The purpose of the present article is to describe the issues associated with providing lifelong accommodation and support to people with severe brain injury, neurobehavioural disability, and overt challenging behaviours. In particular, the article focuses on two groups of people within an Australian context: (a) those who live in community settings but whose behaviour is not adequately managed even by specialist outreach behaviour management services, and (b) those who are confined to aged care residential facilities and who show challenging behaviour. These groups bring to the fore different lifelong behaviour management issues. At present, if community-based clients seriously offend or have an adequate psychiatric diagnosis, they may be placed in heavily secured psychiatric units or prison. Otherwise, by default, they will reside in less restrictive options such as family homes and shared supported accommodation. We will argue that the current service system lacks the ability to apply appropriate structure and control to many clients with serious challenging behaviours, and propose that specialised facilities would make an important addition to the service system. Conversely, young clients confined to residential aged care facilities live in impoverished environments that often contribute to challenging behaviour that can be enormously disruptive, distressing, and unsafe. We will review the recent Australian State and Federal Government initiative aimed at transitioning some young people out of nursing homes, and we raise considerations for future service development. There are many individuals with the potential to make significant gains in a tightly structured setting before returning to the community, while others will manage well with long-term placement in a setting designed for residents with neurobehavioural disability. Case studies and service data are used to support these arguments, and key elements of accommodation and rehabilitation models for those in need of long-term neurobehavioural support are described.
LONG-TERM ACCOMMODATION AND CHALLENGING BEHAVIOUR

 Neurobehavioural Disability and Challenging Behaviour

The group of people who are the focus of this article have permanent and severe neurobehavioural disability, a combination of pervasive cognitive and behavioural dysfunction (Wood & McMillan, 2001). Problems can include impairments in cognitive functions such as executive skills (e.g., planning, organising, self-monitoring), impulse control, emotion regulation, and poor insight into one’s own deficits or the consequences of one’s own behaviours. Clients often exhibit overt challenging behaviours such as verbal and physical aggression, inappropriate sexual and social behaviours, and many lack drive, initiative or motivation. The diversity of challenging presentations is considerable, ranging from those people needing help to initiate the most basic activities, to those who destroy property and wield weapons. Due to their challenging behaviour they present a risk to their own health and that of others.

Nevertheless, there are many examples of individuals making substantial behavioural improvements many years postinjury as a result of behavioural and environmental interventions (Conway et al., 1999; Feeney, Ylvisaker, Rosen, & Greene, 2001; Gardner et al., 2003; Guercio & McMorrow, 2002; Manchester, Hodgkinson, & Casey, 1997; Peters, Gluck, & McCormick, 1992). With appropriate supports, many clients with challenging behaviour can be well managed in community or ‘homelike’ settings (such as one’s own home, or family home), rather than large institutional settings (Carnevale, 1996; Feeney et al., 2001; Todd, Loewy, Kelly, & Simpson, 2004). However, there is a small subgroup of people who, due to the combination of their extreme behaviours and inadequate environments and supports, are often not adequately managed in conventional homelike settings. If they seriously offend they may be placed in jail; if they are highly erratic, volatile, and have an adequate psychiatric diagnosis they may be placed in psychiatric facilities; if they have high medical or physical needs, they are likely to be placed in RACFs. Otherwise, they will reside in less restrictive options such as family homes or share accommodation where their behaviour can be enormously disruptive, distressing, and unsafe. Often they are evicted because of their behaviour, then are admitted elsewhere — a cycle we term the ‘accommodation carousel’.

Correctional or psychiatric facilities are a means to contain severe behavioural problems in the short term, but this approach does not ameliorate the sequelae of the brain injury, promote

(ABI) is almost the same as the general population (less 3–7 years) (Baguley, Slew-Younan, Lazarus, & Green, 2000; Brown et al., 2004; Harrison-Felix, Whiteneck, DeVivo, Hammond, & Jha, 2004; Ratcliff, Colantonio, Escobar, Chase, & Vernich, 2005).

