed this question. The majority of studies investigating ‘fee for service’ were excluded based on study design so that further research is needed on the relationship between ‘fee for service’ and outcome;. Nevertheless, lower-levels of research evidence excluded from this current review may provide important insights regarding this relationship so that further investigation of these studies may be warranted.

### Research question 2

Does an integrated care model improve outcomes for patients with ABI compared with care provided by separate management teams?

#### Findings for research question 2

Integrated care was defined as care provided by the same multidisciplinary team (this may involve any configuration of medical, nursing or allied health) in comparison to care provided by two or more teams of any configuration. The

multidisciplinary team providing the seamless care must have had the same direct management however may not have involved the same personnel. Two systematic reviews (23, 24) and two randomised controlled trials (25-29) were identified. All studies related only to the care of people with stroke (see Table 2).

### **Systematic reviews**

The two systematic reviews provided partial information relevant to this review question as their objectives were broader than just comparing integrated care with care provided in two or more settings. In the Cochrane Review by the Stroke Unit Trialists, the main objective was to determine the effect of care provided on a stroke unit in comparison to alternative forms of care post stroke (23). However, the review compared different forms of stroke unit care and included one RCT which compared care on a comprehensive stroke ward (providing acute care and rehabilitation) with care provided by a mobile stroke team on a general ward. This trial (n=304 participants) found that treatment on the comprehensive ward resulted in reduced mortality and poorer outcomes. Another Cochrane Review (24) reviewed the evidence for Early Supported Discharge services compared with conventional services. This review found that Early Supported Discharge services could not only reduce length of stay but could improve long term functional outcome and reduce admission to institutional care.

### **Clinical trials**

Two randomised controlled trials were also included in this review. These studies compared an integrated care approach with usual care which was provided by two or more health care teams across sectors. A trial conducted in Norway compared 'a chain of care' from the acute stroke unit to the community provided by a mobile stroke team with a more fragmented care approach provided on a stroke unit, rehabilitation unit and in the community (25-28). Mortality levels were similar between groups but a higher proportion of patients in the integrated care group were independent at 6 and 12 month follow up. Subgroup analyses showed that patients with moderate to severe stroke benefited the most from the service. Finally, a RCT conducted in Sweden found no significant difference between groups in patient outcome when comparing a rehabilitation program that began in the acute stroke unit and finished in the home and usual care which involved acute care, inpatient rehabilitation and/or day care (29). However, this study found that delivering services in this way resulted in a reduced length of hospital stay and an increase in patient satisfaction. Both RCTs evaluated interventions in which the same care team commenced care in the acute stroke unit and continued rehabilitation in the home setting.

### **Findings related to people with severe traumatic brain injury**

We were unable to identify any eligible studies examining the effect of an integrated care model for people with a severe traumatic brain injury.

## Findings related to people with traumatic brain injury at all levels of severity

We were unable to identify any studies examining the effect of an integrated care model for people with a traumatic brain injury

## Findings related to people with an acquired brain injury

- There is moderate evidence (based on two RCTs) that an integrated rehabilitation approach, commencing in the acute stroke unit and extending into the home setting, results in equal or improved ability to perform ADLs in the short term after stroke.
- There is moderate evidence (based on one, well designed RCT) that an integrated rehabilitation approach can reduce the length of stay in acute settings.

There is some evidence (from one RCT) that people with moderate to severe stroke benefited the most from the integrated care model.

## Research question 3

Does the use of an integrated care pathway result in improved outcomes for ABI patients or their health care organisation compared to care those which do not routinely adhere to an integrated care pathway?

## Findings for research question 3

An integrated care pathway (ICP) defines the expected course of events in the care of patient with a particular condition within a set time frame; ICPs are documented and staff expected to adhere to the ICP. In order to be considered in this review, the pathway needed to be multidisciplinary (direct expected care behaviours in two or more professional groups). We identified three systematic reviews (30-32) and two randomised controlled trials (16, 33) that met the inclusion criteria for this question; all studies included patients with stroke and there were no eligible studies which had been undertaken with patients with traumatic brain injury. Details of included papers are presented in Table 3.

## Systematic reviews

Sulch et al (2000) systematically reviewed the evidence for the use of ICPs for stroke in either the acute or rehabilitation setting (30). They included six controlled studies in the reviews; all but one of these used historical controls. The authors reported that while there were some suggestions of benefit, the evidence supporting ICPs was weak and further evidence was needed to warrant implementation in clinical practice. A subsequent Cochrane Review (Kwan) (31) included three randomised controlled trials and seven non-randomised trials. Not all of the randomised trials included in their review were eligible for inclusion in this review due to the broad interpretation of 'integrated care pathway'. The Kwan Cochrane Review reported no strong evidence for the use of ICPs and additionally reported that patient satisfaction and quality of life was lower in participants who received care based on an ICP. In the most recent systematic review, Allen (32) included one randomised and four non-randomised studies. The review authors reported that it was unlikely that ICPs would be beneficial in all contexts and that the benefits of ICPs appeared to be more apparent

in the acute care setting where care and interventions were more predictable than those in rehabilitation settings.

### **Clinical trials**

Two randomised controlled trials met the inclusion criteria and definition of ICP. Both trials were of high quality and included large numbers of participants but the ICPs used within the trials were different in terms of the purpose, setting and characteristics. Sulch et al (2000) (33) examined the effect of a care pathway in a stroke rehabilitation setting. In this trial, the care pathway included evidence-based rehabilitation activities (discipline specific) and was managed by a senior nurse. The authors found no significant differences between the patients using the ICP and those without in terms of mortality, length of stay, independence in ADLs or time spent in therapy. A more recent trial in stroke patients conducted by Middleton et al (16) demonstrated more positive results. This cluster randomised controlled trial evaluated the implementation of an ICP designed to manage fever, hyperglycaemia and swallowing for the first 72 hours after admission to an acute stroke unit. Patients managed using the ICP were significantly less likely to be dead or dependent at 90 days than patients in the control group, and thus suggested that similar evidence based protocols to manage fever, hyperglycaemia and swallowing are implemented to augment stroke unit care.

### **Findings related to people with severe traumatic brain injury**

No eligible studies that evaluated the effect of an integrated care pathway for people with a severe brain injury were identified.

### **Findings related to people with traumatic brain injury at all levels of severity**

No eligible studies that evaluated the effect of integrated care pathways for people with traumatic brain injury were identified.

### **Findings related to people with an acquired brain injury**

There is moderate evidence that an evidence based ICP to manage fever, hyperglycaemia and swallowing for the first 72 hours after admission to an acute stroke unit can decrease death and disability at 90 days post-stroke. There is a lack of evidence for the use of ICPs in general for people with stroke.

## **Research question 4**

Does enhancing continuity of care through follow-up or case management improve outcomes for patients with ABI in comparison to care where these services are not provided?

### **Findings for research question 4**

Studies examining the effect of follow up or case management within the same organisation or referral to one or more other organisations were included. The follow up was for *any* health care service (rehabilitation, counselling, or medication review)

and was arranged following discharge from acute care or rehabilitation services. Case management was defined as the coordination of multidisciplinary care and reconciling this with patient needs. To be classified as case management, services needed to involve three or more of the following processes: entry screening, assessment, planning, coordination, monitoring and review, exit/closure planning.

We identified a number of different intervention approaches that met our definition of 'continuity of care via follow up or case management'. Intervention approaches were broadly categorised as presented in Table 4.

Due to the broad nature of this question, we identified a large pool of eligible studies; ten systematic reviews and 34 controlled trials (33 of which were randomised). There was significant clinical heterogeneity between studies. Due to the number of studies included, a narrative synthesis is provided and brief details for each study are provided in Table 5.

The majority of systematic reviews (9, 90%) included only patients with stroke and the remaining review included patients with traumatic brain injury only. The trials also predominantly recruited patients with stroke (25, 74%). The remaining trials described their participant groups as having traumatic brain injury (8, 24%) or acquired brain injury (1, 3%). All included reviews and studies recruited both males and females and few studies excluded patients based on age. Included participants experienced predominantly mild to moderate disability. This is unsurprising, since case management by definition coordinates multiple services for persons, often with respect to accommodation issues (34) and patients with mild to moderate ABI are more likely to live in the community than those with a severe brain injury. The number of studies included in the systematic reviews ranged from 3-16. Sample sizes were relatively large; the majority (28, 80%) of studies recruited more than 100 participants (range n=22 to n=1156).