The prognosis for many people with severe brain injury is not good. Outcome studies indicate that between 26% to 45% of people with severe TBI are poorly integrated into their community in the longer term in spite of access to rehabilitation services (Doig, Fleming, & Tooth, 2001; Tate et al., 2003; Winkler, Unsworth, & Sloan, 2006). A recently published set of clinical guidelines regarding care of people with TBI living in the community presents the stark prospect that ‘Severe TBI is not curable and medical and rehabilitation management may not ultimately be able to provide the improvement desired by the patient and his or her family’ (Trevena, Cameron, & Porwal, 2004, p.3). A similarly dire prognosis can be extended to people with severe disabilities resulting from non-traumatic brain injuries (such as hypoxic events and cerebrovascular accidents). The same clinical guidelines report that behavioural problems appear likely to be chronic. Indeed, persistent, overt, challenging behaviours in this population are well documented (Baguley, Cooper, & Felmingham, 2006; Brooks et al., 1986; Conway, Schaub, & Benson-Yody, 1999; Fahy, Irving, & Millac, 1967; Guercio & McMorrow, 2002; Thomsen, 1992; Watson et al., 2001). Behaviour management remains the biggest challenge to service providers in Australia (Ponsford, 2001).

This article addresses lifelong accommodation and support issues associated with two different but related groups of people who display challenging behaviour: (a) those who are community-based but whose behavioural dysfunction is severe and not well controlled, and (b) those who are young and reside in a residential aged care facility (RACF). While the issues presented reflect the service system in Victoria, Australia and the clinical experiences of the authors, many of the issues will have relevance both nationally and internationally. While deinstitutionalisation and community integration are appropriate for the vast majority of people with ABI, we will argue that the quality of life for people affected by higher levels of challenging behaviour would be markedly improved by a more controlled living environment — either permanent or transitional. We will identify gaps in the current service system, and then discuss potential service solutions and future directions.
socially desirable behaviour, or maintain behaviour change over the longer term. When outreach behaviour-management or other services can be engaged, they are often piecemeal, grossly underresourced, and struggle to get the containment and service coordination needed for effective treatment. Because of a dearth of long-term supportive treatment environments, general hospital and rehabilitation hospital beds can be taken up with these difficult clients at considerable expense long after the client has achieved medical stability and primary rehabilitation goals.

Clients ‘Unmanageable’ in Community Settings

In Victoria, Australia, approximately 160 clients per year are referred to the ABI Behaviour Consultancy (the ‘Consultancy’; Todd et al., 2004) for assessment and treatment of challenging behaviour. The service type is unique in Australia. The Consultancy is a community-based outreach behaviour management service. Clients are aged between 18 and 65 years, have brain injuries from a range of causes, are in the public health system, and typically display a range of overt challenging behaviours as described above. Most clients (about three-quarters) live in a range of home-based settings (own home, family home, hostels, supported residential services, public housing), and the remainder live in aged care facilities (about 15%) or other facilities (about 10%; community residential units, hospitals, rehabilitation units, prison). As a group, these clients tend to be unemployed, have comorbidities (substance abuse, mental illness), have limited social networks, and are often well past traditional rehabilitation services. It is common for this group to face eviction from current accommodation, a range of legal consequences for their behaviours, loss or refusal of services, and significant interpersonal difficulties (e.g., retaliatory assaults). The Consultancy struggles to gain good-quality, long-term solutions in cases where stable, specialised, long-term accommodation is not available. In particular, the service can not manage cases of severe behaviour disorder in the existing service system.

Comparative Data and Case Studies

The following section compares the neuropsychiatric profile of clients referred to the Consultancy

![FIGURE 1](image)

**FIGURE 1**
Mean scores for HoNOS-ABI domains for 3 samples.

*Note: ‘Other’ = other mental and behavioural problems; ‘ADL’ = activities of daily living; ‘Accommodation’ and ‘Activity’ represent ‘community’ domains, hence data was not available for Inpatient (UK).*
with that of two samples from the United Kingdom (UK) to illustrate not only the characteristics of the samples, but significant differences in treatment approaches. Three individual case vignettes are then presented to illustrate situations in which the existing service system has not been able to adequately ameliorate the behavioural consequences of the disability.

Three ABI Samples: Treatment Approaches

We are able to compare the current function of the people referred to the Consultancy with two UK samples of people with ABI using a common measure, a Health of the Nation Outcome Scale (HoNOS). HoNOS scales are a collection of clinician-completed measures of health and social functioning. The HoNOS-ABI (Fleminger et al., 2005) is a measure of neuropsychiatric sequelae modified for use with people with ABI. An individual can be scored from 0 (no problem) through 4 (severe to very severe problem) on each of 12 dimensions, where scores of 2 through 4 are indicative of the need for clinical intervention. The HoNOS-ABI is a relatively new scale for which initial data regarding psychometric properties is limited but promising (Coetzer & DuToit, 2001; Fleminger et al., 2005).

Figure 1 shows HoNOS-ABI data for three samples: (a) Community (UK), n = 40 adults, on average more than four years post injury, accessing community-based ABI services in the United Kingdom (Coetzer & DuToit, 2001), (b) Inpatient (UK), n = 50 adults housed as inpatients in neuropsychiatric brain injury rehabilitation sites in the United Kingdom (Fleminger et al., 2005), and (c) Community (Vic, Au), n = 138 adults living in Victoria, Australia receiving services from the Consultancy.

Consideration of the overall profiles in Figure 1 reveals that the Community (Vic, Au) sample and the Inpatient (UK) sample are quite similar, and routinely show more serious problems than the Community (UK) sample. Despite the similarity in neuropsychiatric profile of the Community (Vic, Au) and the Inpatient (UK) samples, there is a dramatic difference in the management of these two groups. The UK Inpatient sample lived in controlled, specialised neurobehavioural settings with psychiatric input — most being able to detain patients under the mental health act (S. Fleminger, personal communication, April 10, 2006). Most of the Community (Vic, Au) sample (about three quarters), by contrast, lived in community or home-like settings. These data demonstrate that in the United Kingdom people with significant neurobehavioural dysfunction are often placed in specialised facilities where those facilities exist. In Australia, however, as the following case illustrations make clear, we do not have the number or range of specialised facilities for people with these types of neurobehavioural and neuropsychiatric profiles.

Case Illustrations

The cases have had details altered to protect client identities, but remain a realistic portrayal of this client group.

Case 1: Going to Jail

ABI and disability. Ray was 14 years of age when he was involved in a motor vehicle accident that resulted in a period of loss of consciousness of 12 days. He recovered well physically and returned to live in the family home, but notable cognitive deficits existed: impulsivity, lack of insight, and egocentricity. Attempts to recommence schooling post brain injury failed. At 17 years of age he was referred to the Consultancy.

Behaviour and risk. Ray’s post-ABI behaviour during his teenage years included theft (including a motor vehicle) and armed robbery. His social circle during this time predominantly included drug dealers and users. He was at risk of a life of crime and repeated incarceration. A parole officer was assigned to him and he was placed on a Community-Based Order.

Intervention and course of events. Administration (finances) and Guardianship (lifestyle) controls were put in place. Mood stabilising medication was trialled, and a range of services were engaged. Ray had a series of failed placements including a community residential unit, a youth detention centre, and living by himself with individualised support. He was evicted from these places because of his aggressive behaviour towards co-residents and substance abuse. Finally when he was placed in a supported residential service with 5 hours of one-to-one support per week, he committed a serious physical and sexual assault of a staff member and was subsequently sentenced to jail at age 20.

Evaluation. Service providers failed to gain control over Ray’s behaviour because the settings and staff were ill-equipped to deal with his physical size, strength, and mobility combined with cognitive and behavioural deficits. Whenever he had opportunity he engaged in drug and alcohol taking, and poor behaviour resulted. His behaviour in prison has been settled, largely due to structure,
clear rules, boundaries, and enforcement. He is now considered a forensic client, but will not be paroled to an existing sexual offenders unit apparently because he lacks the conventional admission criterion of an intellectual disability diagnosis.