## **Research question 5**

Does engaging consumers in governance of health care organisations improve outcomes for patients with ABI in comparison to models where there is no consumer participation in governance?

### **Findings for research question 5**

We were unable to identify any studies meeting our eligibility criteria that addressed this research question.

## **Research question 6**

Do quality monitoring systems improve outcomes for patients with ABI or health care organisations?

## Findings for research question 6

We identified one systematic review, four cluster randomised controlled trials, one randomised controlled trial and one controlled trial that met our inclusion criteria in this category; all included participants with stroke and there were no eligible studies involving people with TBI. Characteristics of studies are presented in Table 6.

### Systematic reviews

The systematic review (35) examined whether the evaluation of compliance with quality metrics or public reporting improved patient outcomes. They included 16 observational studies in the review. Many of the studies within the review evaluated process measures based on published stroke clinical guidelines. Due to the heterogeneity between studies results were not pooled in the systematic review. The review reported that there was conflicting evidence for the appraised forms of quality monitoring: six studies found mostly positive relationships between increased compliance with quality metrics and outcomes, and five studies reported either limited or no significant relationships.

### Clinical trials

The four included trials evaluated a variety of quality monitoring interventions targeted at improving care quality. Studies reported by Dirks (36), Hinchey (37), Johnston (38) and Lakshminarayan (39) all aimed to improve compliance with interventions that are regarded as best practice in acute stroke care (for example, increasing the rates of thrombolysis to appropriate patients and secondary prevention measures). These interventions appeared to have varying success; three of the studies (36-38) reported improvements in the intervention group in some aspects of care however, improvements were not seen on all targeted performance measures. The remaining study found no difference between patients in the intervention and control groups (39). These four studies all used different quality monitoring approaches to improve care. Based on the information available in these studies, there does not appear to be clear evidence supporting a particular quality monitoring approach for improving processes within acute care.

Two studies examined quality monitoring interventions designed to improve outcomes for patients participating in stroke rehabilitation (40, 41). The interventions were different however both aimed to improve team processes and function and used strategies such as audit, feedback and team training. One study reported that patients in the intervention group improved significantly more than the control group (on the motor score of the Functional Independence Measure (FIM) (41). Neither study reported significant improvement on length of stay or other outcomes.

### Findings related to people with severe traumatic brain injury

We were unable to identify any eligible studies investigating the effect of quality monitoring interventions involving people with severe traumatic brain injury.

**Findings related to people with traumatic brain injury at all levels of severity**

We were unable to identify any eligible studies investigating the effect of quality monitoring interventions involving people with traumatic brain injury at all levels of severity.

**Findings related to people with an acquired brain injury**

The review and studies included patients with disability at all levels of severity therefore results apply to all stroke survivors. There is currently conflicting evidence regarding the effectiveness of implementing a quality monitoring intervention. Three RCTs have reported improvements in aspects of patient care; however, the evidence does not support a particular quality monitoring intervention approach.

**Research question 7**

In what ways has the World Health Organisation (WHO) International Classification of Functioning, Disability and Health (ICF) affected funding or delivery of care for patients with ABI?

**Findings for research question 7**

We were unable to identify any studies that met the eligibility criteria and addressed the implications of the WHO ICF on rehabilitation after ABI.

**Review of Guidelines**

We identified the following four guidelines that addressed models of care for people with a moderate to severe brain injury:

- ABIKUS Evidence Based Recommendations for Rehabilitation of Moderate to Severe Acquired Brain Injury (ABIKUS 2007) (42).
- National Clinical Guidelines Following Acquired Brain Injury (Royal College of Physicians (RCP) and British Society of Rehabilitation Medicine, 2003) (43).
- Traumatic Brain Injury Diagnosis, Acute Management and Rehabilitation published by the New Zealand Guidelines Group (NZGG 2007) (44).
- Brain Injury Rehabilitation in Adults (Scottish Intercollegiate Guidelines Network (SIGN) 2013) (4).

Appraisal of the guidelines using the AGREE II criteria is presented in Table 7 in Appendix C.

None of the guidelines provided information regarding the effects of fee-for-service care, integrated care across sectors, consumer participation in clinical governance or the impact of the introduction of the WHO ICF. Guidelines related to the research questions are presented in Table 8 in Appendix C.

## Integrated care pathways

Two of the guidelines addressed the use of ICPs; both recommending their use for management of common problems such as spasticity. These recommendations were made based on research conducted with people following stroke.

## Continuity of care

All four guidelines recommended services for continuing care including case management, ongoing assessment of depression, vocational rehabilitation and assistance to resume leisure activities. The guidelines identified supporting evidence for the use of vocational rehabilitation services however, recommendations for the implementation of case management services were made based on expert opinion or consensus of the guideline group.

## Quality monitoring

Two of the guidelines recommended the use of specialised education programs (with competencies) for staff as a way of ensuring quality of care. Recommendations were made based on expert opinion or consensus of the guideline group.

## Method

The main objective of this review was to identify the most effective models of care for people with severe brain injury with a specific focus on studies which included participants similar to the cohort of patients likely to be admitted to the new Alfred Health severe ABI unit. As there is a lack of randomised trials with this client group we searched for trials conducted with all adults with acquired brain injury and relevant guidelines. We used the framework designed by the Cochrane Effective Practice and Organisation of Care Review (EPOC) Group to determine potential research questions that were delivered at the level of the organisation. This list of potential questions was circulated and the seven questions in this review were identified in consultation with stakeholders, including representatives from ERABI, Alfred Health, Australasian Cochrane Collaboration, ISCR, the Transport Accident Commission and Department of Health in order to ensure that they addressed the needs and priorities of local ABI rehabilitation services. The methods used within this review were determined a priori, detailed in a protocol and registered with PROSPERO (45).

Inclusion and exclusion criteria are detailed in Table 9 in Appendix D.

## Search Strategy

We searched multiple electronic databases (Medline (Ovid) 1980-Week 4 January 2013, PsycINFO (Ovid) 1980-Week 4 January 2013, EMBASE (Ovid) 1980-Week 4 January 2013 and CINAHL 1980-21<sup>st</sup> February 2013), the Cochrane Library (Cochrane Database of Systematic Reviews, the Database of Abstracts of Reviews of Effects and the Cochrane Controlled Trials Register searched on the 26<sup>th</sup> of January 2013), the Cochrane EPOC trials register (searched on the 13<sup>th</sup> of February

2013) and the ERABI report (searched on the 26<sup>th</sup> of January 2013). We reviewed reference lists of systematic reviews for relevant studies. Please refer to the Appendices for further details regarding the search (Medline search strategy and PRISMA flow diagram).

In the guidelines search, we searched Medline ((Ovid) 2000 – April 2013), the Cochrane Library (2000 – April 2013), PsycINFO ((Ovid) 2000 – April 2013), EMBASE ((Ovid) 2000 - April 2013), CINAHL Plus (EbSCOhost (2000 – April 2013), plus 24 websites known to publish guidelines [National Guideline Clearinghouse; NHMRC Clinical Guideline Portal; NHMRC Clinical Guideline Portal and Emergency Care Portal (Australia); Medical Journal of Australia Clinical Guidelines; National Institute of Health and Clinical Excellence (NICE); Johanna Briggs Institute; Guidelines International network; Guidelines Advisory Committee (Canada); TRIP database; Australian State Department of Health and Ageing; Canadian Medical Association; Department of Veterans' Affairs; International Council of Nurses; Nursing Best Practice Guidelines; Royal College of Nursing (UK); American Academy of Paediatrics (United States); Guidelines Advisory Committee (GAC); National Health Service (NHS) Evidence (UK); National Electronic Library for Health (UK); New Zealand Guidelines Group; Scottish Intercollegiate Guidelines Network (Scotland); Brain Trauma Foundation; World Health Organization; Academy of Neurologic Communication Disorders and Science].

## Data collection and analysis

One review author (KL) coordinated the searches. All titles and abstracts elicited in the search were reviewed by one person (KL or LP) to determine whether they met the criteria for inclusion in the review. Potentially relevant papers were obtained in full text and reviewed independently by two people (KL and LP). Any disagreements were resolved by discussion or moderation by a third person (NL).

Data was extracted by one person (KL) and reviewed for accuracy by a second person (DW or LP). The following data was extracted into study appraisal tables: authors, place and date of publication, study design, participant eligibility criteria, the number of participants, intervention, comparison intervention, outcome measures, results, and author's conclusion.