**Case 2: Younger People in Residential Aged Care**

**ABI and disability.** James was 45 years old when he suffered a severe hypoxic brain injury secondary to a cardiac arrest. Although he made a relatively good physical recovery, he had a severe amnesic syndrome and was not oriented to time or place.

**Behaviour and risk.** James absconded several times from three different aged care facilities. In one episode he was not found for several hours and, during this period, had crossed several major roads at night-time, had become severely dehydrated, and had sustained cuts and abrasions from a number of falls. He was at risk of being seriously injured or killed when he crossed roads by himself. In these RACFs, staff tended to complete personal care tasks for James rather than prompt him to complete tasks himself. As a result, there has been a gradual and ongoing decline in his physical abilities, behavioural presentation, and independent living skills. For example, when he was first admitted to an aged care facility he was continent, however he lost the ability to toilet independently and required continence pads. Incontinence made him ineligible for a range of alternate accommodations options. It also made it more difficult for him to be included in community-based social and recreation groups, and was a barrier to friends and family who would otherwise accompany him on social and recreational outings in the community.

**Intervention and course of events.** Intervention was limited. On a typical day in the RACF, James spent most of the time in bed. The facility staff tended to attribute this to James being ‘lazy’ rather than to a combination of brain injury sequelae (lack of initiative) and environmental supports (limited opportunities for meaningful activities, and limited assistance). James’s spouse worked part-time to contribute to the costs of care: she had no means to provide, at their home, the 24-hour supervision that James required.

**Evaluation.** His gradual decline over 2 years was not only a failure of the service system at a humane level, it increased James’s level of dependence on others and his lifetime care costs. He had very limited options for rehabilitation and community integration. He was ‘stuck’.

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**Case 3: A Partial Success**

**ABI and disability.** Sarah was 28 years old when she suffered a TBI after a fall. This resulted in a coma of 10 days and a 9-month hospital stay. This occurred against a background of personality disorder and polysubstance abuse. Subsequent to her brain injury she had multiple psychiatric admissions and failed community placements over approximately a 10-year period. She had significant cognitive deficits, particularly executive dysfunction, impulsivity, and limited insight into her deficits.

**Behaviour and risk.** At the time of referral to the Consultancy at age 39 her behaviours included verbal aggression (including threats), physical aggression (including assaults), inappropriate social behaviour (including begging and harassment, and public drunkenness and drug use), absconding from her accommodation, and provision of sex for money. Sarah was vulnerable: Her house was used by drug dealers, she engaged in drug taking, she was variously stolen from and assaulted. The top chart of Figure 2 displays Sarah’s behaviour profile based on the Overt Behaviour Scale (Kelly et al., 2006). The figure depicts the frequency and impact (each rated on a 5-point Likert scale) of the most severe behaviour in each of the categories listed. Higher scores reflect increased frequency (1 = less than once per month, 5 = multiple times each day) and greater impact (1 = none, 5 = extreme). Sarah was engaging in a variety of challenging behaviours, with aggressive and sexual behaviours occurring at least daily. The ceiling ratings of subjective impact indicate the substantial distress and disruption that were being experienced by others around Sarah. This chart represents a time (year 2002) when Sarah lived in a supported residential service with limited, nonspecialised staffing, and had no funds with which to broker services.

**Intervention and course of events.** Sarah had experienced almost 2 decades of failed accommodation placements in supported residential services across the state. A mental health residential placement resulted in some amelioration of challenging behaviours, but this gain was lost upon discharge to unstructured community settings. One placement in a supported residential service included a substantial support package (30-hours/week of 1:1 support) but did not circumvent drug and alcohol problems and assaultative behaviour. In 2003 she was placed in a small group home for people with ABI, which had 24-hour/day staffing. This group home is a recent and uncommon addition to the State’s
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housing stock. The lower chart of Figure 2 shows the marked change in Sarah’s behaviour profile as a result of the controlled, more specialised environment. All behaviours diminished in frequency and impact, and physical aggression against other people, inappropriate sexual behaviour, and absconding had ceased.