The methodological quality of all reviews and studies was appraised independently by two people (KL and DW or LP). Systematic reviews were assessed using the PRISMA checklist(46), randomised controlled trials were assessed using the PEDro scale(47) and studies of other design were assessed using the Downs and Black Scale(48). Any disagreements were discussed or moderated by a third person (NL). The methodological quality of guidelines was assessed using the AGREE II instrument (49).

Results and characteristics of the studies were summarised and presented in Appendix B in Tables 2-6.

## Appendix A

**Table 1: Additional questions regarding models of care**

<i>Research question</i>
Do changes to the multidisciplinary team impact on outcome (for example, creation of a new team of health professionals of different disciplines, the addition of new members to the team or changing the caseload or configuration of members of the team)?
Does the method of communication between health professionals impact on outcomes (for example, tele-health, tele-medicine)?
Do changes to the physical structure or facilities (for example changes to the ward environment) change the outcomes?
Do changes to the medical records systems (for example, transition from paper based to electronic records) impact on outcomes?
What is the evidence for the revision of professional roles: shifting of roles amongst health professionals (also known as 'professional substitution', 'boundary encroachment' or 'extended scope of practice')?
Does the timing of intervention provided by the clinical multidisciplinary team impact on the outcomes of patients with ABI?
Are there benefits in changing the setting or site of service delivery (for example, home based, community based)?
Which configuration of medical professionals represents the most effective workforce for an ABI unit (how many medical specialties are involved and in what capacity?)
Are there benefits in employing paraprofessionals in an ABI rehabilitation unit which will be admitting patients with severe injuries (for example, a leisure therapist or art therapist)?
Is there information to guide the nature of staff employed (levels of experience) for the nursing and allied health staff?

## Appendix B

**Table 2: Research Question 2 - Integrated Care**

<i>Study</i>	<i>Patient</i>	<i>Intervention/Comparator</i>	<i>Outcomes</i>	<i>Results</i>
<p><b>Stroke Unit Trialists (23) 2009</b></p> <p>Design: SR</p> <p>Size: 31 studies</p> <p>Setting: Stroke units</p> <p>PRISMA: 20/27</p>	<p>Patients with acute stroke</p> <p>Included all levels of severity</p>	<p>I: Stroke unit care</p> <p>C: Less organised models of care</p>	<p>Death, dependency or institutionalisation, QOL, patient and carer satisfaction, LOS</p>	<p>Treatment on a comprehensive stroke ward (acute plus rehabilitation) resulted in reductions in death compared to treatment from a mobile stroke team on a general ward</p>
<p><b>Fearon 2012 (24)</b></p> <p>Design: SR</p> <p>Size: 14 studies</p> <p>Setting: Acute stroke to home</p> <p>PRISMA: 23/27</p>	<p>Patients with acute stroke</p> <p>Predominantly moderate levels of severity</p>	<p>I: Early supported discharge</p> <p>C: Other models of care</p>	<p>Death or long term dependency, LOS, ADL function, subjective health status, mood, carer outcome, patient and carer satisfaction</p>	<p>Appropriately resourced Early Supported Discharge models can reduce length of stay and that patients receiving ESD are more likely to be independent and living at home 6 months after stroke.</p>
<p><b>Indredavik 2000(25-28)</b></p> <p>Design: RCT</p> <p>Size: N=320</p> <p>Setting: Hospital to home</p> <p>PEDro: 6/10</p>	<p>Patients with acute stroke</p> <p>Predominantly moderate levels of severity</p>	<p>I: Chain of care provided by a mobile stroke team from the acute setting into the community</p> <p>C: Acute care and community care provided by different intervention teams</p>	<p>ADL function and independence, living situation, death, LOS</p>	<p>Patients receiving integrated care had improved functional outcome at 6 months and 1 year and similar length of stay and mortality on the acute stroke unit</p>
<p><b>Widen Holmqvist 1998 (29)</b></p> <p>Design: RCT</p> <p>Size: N=81</p> <p>Setting: Hospital to home</p> <p>PEDro: 7/10</p>	<p>Patients with acute stroke</p> <p>Predominantly moderate levels of severity</p>	<p>I: Care provided by a hospital outreach team from the acute setting into the community</p> <p>C: Acute care, rehabilitation and/or community care provided by different teams</p>	<p>Resource use, caregivers QOL and time spent caring, patient satisfaction, Sickness Impact Profile, ADL function and independence</p>	<p>There were no statistically significant differences in outcome between groups at 3 or 12 months. Patients in the control group spent significantly more days in inpatient services.</p>

**Table 3: Research Question 3 – Care Pathways**

<i>Study</i>	<i>Patient</i>	<i>Intervention/Comparator</i>	<i>Outcomes</i>	<i>Results</i>
<p><b>Sulch 2000 (30)</b></p> <p>Design: SR</p> <p>Size: 6 studies</p> <p>Setting: Acute or rehabilitation</p> <p>PRISMA: 3/27</p>	<p>Patients with stroke</p> <p>Included all levels of severity</p>	<p>I: Integrated care pathway</p> <p>C: No integrated care pathway</p>	<p>LOS, cost of care, functional outcome, discharge destination, investigations or interventions</p>	<p>Information from non-randomised trials suggests there may be some benefits in using ICPs (reduced length of stay and reduced costs)</p>
<p><b>Kwan 2002 (31)</b></p> <p>Design: SR</p> <p>Size: 10 studies</p> <p>Setting: Acute</p> <p>PRISMA: 21/27</p>	<p>Patients with acute stroke</p> <p>Included all levels of severity</p>	<p>I: Integrated care pathway</p> <p>C: No integrated care pathway</p>	<p>Death or dependency, complications, readmission, use of investigations, patient satisfaction, LOS, cost of hospitalisation, QOL</p>	<p>There do not appear to be benefits in the implementation of an ICP and it is possible that use is associated with reduced patient satisfaction and QOL</p>
<p><b>Allen 2008 (32)</b></p> <p>Design: SR</p> <p>Size: 5 studies</p> <p>Setting: Acute or rehabilitation</p> <p>PRISMA: 12/27</p>	<p>Patients with stroke</p> <p>Included all levels of severity</p>	<p>I: Integrated care pathway</p> <p>C: No integrated care pathway</p>	<p>Service integration</p>	<p>There is currently a lack of evidence to support the use of ICPs and therefore implementation should be restricted to areas which are predictable and can be standardised</p>
<p><b>Sulch 2000 (33)</b></p> <p>Design: RCT</p> <p>Size: N=152</p> <p>Setting: Rehabilitation</p> <p>PEPro: 7/10</p>	<p>Patients with stroke</p> <p>Moderate to severe disability</p>	<p>I: Integrated care pathway</p> <p>C: No Integrated care pathway</p>	<p>LOS, ADL Function, QOL, mood, time spent in therapy, death and discharge destination</p>	<p>There were no benefits associated with use of the ICP and patients in the control group reported higher levels of QOL 6 months after stroke</p>
<p><b>Middleton 2011(16)</b></p> <p>Design: Cluster RCT</p> <p>Size: N=735</p> <p>Setting: Acute</p> <p>PEPro: 9/10</p>	<p>Patients with stroke</p> <p>Included all levels of severity</p>	<p>I: Integrated care pathway directed at fever, hyperglycaemia and swallowing</p> <p>C: No integrated care pathway</p>	<p>Death or dependency, ADL function, QOL, LOS, processes of care</p>	<p>Patients managed using the ICP were less likely to be dead or dependent in the short term,</p>

**Table 4: Research Question 4 - Intervention approaches used in the studies**

	Systematic Reviews (N=10)	Trials (N=34)
Case management (CM)	5	14
Early supported discharge and/or rehabilitation program (ESD)	5	12
Short term program (consultation based model) (STP)	-	8

**Table 5: Research Question 4 - Continuity of care**

Study	Patient	Intervention/Comparator	Outcomes	Results
<p><b>Allison 2011 (50)</b></p> <p>Design: SR</p> <p>Size: 9 studies</p> <p>Setting: Community</p> <p>PRISMA:11/27</p>	<p>Patients with stroke</p> <p>Predominantly mild to moderate severity</p>	<p>I: Post-discharge care involving elements of both health and social care (CM)</p> <p>C: Alternative or no post-discharge care</p>	<p>Patient satisfaction, patient health outcome, depression, patient behaviour, ADL function, QOL, caregiver burden, hospital readmission</p>	<p>There was a lack of evidence to support the use of stroke support workers, care coordinators or case management as implemented in these studies to deliver primary-care based health and social care.</p>
<p><b>Chesnut 1999 (51, 52)</b></p> <p>Design: SR</p> <p>Size: 3 studies</p> <p>Setting: Community</p> <p>PRISMA: 6/27</p>	<p>Patients with TBI</p> <p>Included all levels of severity</p>	<p>I: Long term care coordination (CM)</p>	<p>General functional status</p>	<p>There was a lack of high quality studies and studies included in the review reported conflicting results therefore the authors were unable to make clear recommendations on the evidence for this approach.</p>
<p><b>Ellis 2010 (53)</b></p> <p>Design: SR</p> <p>Size: 16 studies</p> <p>Setting: Predominantly community</p> <p>PRISMA: 23/27</p>	<p>Patients with stroke</p> <p>Included all levels of severity</p>	<p>I: Stroke liason worker (CM)</p> <p>C: Alternative care or no post-discharge care</p>	<p>Subjective health, function, participation, death, institutionalisation, mood, stroke related knowledge, health service utilisation, patient satisfaction</p>	<p>Patients with mild to moderate disability had a significant reduction in dependence and there were reports of higher patient and carer satisfaction however there was no other evidence that the intervention improves outcome.</p>
<p><b>Fearon 2012 (24)</b></p> <p>Design: SR</p> <p>Size: 14 studies</p> <p>Setting: Acute stroke to home</p> <p>PRISMA: 23/27</p>	<p>Patients with acute stroke</p> <p>Predominantly moderate levels of severity</p>	<p>I: Early supported discharge (ESD)</p> <p>C: Other models of care</p>	<p>Death or long term dependency, length of stay, ADL function, subjective health status, mood, carer outcome, patient and carer satisfaction</p>	<p>Appropriately resourced Early Supported Discharge models can reduce length of stay and that patients receiving ESD are more likely to be independent and living at home 6 months after stroke.</p>

<p><b>Graven 2011 (54)</b></p> <p>Design: SR</p> <p>Size: 9 studies</p> <p>Setting: Predominantly community</p> <p>PRISMA: 14/27</p>	<p>Patients with stroke</p> <p>Predominantly mild to moderate levels of severity</p>	<p>I: Community based rehabilitation and/or care coordination provided by nursing or allied health practitioners (CM)</p> <p>C: Other models of care</p>	<p>Participation, depression, QOL</p>	<p>The review authors found insufficient evidence to support care-coordination activities for reducing depression or improving participation or hrQOL.</p>
<p><b>Larsen 2006 (55)</b></p> <p>Design: SR</p> <p>Size: 7 studies</p> <p>Setting: Acute</p> <p>PRISMA: 7/27</p>	<p>Patients with stroke</p> <p>Included all levels of severity</p>	<p>I: Early supported discharge (as an extension of stroke unit services (ESD))</p> <p>C: Conventional stroke unit rehabilitation</p>	<p>Death, institutionalisation, function, length of stay, intensity of rehabilitation</p>	<p>Patients receiving ESD had reduced incidence of experiencing a poor outcome. Most studies reported a reduction in hospital LOS for patients in the ESD group.</p>
<p><b>Outpatient Service Trialists 2003 (56)</b></p> <p>Design: SR</p> <p>Size: 14 trials</p> <p>Setting: Community</p> <p>PRISMA: 22/27</p>	<p>Patients with stroke</p> <p>Predominantly mild to moderate levels of severity</p>	<p>I: Therapy based services for people living at home (ESD)</p> <p>C: Alternative models of care</p>	<p>Death, ADL function, institutionalisation, QOL, mood, patient satisfaction</p>	<p>There was no significant difference between intervention and control groups for death or institutionalisation or death or dependency at follow up. However, patients receiving therapy at home were significantly more independence in PADLs and IADLs at follow up.</p>
<p><b>Salter 2010 (57)</b></p> <p>Design: SR</p> <p>Size: 10 studies</p> <p>Setting: Community</p> <p>PRISMA: 13/27</p>	<p>Patients with stroke</p> <p>Included all levels of severity however, predominantly mild to moderate</p>	<p>I: support (social, emotional or familial) for individuals with stroke (CM)</p> <p>C: Alternative models of care</p>	<p>Depression, mood or psychiatric distress</p>	<p>Only one of the included trials identified significant benefits for the intervention group. This may have been associated with intervention characteristics including early initiation, increased intensity and screening for depression.</p>
<p><b>Teasell 2003 (58)</b></p> <p>Design: SR</p> <p>Size: 10 studies</p> <p>Setting: Acute to community</p> <p>PRISMA: 8/27</p>	<p>Patients with stroke</p> <p>Predominantly mild to moderate levels of severity</p>	<p>I: Early supported discharge (ESD)</p> <p>C: Alternative models of care</p>	<p>Length of hospital stay, functional outcomes</p>	<p>There were no statistically significant differences between intervention and control groups on Barthel Index suggesting that ESD is neither superior nor inferior. ESD programs reduced the length of stay in acute care in several of the studies.</p>
<p><b>Winkel 2008 (59)</b></p> <p>Design: SR</p> <p>Size: 8 studies</p> <p>Setting: Acute to community</p> <p>PEDro: 12/27</p>	<p>Patients with stroke</p> <p>Predominantly mild to moderate levels of severity</p>	<p>I: Early discharge to home rehabilitation program involving physiotherapy (ESD)</p> <p>C: Rehabilitation at hospital</p>	<p>At least one of the outcome areas of physiotherapy</p>	<p>ESD has been demonstrated to reduce hospital length of stay. It has been shown to be more effective in improving performance in IADLs and may be more effective in improving PADL performance.</p>

<p><b>Allen 2009 (60)</b></p> <p>Design: RCT</p> <p>Size: N=380</p> <p>Setting: Acute to community</p> <p>PEDro: 8/10</p>	<p>Patients with stroke</p> <p>Predominantly mild severity</p>	<p>I: 6 months of follow up contact from an Advanced Practice nurse who worked with the GP to implement a care plan, organised further services and provided education (CM)</p> <p>C: Usual care plus provision of written stroke related education.</p>	<p>NIHSS, TUG, physical performance test, mortality, institutionalisation, QOL, mgt of post-stroke complications, stroke knowledge and lifestyle modification</p>	<p>There was little difference between groups at 6 months. The intervention group had slightly improved lifestyle management and stroke knowledge.</p>
<p><b>Andersen 2000 (61)</b></p> <p>Design: RCT (three arms)</p> <p>Size: N=155</p> <p>Setting: Rehabilitation to community</p> <p>PEDro: 7/10</p>	<p>Patients with stroke</p> <p>Mild to moderate severity</p>	<p>Ia: Three home visits from a geriatric rehabilitation physician for medication review, referral/liason with other services, information (STP)</p> <p>Ib: Home visits (average of 3) from the hospital physiotherapists for instruction and education</p> <p>C: Standard aftercare (may have included outpatient rehabilitation and home care)</p>	<p>Function, ADLs, mortality, institutionalisation and readmission</p>	<p>Significantly less hospital readmissions in both intervention groups compared to the control group at 6 months.</p> <p>There was no difference in functional outcome between groups at 6 months.</p>
<p><b>Askim 2004 (62, 63)</b></p> <p>Design: RCT</p> <p>Size: N=62</p> <p>Setting: Acute to community</p> <p>PEDro: 8/10</p>	<p>Patients with stroke</p> <p>Mild to moderate severity</p>	<p>I: Early supported discharge “mobile stroke team” who ensured a smooth transition between acute and home care and “acted as a safety net” providing telephone contact and at least one other home visit (ESD)</p> <p>C: Usual care without the “mobile stroke team”</p>	<p>Function, Nottingham Health Profile, Caregiver strain, balance, gait speed</p>	<p>Patients in the intervention group tended to have a higher quality of life however there were no significant differences between groups in functional outcome or length of stay.</p>
<p><b>Bautz-Holter 2002 (64)</b></p> <p>Design: RCT</p> <p>Size: N=82</p> <p>Setting: Acute to community</p> <p>PEDro: 7/10</p>	<p>Patients with stroke</p> <p>Mild to moderate severity</p>	<p>I: Early supported discharge team who worked with the hospital team to coordinate discharge and continued rehabilitation with the general community rehabilitation services. (ESD)</p> <p>C: Received usual acute and rehabilitation services which were perceived to be ‘less well organised’</p>	<p>ADLs, General Health Questionnaire, Depression, health service utilisation, patient and carer satisfaction.</p>	<p>At 3 months, the GHQ was significantly higher in the intervention group however this difference was no longer present at 6 months.</p> <p>There were no other significant differences between groups at follow-up.</p>
<p><b>Bell 2005 (65, 66)</b></p> <p>Design: RCT</p> <p>Size: N=171</p> <p>Setting: Rehabilitation to community</p> <p>PEDro: 8/10</p>	<p>Patients with TBI</p> <p>Mild to moderate severity</p>	<p>I: Regular phone calls over 9 months upon discharge to follow-up any issues, identify concerns and provide information, mentoring, goal setting, reassurance and referral to community resources. (CM)</p> <p>C: Usual care</p>	<p>Function, community integration, neurobehavioural functioning inventory, Glasgow outcome scale, QOL, emotional state</p>	<p>The intervention group had significantly better scores on functional status and perceived quality of wellbeing than the control group however the magnitude of the effect is unclear.</p>

<p><b>Bell 2008 (67)</b></p> <p>Design: RCT</p> <p>Size: N=366</p> <p>Setting: ED to community</p> <p>PEDro: 8/10</p>	<p>Patients with mild TBI</p> <p>Mild severity</p>	<p>I: Regular phone calls over 3 months post injury after presentation to the ED, a contact phone number and additional information about brain injury and where to get help (CM)</p> <p>C: Usual care (patient handout and outpatient treatment if prescribed).</p>	<p>Head injury symptoms, QOL, PHQ, role performance, community participation</p>	<p>Patients in the intervention group reported fewer symptoms 6 months post injury than the control group</p>
<p><b>Bell 2011 (68)</b></p> <p>Design: RCT</p> <p>Size: N=433</p> <p>Setting: Rehabilitation to community</p> <p>PEDro: 6/10</p>	<p>Patients with TBI</p> <p>Included all levels of severity</p>	<p>I: Regular phone calls for up to 21 months post injury from a case manager. The purpose of the calls was to help participants to identify, prioritise and solve problems as independently as possible (CM)</p> <p>C: Usual care</p>	<p>Function, level of disability, participation, symptoms, QOL, vocational status</p>	<p>No significant differences were found between groups for any of the measures at either 1 or 2 years post injury.</p>
<p><b>Boter 2004 (69)</b></p> <p>Design: RCT</p> <p>Size: N=536</p> <p>Setting: Acute to community</p> <p>PEDro: 8/10</p>	<p>Patients with stroke</p> <p>Mild to moderate severity</p>	<p>I: Three phone calls and a home visit from a nurse in the first 6 months after discharge to support patients to problem solve any issues post stroke (CM)</p> <p>C: Usual care</p>	<p>Patient satisfaction, QOL, mood, readmission, function, health service utilisation, medication</p>	<p>There were no significant differences between groups. Patients in the intervention group reported slightly better scores related to 'role limitations due to emotional health' and used less rehabilitation services.</p>
<p><b>Christie 1984 (70)</b></p> <p>Design: RCT</p> <p>Size: N=213</p> <p>Setting: Community</p> <p>PEDro: 4/10</p>	<p>Patients with stroke</p> <p>Included all levels of severity</p>	<p>I: Social work follow up (seven appointments over a 12 month period). Advice, counselling, referral to other agencies and crisis intervention was provided (CM)</p> <p>C: Usual care</p>	<p>Death, activity and independence, health service utilisation</p>	<p>There were no significant differences between groups at follow up.</p>
<p><b>Claiborne 2006 (71, 72)</b></p> <p>Design: RCT</p> <p>Size: N=28</p> <p>Setting: Rehabilitation to community</p> <p>PEDro: 4/10</p>	<p>Patients with stroke</p> <p>Predominantly mild to moderate severity</p>	<p>I: Follow up from a social worker comprising one home visit and telephone calls as required over 3 months (CM)</p> <p>C: Usual care</p>	<p>Health service utilisation, QOL, depression</p>	<p>There were some differences in the way in which health care services were utilised with the intervention group using more outpatient services and less emergency services however there were no other differences between groups.</p>
<p><b>Indredavik 2000 (25-28)</b></p> <p>Design: RCT</p> <p>Size: N=320</p> <p>Setting: Hospital to home PEDro: 6/10</p>	<p>Patients with acute stroke</p> <p>Predominantly moderate levels of severity</p>	<p>I: Chain of care provided by a mobile stroke team from the acute setting into the community (ESD)</p> <p>C: Acute care and community care provided by different intervention teams</p>	<p>Barthel Index, Modified Rankin Scale, living situation, mortality, length of stay</p>	<p>Patients receiving integrated care had improved functional outcome at 6 months and 1 year and similar length of stay and mortality on the acute stroke unit</p>

<p><b>Forster 1996 (73)</b></p> <p>Design: RCT</p> <p>Size: N=240</p> <p>Setting: Community</p> <p>PEDro: 7/10</p>	<p>Patients with stroke</p> <p>Predominantly mild to moderate severity</p>	<p>I: Received ≥ 6 visits and telephone calls from a nurse over 12 months to provide information, support and advice (CM)</p> <p>C: Usual care</p>	<p>Function, General Health questionnaire</p>	<p>There were no significant differences between groups on any of the outcome measures.</p>
<p><b>Forster 2009 (74)</b></p> <p>Design: RCT</p> <p>Size: N=265</p> <p>Setting: Community</p> <p>PEDro: 8/10</p>	<p>Patients with stroke</p> <p>Mild to moderate severity</p>	<p>I: Follow up assessment from a stroke nurse 5-6 months after stroke. Issues identified in the assessment were managed in a standardised manner (STP)</p> <p>C: Letter sent to GP recommending 6 month review</p>	<p>Function, mood, satisfaction with care, caregiver burden</p>	<p>There were no real differences between groups at 12 month follow up however patients reported improved satisfaction with care in some areas.</p>
<p><b>Ghaffar 2006 (75)</b></p> <p>Design: RCT</p> <p>Size: N=191</p> <p>Setting: ED to community</p> <p>PEDro: 5/10</p>	<p>Patients with mild TBI</p> <p>Mild severity</p>	<p>I: Patients were followed up in a multidisciplinary TBI clinic within 1 week of injury and offered pharmacotherapy, PT, OT and supportive psychotherapy if required (STP)</p> <p>C: Usual care (no follow up arranged)</p>	<p>Symptoms, General Health questionnaire, cognition</p>	<p>In general there were no significant differences between group however a small subgroup (those with a premorbid psychiatric history) appeared to benefit from treatment, reporting lower levels of depression at 6 months.</p>
<p><b>Gilbertson 2000 (76)</b></p> <p>Design: RCT</p> <p>Size: N=138</p> <p>Setting: Acute to community</p> <p>PEDro: 7/10</p>	<p>Patients with stroke</p> <p>Mild to moderate severity</p>	<p>I: Usual services plus 6 week domiciliary program provided by an occupational therapist focussing on regaining function, goal attainment and liason with other services (ESD)</p> <p>C: Usual care which may have included rehabilitation, home visit, support and equipment and review at a stroke clinic</p>	<p>Function, death, patient satisfaction with care, health service utilisation, subjective health status.</p>	<p>Patients in the intervention group reported improved ability to perform ADLs at 8 weeks than those in the control group and fewer experienced a poor global outcome however these improvements were not as apparent at 6 month follow up. Patients in the intervention group had higher levels of satisfaction with care.</p>
<p><b>Goldberg 1997 (77)</b></p> <p>Design: RCT</p> <p>Size: N=55</p> <p>Setting: Rehabilitation to community</p> <p>PEDro: 4/10</p>	<p>Patients with stroke</p> <p>Mild to moderate severity</p>	<p>I: Standard outpatient services plus weekly phone contact and monthly home visits from a case manager, a hotline number, educational resources and access to home based social work and psychologists as required (CM)</p> <p>C: Standard outpatient services</p>	<p>Function, Efficacy, depression, physical health</p>	<p>Patients in the intervention group reported improved ability to perform ADLs at 6 months and the majority of patients felt the intervention was valuable. There were no other significant differences between groups.</p>

<p><b>Grasel 2005 (78)</b></p> <p>Design: Controlled trial</p> <p>Size: N=71</p> <p>Setting: Rehabilitation to community</p> <p>D &amp; B: 20/26</p>	<p>Patients with stroke</p> <p>Mild to moderate severity</p>	<p>I: Usual care plus enhanced support on transition home including carer support (attendance at a seminar and individual training), a weekend at home prior to discharge and telephone support 3 months after discharge (ESD)</p> <p>C: Usual care</p>	<p>Function, gait, Spasticity, UL function, QOL and carer based assessments</p>	<p>Patients in the intervention group had a longer length of stay in the rehabilitation setting. At 6 months there were no significant differences between groups.</p>
<p><b>Greenwood 1994 (79)</b></p> <p>Design: RCT</p> <p>Size: N=126</p> <p>Setting: Acute</p> <p>PEDro: 4/10</p>	<p>Patients with severe head injury</p> <p>Severe injury</p>	<p>I: Case management (assessment, development of rehabilitation plan, liaison with family and health professionals, information, counselling and support) (CM)</p> <p>C: No case manager allocated</p>	<p>Physical function, cognitive function, function, social and behavioural function, symptoms, service utilisation, social situation, patient satisfaction</p>	<p>Patients receiving case management were more likely to be referred to rehabilitation or outpatient services however there were no other significant differences between groups.</p>
<p><b>Joubert 2006 (80-82)</b></p> <p>Design: RCT</p> <p>Size: N=233</p> <p>Setting: Community</p> <p>PEDro: 3/10</p>	<p>Patients with stroke</p> <p>Included all levels of severity</p>	<p>I: Integrated care model involving enhanced frequency and level of collaboration between the patient, a study coordinator and the GP for the first 12 months after stroke (CM)</p> <p>C: Usual care</p>	<p>Clinical and risk factor information, Function, cognitive status, QOL.</p>	<p>Patients in the intervention group were more successful in improving some health outcomes (lowering sBP, reducing BMI and increasing their walking). They were also less likely to be depressed at 12 months.</p>
<p><b>Lincoln 2003 (83)</b></p> <p>Design: RCT</p> <p>Size: N=230</p> <p>Setting: Community</p> <p>PEDro: 6/10</p>	<p>Patients with stroke</p> <p>Included all levels of severity</p>	<p>I: Stroke Association Family Support Officer (FSO) (STP)</p> <p>C: No FSO allocated</p>	<p>General Health, Function, Knowledge regarding stroke and services, caregiver information</p>	<p>Patients and carers in the intervention group reported improved knowledge in some areas however, there were no other significant differences between groups in outcomes.</p>
<p><b>Logan 1997 (84)</b></p> <p>Design: RCT</p> <p>Size: N=111</p> <p>Setting: Community</p> <p>PEDro: 7/10</p>	<p>Patients with stroke</p> <p>Mild to moderate severity</p>	<p>I: Enhanced social service occupational therapy (quicker response to referral, more frequent input and more total therapy) (ESD)</p> <p>C: Standard social service occupational therapy</p>	<p>ADL Function, General Health Questionnaire</p>	<p>Patients in the intervention group had higher self-reported extended ADL function at 3 months however at 6 months these differences were no longer apparent.</p>
<p><b>Mant 2000 (85, 86)</b></p> <p>Design: RCT</p> <p>Size: N=520</p> <p>Setting: Acute to community</p>	<p>Patients with stroke</p> <p>Mild to moderate severity</p>	<p>I: Stroke Association Family Support Officer (FSO) (STP)</p> <p>C: No FSO allocated</p>	<p>Knowledge about stroke and services, ADL function, Mobility, mood, caregiver information</p>	<p>There were no significant differences between patient groups at 6 months however, when assessed at 12 months patients in the intervention group reported higher levels of aspects of QOL (though only 57% of participants</p>

PEDro: 7/10		were assessed at this point). Caregivers reported higher scores in some areas of QOL and reported higher levels of being able to perform extended ADLs.		
<b>Markle Reid 2011 (87)</b>	Patients with stroke	I: Interprofessional stroke team providing assessment, rehabilitation, stroke prevention, community re-integration and care coordination (ESD)	QOL, personal resource questionnaire, mood, cognitive function, participation, number of strokes, health service utilisation	There were no significant differences between groups at 12 months and subgroup analysis was unable to identify particular groups of patients that benefited most.
Design: RCT	Mild to moderate severity	C" Home care however this was not provided by a dedicated team and continuity of care was not assured		
Size: N=101				
Setting: Community				
PEDro: 6/10				
<b>Mayo 2000 (88)</b>	Patients with stroke	I: Early supported discharge with a 4 week program and support and rehabilitation provided as needed in person or over the phone (ESD)	QOL, symptoms, gait, ADL function, participation	Patients in the intervention group reported higher physical health scores and improved significantly more on the 'physical role' component of the SF36 at 3 months. They also scored better on the measures of IADL.
Design: RCT	Mild to moderate severity	C: "Less organised" outpatient services		
Size: N=114				
Setting: Community				
PEDro: 6/10				
<b>Mayo 2008 (89, 90)</b>	Patients with stroke	I: Nurse providing case management for 6 weeks via home visits and telephone calls (CM)	QOL, preference based stroke index, participation, ADL function, depression, gait, health service utilisation	The odds of responding to one or more aspects of QOL was higher in the intervention group than the control group suggesting there were some benefits in QOL associated with the intervention.
Design: RCT	Included all levels of severity	C: Patient were instructed to make an appointment with the GP		
Size: N=190				
Setting: Community				
PEDro: 8/10				
<b>Powell 2002 (91)</b>	Patients with severe TBI	I: Individualised outreach community multidisciplinary rehabilitation for an average of 27 weeks (ESD)	Function, mood	Participants in the intervention group improved significantly more on the Barthel Index and the BICRO39 than those in the control group.
Design: RCT	Severe	Control group: Provided with information on existing sources of potential help		
Size: N=110				
Setting: Community				
PEDro: 8/10				
<b>Rodgers 1997 (92)</b>	Patients with stroke	I: Early supported discharge team (ESD)	Death, institutionalisation, readmission, ADL function, depression, self-reported health status, caregiver outcomes	No significant differences were found between groups although the intervention group appeared to be participating in more IADLs than the control group.
Design: RCT	Mild to moderate severity	C: Use of conventional hospital and rehabilitation services		
Size: N=92				
Setting: Community				
PEDro: 7/10				
<b>Rudd 1997 (93)</b>	Patients with stroke	I: Early supported discharge (ESD)	Cognitive status, physical function, ADL function, mood, gait, self-reported health status, caregiver	Patients in the intervention group had a shorter LOS however, there were no differences between groups at one year on any of the
Design: RCT	Mild to moderate	C: Usual hospital and outpatient services.		
Size: N=331				

Setting: Community PEDro: 5/10	severity		outcomes, patient and carer satisfaction	measures.
<b>Tilling 2005 (94)</b> Design: RCT Size: N=340 Setting: Community PEDro: 6/10	Patients with stroke  Included all levels of severity	I: Stroke Association Family Support Officer (FSO) (CM)  C: No FSO allocated	Patient satisfaction, ADL function, mood	There were few differences between groups at follow up. A lower proportion of patients in the intervention group were satisfied with community services and a higher proportion were satisfied with information about recovery and advice about prevention.
<b>Torp 2006 (95)</b> Design: RCT Size: N=198 Setting: Acute to community PEDro: 7/10	Patients with stroke  Predominantly moderate level of severity	I: Care provided by an interdisciplinary stroke team that commenced care during the last 7 days of the hospital stay and provided up to 10 visits in the community including rehabilitation, supervision and handing over care to local home care services (ESD)  C: Standard care which involved rehabilitation, home visits and home care services	ADL function, cognitive status, depression, QOL	There were no significant differences between groups
<b>Trexler 2010 (96)</b> Design: RCT Size: N=22 Setting: Community PEDro: 4/10	Patients with ABI  Predominantly moderate level of severity	I: Allocated to 'resource facilitators' who contacted participants every 2 weeks (via telephone or home/community visits). A large focus of the facilitator was returning the patient to work (CM)  C: Usual care (no 'resource facilitator')	Participation, self reported health	Levels of participation improved more in the intervention group and more of the intervention group were employed at the time of 6 month follow up (though numbers and differences were small).
<b>Wade 1997 (97)</b> Design: RCT Size: N=1156 Setting: ED to community PEDro: 3/10	Patients with head injury  Included all levels of severity	I: Routine follow up from an occupational therapist or psychologist 7-10 days post injury with organisation of further follow up as required (STP)  C: Usual care (no routine followup)	Symptoms	As a whole, there were no significant differences between groups however subgroup analyses revealed that patients in the control group with a more severe head injury were more likely to have continuing problems at 6 months.
<b>Wade 1998 (98)</b> Design: RCT Size: N=314 Setting: ED, hospital and community PEDro: 5/10	Patients with head injury  Predominantly moderate to severe	I: Routine follow up from an occupational therapist or psychologist 7-10 days post injury with organisation of further follow up as required (STP)  C: Usual care (no routine followup)	Symptoms	The intervention group reported fewer or less severe concussion symptoms and less disruption of social activities at 6 months than the control group.

<b>Ytterberg 2000 (99)</b>	Patients with stroke	I: All day follow up visit one month after discharge (STP)	Self- reported health status	There were no significant differences between groups
Design: RCT	Predominantly mild severity	C: Usual care with no specific follow-up arranged		
Size: N=111				
Setting: Community				
PEDro: 2/10				

*Intervention codes: CM: Case management; ESD: Early supported discharge; STP: Short term program of continuity of care*

**Table 6: Research Question 6 - Quality monitoring**

<i>Study</i>	<i>Patient</i>	<i>Intervention/Comparator</i>	<i>Outcomes</i>	<i>Results</i>
<p><b>Parker 2012 (35)</b></p> <p>Design: SR</p> <p>Size: 16 studies</p> <p>Setting: Acute</p> <p>PRISMA: 11/27</p>	<p>Patients with stroke</p> <p>All levels of severity</p>	<p>I: Studies that evaluated the relationship between compliance with <math>\geq 2</math> quality metrics and patient centred outcomes or the public reporting of stroke metrics and QI activity, quality of care and patient centred outcomes.</p>	<p>Mortality, ADL function, adverse events/complications, QOL, patient satisfaction</p>	<p>There is some evidence of positive associations between stroke metric compliance and improved outcomes however, there are few high quality studies. Information on the impact of public reporting of stroke quality metric data is extremely limited</p>
<p><b>Dirks 2012 (36)</b></p> <p>Design: cluster RCT</p> <p>Size: N=5515 patients from 12 hospitals</p> <p>Setting: Acute</p> <p>PEDro: 7/10</p>	<p>Patients with stroke</p> <p>All levels of severity</p>	<p>I: An intervention based on the 'Breakthrough Series' model to increase the rates of thrombolysis in acute stroke wards</p> <p>C: Usual care</p>	<p>Treatment rates of tPA, time from event to admission, death or disability, QOL</p>	<p>Thrombolysis rates in the intervention group rose earlier and remained higher than the control group.</p>
<p><b>Falconer 1993 (40)</b></p> <p>Design: RCT</p> <p>Size: N=128</p> <p>Setting: Rehabilitation</p> <p>PEDro: 4/10</p>	<p>Patients with stroke</p> <p>Predominantly moderate severity</p>	<p>I: Care was provided based on an interdisciplinary care model and the use of a 'critical path method (CPM) to plan care and discharge. The CPM provided the team with information and continuous feedback</p> <p>C: Usual care in which the care model was more multidisciplinary and a CPM was not used.</p>	<p>Length of hospital stay, hospital charges, ADL function, patient satisfaction</p>	<p>The groups received comparable type, intensity and duration of treatment and there was no significant difference between groups in length of stay and hospital charges</p>
<p><b>Hinchey 2010 (37)</b></p> <p>Design: Controlled trial</p> <p>Size: N= 2071 pre-intervention patients and 1240 post-intervention patients</p> <p>Setting: Acute</p> <p>D &amp; B: 13/26</p>	<p>Patients with stroke</p> <p>Included all levels of severity</p>	<p>I: Multifaceted intervention targeted towards improving key performance measures: door-to-needle time for TPA, dysphagia screening, DVT prophylaxis and warfarin treatment for AF. The intervention included meetings, identification of barriers, reminder systems, education, audit and feedback.</p> <p>C: Audit and feedback alone</p>	<p>Difference in post-intervention adherence rates</p>	<p>The intervention group had a significantly higher rate of patients with AF discharged on warfarin however there were no other significant differences between groups.</p>

<p><b>Johnston 2010 (38)</b></p> <p>Design: cluster RCT</p> <p>Size: 12 hospitals (3361 patients)</p> <p>Setting: Acute</p> <p>PEDro: 8/10</p>	<p>Patients with stroke</p> <p>Included all levels of severity</p>	<p>I: Standardised stroke discharge orders on adherence to 3 practices: normalisation of blood pressure, statin treatment and anticoagulation for AF</p> <p>C: Usual care (no standardised orders)</p>	<p>Management of these outcomes at 6 months</p>	<p>There was no significant impact of intervention at the hospital level.</p> <p>Analysis at the patient level found that rates of optimal treatment increased at intervention hospitals whereas there was no change at control hospitals. Improvements were primarily related to increased statin use and improved blood pressure control.</p>
<p><b>Lakshminarayan 2010 (39)</b></p> <p>Design: cluster RCT</p> <p>Size: 19 hospitals (1211 patients)</p> <p>Setting: Acute</p> <p>PEDro: 8/10</p>	<p>Patients with stroke</p> <p>Included all levels of severity</p>	<p>I: Intervention to improve care quality as measured by 10 key performance measures. Intervention included receipt of a report on baseline quality, the use of clinical opinion leaders and assistance from study personnel to implement changes and overcome barriers</p> <p>C: Received report on baseline quality only</p>	<p>Ten performance measures(eg tPA use, smoking cessation counselling, PT and OT evaluation or treatment &lt;48 hours)</p>	<p>There were no significant differences between groups</p>
<p><b>Strasser 2008 (41)</b></p> <p>Design: cluster RCT</p> <p>Size: N=487 patients</p> <p>Setting: Rehabilitation</p> <p>PEDro: 5/10</p>	<p>Patients with stroke</p> <p>Included all levels of severity</p>	<p>I: Both groups received summaries of their team's performance on process measures. The intervention group received team training provided over 6 months. Comprised a 2.5 day workshop for team leaders to develop team problem-solving strategies, written action plans to address team process problems and support to implement action plans</p> <p>C; Received the summary of performance only</p>	<p>ADL function, community discharge and length of stay</p>	<p>Patients in the intervention group improved significantly more on the FIM motor score than the control group</p>

## Appendix C

**Table 7: Guidelines and rating for each domain (/100)**

Domain rating	ABIKUS	RCP/BRSM	NZGG	SIGN
1. Scope and purpose	77.78	69.44	22.22	13.89
2. Stakeholder involvement	58.33	80.56	83.33	66.67
3. Rigor	60.42	36.46	63.54	56.25
4. Clarity	86.11	72.22	83.33	75
5. Applicability	0.00	12.50	45.83	35.42
6. Editorial independence	12.50	62.50	87.50	29.17

**Table 8: Evidence from the Guidelines**

<i>Integrated care pathways</i>	
<b>ABIKUS</b>	<p>Guideline 5: Interdisciplinary protocols or integrated care pathways should be in place for management of common problems</p> <p>Rationale: The authors stated this recommendation was made based on the guidelines presented by the RCP and therefore is based on level A (highest category) evidence.</p>
<b>RCP</b>	<p>Guideline 2: Specialist neurological rehabilitation services for people with acquired brain injury should have agreed protocols for common problems such as management of spasticity, epilepsy, depression etc.</p> <p>Rationale: Based on the RCP Clinical Guidelines for Stroke</p> <p>Guideline 22: Interdisciplinary protocols or integrated care pathways should be in place for management of common problems</p> <p>Rationale: based on the RCP Clinical Guidelines for Stroke</p>
<i>Continuity of care</i>	
<b>ABIKUS</b>	<p>Guideline 4: Within and between service networks, there should be a case management or equivalent system, which gives persons with brain injuries and their family/caregivers an identifiable guide and advocate (navigator) through the continuum of care.</p> <p>Rationale: Based on expert opinion, experience of a consensus panel</p> <p>Guideline 72: Persons with moderate to severe ABI are at future risk of depression and should be monitored on an ongoing basis for development of depression.</p> <p>Rationale: Based on expert opinion, experience of a consensus panel</p> <p>Guidelines 93 and 94: Patients seeking to return to employment or education should</p>

	<p>be assessed by a team trained in vocational needs. Clinicians should consider vocational needs and refer to specialist vocational rehabilitation programs where appropriate</p> <p>Rationale: Based on expert opinion, experience of consensus panel</p> <p>Guideline 97: Patients with difficulty undertaking leisure activities of their choice should be offered a goal directed community-based program aimed at increasing participation in leisure and social activities, in liaison with local volunteer organisations.</p> <p>Rationale: This recommendation was made based on the guidelines presented by the RCP and based on at least one cohort comparison, case study or other type of experimental study.</p>
<p><b>RCP</b></p>	<p>Guideline 9: Within each service network, there should be a case management or equivalent system which gives brain-injured patients and their families/carers an identifiable guide and advocate through the whole care pathway</p> <p>Rationale: Based on expert committee reports, opinions and/or experience of respected authorities</p> <p>Guideline 36: All patients being discharged after a recent ABI, regardless of follow-up arrangements already made, should: be given a card with details of the specialist neurological team and how to contact them, be warned of any likely problems they may face and how to manage them, have a family member or friend also informed of these issues (with the patient's agreement)</p> <p>Rationale: Based on expert committee reports, opinions and/or experience of respected authorities</p> <p>Guideline 158: Clinicians involved in brain injury rehabilitation should consider vocational needs and refer patients to relevant agencies as part of their routine planning, and where appropriate, refer to a specialist vocational rehabilitation program</p> <p>Rationale: Based on expert committee reports, opinions and/or experience of respected authorities</p> <p>Guideline 166: Patients with significant ABI should have long-term access to an individual or team with experience in management of ABI that have responsibility for their continuing care and support needs, has knowledge of the various specialist and local services available, coordinates appropriate referrals, assessments and reviews as required and works across the range of statutory, voluntary and independent services to meet the needs of patients and their families.</p> <p>Rationale: Based on expert committee reports, opinions and/or experience of respected authorities</p>
<p><b>NZGG</b></p>	<p>Guideline 4.3.2.1: People with traumatic brain injury who require rehabilitation should have a case coordinator/key worker appointed. The case coordinator/key worker should: be focused on the needs of the person with TBI and their carer, have specialist training, provide continuity and good communication and be the key point of contact.</p> <p>Rationale: based on fair evidence (based on studies that are valid but there are some concerns about the volume, consistency, applicability and clinical relevance that may cause some uncertainty but are not likely to be overturned by other evidence).</p> <p>Guideline 6.4: People with TBI should be assessed for the need for vocational rehabilitation to assist their return to work</p> <p>Rationale: based on good evidence (a number of studies that are valid, consistent,</p>

	<p>applicable and clinically relevant</p> <p>Guideline 9.1: Anyone with moderate to severe TBI discharged from a residential rehabilitation setting should be considered for scheduled telephone follow-up contact using motivational and problem-solving techniques</p> <p>Rationale: based on fair evidence (based on studies that are valid but there are some concerns about the volume, consistency, applicability and clinical relevance that may cause some uncertainty but are not likely to be overturned by other evidence)</p>
<b>SIGN</b>	<p>Recommendation 10.2.2: Community rehabilitation services for patients with brain injuries should include a wide range of disciplines working within a coordinated interdisciplinary model/framework and direct access to generic services through patient pathways. Each patient should have a named worker.</p> <p>Rationale: Recommended best practice based on the clinical experience of the guideline development group</p> <p>Recommendation 10.3.3: Where further rehabilitation is indicated for patients with brain injury who are discharged from inpatient care, it may be offered by telephone or face-to-face methods to alleviate long term burdens due to depression, behavioural and cognitive consequences.</p> <p>Rationale: Recommended best practice based on the clinical experience of the guideline development group</p>
<b>Quality monitoring</b>	
<b>ABIKUS</b>	<p>Guideline 3: Service providers for persons with moderate to severe ABI should be given specialised training to develop competencies in evaluation and management related to moderate to severe ABI. This should be provided on an ongoing basis.</p> <p>Rationale: Based on expert opinion, experience of consensus panel</p> <p>Guideline 20: Staff should be trained in behavioural change strategies, especially in understanding of brain-behaviour relationships and these should be applied consistently</p> <p>Rationale: Based on expert opinion, experience of consensus panel.</p>
<b>RCP</b>	<p>Guideline 2: Specialist neurological rehabilitation services for people with acquired brain injury should have educational programs for staff, patients and carers</p> <p>Rationale: Based on expert committee reports, opinions and/or experience of respected authorities</p>

## Appendix D

**Table 9.1: Inclusion and exclusion criteria for systematic reviews and studies**

<p><i>Population</i></p>	<p><b>Inclusion:</b> People (any gender) ≥ 16 years old with an acquired brain injury at all levels of severity who present at acute care (includes ER and ICU) or rehabilitation services Acquired brain injury may be as a result of trauma, disruption to the supply of oxygen to the brain, stroke, tumours, infection (e.g. meningitis), poisoning or substance abuse as defined by the Australian Institute of Health and Welfare (1999)</p>
	<p><b>Exclusion:</b> children (&lt;16 years) People with post-concussion syndrome or degenerative neurological conditions</p>
<p><i>Intervention</i></p>	<p><b>Inclusion:</b> Fee for service Formal integration of services (seamless care) or integrated care pathways Continuity of care Consumer participation in governance Presence and organisation of quality monitoring systems Introduction of the WHO ICF system as part of organisation or care</p>
<p><i>Comparison/control</i></p>	<p><b>Inclusion:</b> Fee for service vs no fee for service Fee for service vs partial fee for service Integrated care vs non-integrated care Integrated care pathway vs no integrated care pathway Continuity of care (follow up or case management) vs usual care Continuity of care (follow up or case management) vs no follow up or case management Comparison of two models where follow up or case management is provided and one is regarded as being of higher quality than the other. Consumer participation vs no consumer participation Comparison of two models of consumer participation (will assist in identifying most effective model) Presence of quality monitoring system vs no quality monitoring system Comparison of two models of quality monitoring Models incorporating the ICF vs models where the ICF is not acknowledged/incorporated</p> <p><b>Exclusion:</b> where there is no comparison e.g. case series</p>
<p><i>Outcomes</i></p>	<p><b>Inclusion:</b> The primary outcome is patient outcome. This may include outcomes measured at the level of activity or participation, health related quality of life, mortality or morbidity. The secondary outcomes are:</p> <ul style="list-style-type: none"> <li>• Service utilisation ( eg length of stay)</li> <li>• Adverse effects (clinical, system)</li> <li>• Quality of care outcomes (eg adherence to recommended care)</li> <li>• Participant satisfaction</li> <li>• Resource use</li> </ul> <p><b>Exclusion:</b> Nil</p>

<b>Setting</b>	<b>Inclusion:</b> acute care, rehabilitation or home
	<b>Exclusion:</b> long term care facility
<b>Study Design</b>	<b>Inclusion:</b> Systematic reviews (SR), randomised controlled trials (RCTs), clinical controlled trials (CCTs), controlled before and after studies (CBAs), interrupted time series (ITS).
	<b>Exclusion:</b> Non-systematic reviews, all other study designs, editorials, letters, commentaries
<b>Publication details</b>	<b>Inclusion:</b> All English language studies conducted on humans
	<b>Exclusion:</b> Non-English language papers, studies conducted on animals, conference proceedings
<b>Time period</b>	<b>Inclusion:</b> Published from 1980
	<b>Exclusion:</b> Prior to 1980

**Table 9.2: Inclusion and exclusion criteria for guidelines**

<b>Population</b>	<b>Inclusion:</b> Traumatic Brain Injury at all levels of severity
	<b>Exclusion:</b> children (<16 years) Non-traumatic causes of ABI, brain damage due to birth trauma, shaken baby syndrome, all other brain diseases.
<b>Intervention</b>	<b>Inclusion:</b> Fee for service Formal integration of services (seamless care) or integrated care pathways Continuity of care Consumer participation in governance Presence and organisation of quality monitoring systems Introduction of the WHO ICF system as part of organisation or care
<b>Setting</b>	<b>Inclusion:</b> All phases of care including pre-hospital/community based
<b>Study type</b>	<b>Inclusion:</b> Clinical Practice Guideline, defined as: “Systematically developed statements to assist practitioner and patients’ decisions about appropriate health care for specific clinical circumstances” where at least one of the recommendations cites scientific evidence
<b>Publication details</b>	<b>Inclusion:</b> English language
	<b>Exclusion:</b> Non-English language papers
<b>Time period</b>	<b>Inclusion:</b> Published from 2000 onward
	<b>Exclusion:</b> Prior to 2000

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