**Evaluation.** Keys to the successful placement were: (a) purpose-built accommodation; (b) multiple, highly trained staff present at all times; (c) intensive consultation between staff and clinical neuropsychologists experienced in the management of challenging behaviours, and (d) Sarah’s participation in the placement process (e.g., visiting the site construction and choosing furniture). After more than 3 years since her placement, the move is considered to be successful but precarious — it has broken down with minor environmental changes (e.g., staff change).

These case studies illustrate the difficulties that neurobehavioural outreach services experience when they work with clients living in environments that exacerbate rather than ameliorate challenging behaviour. There are three key reasons why these environments are problematic for this group. First, there is often inadequate containment to provide treatment; Second, it is extraordinarily difficult to get consistency in behaviour management approaches across family members and multiple, often independent services (e.g., behaviour management, case management, speech therapy, physiotherapy, disability support workers, recreation specialists, etc.). Third, especially in the case of younger people in aged care, the environment is
often impoverished, with limited opportunity to engage in meaningful everyday activities or social interaction which leads to loss of skills and dependency on others.

**Current Services System**

We will discuss a continuum of accommodation and support for people with lifelong neurobehavioural disability below. However, it is worthwhile to consider in some detail two of the current alternatives: strict containment in prison, and impoverished environments in aged-care facilities.

**People With ABI in Prison**

Numerous international studies have found high levels of TBI among prison populations (range 50 to 100%) (Barnfield & Leathem, 1998; Slaughter, Fann, & Ehde, 2003; Turkstra, Jones, & Toler, 2003) leading to speculation that a causal link exists between neuropsychiatric sequelae and offending behaviour. One recent study of 200 Australian prisoners found that 65% reported a history of TBI with a loss of consciousness (Schofield et al., 2006). Multiple TBI's were commonly reported, as were ongoing sequelae such as headaches (33%), personality change (22%), anxiety/depression (22%), memory loss (21%), uncontrollable anger (20%) and relationship breakdown.

In a series of three studies that investigated the role of head injury in cognitive functioning, emotional adjustment and criminal behaviour, Sarapata and colleagues (1998) concluded that many serious crimes are a consequence of a brain injury. Although their evidence is cross-sectional, making inferences of causality tentative, their assessment is indeed that brain injury leads to criminal behaviour which leads to incarceration. People with brain injuries are more likely to engage in crime because they have impaired cognition, which diminishes their appreciation of the legal consequences of their behaviour. The loss of control of emotions and aggressive impulses associated with brain injury may also lead to criminal behaviour (Grafman et al., 1996; Sarapata, Herrman, Johnson, & Aycock, 1998). The provision of suitable accommodation and supports for people with ABI who are at risk of incarceration is likely to prevent some crimes. In many situations the provision of appropriate housing and support is likely to be more cost effective when you consider the expenses of the imprisonment (almost A$90,000 per annum; Steering Committee for the Review of Government Service Provision, 2007) plus the additional costs of the crime such as: judicial processes, victims’ medical intervention, counselling, property damage, and insurance.

**People With ABI in Residential Aged Care**

Australia-wide there are nearly 1300 people with ABI under 60 years of age residing in aged care facilities (Winkler, Farnworth, & Sloan, 2006). This is paradoxical given that existing aged care policy dictates that people must be over 65 years to be eligible for such a placement. Younger people are not necessarily placed in residential aged care because they require 24-hour nursing care (although they may require 24-hour supervision and assistance); it is usually because there are no practical alternatives (Senate Community Affairs references Committee, 2005; Strettles et al., 2005).

These environments have a strong influence on behaviour. This was recently recognised by the Senate Community Affairs References Committee (2005) who stated that for younger people in aged care who already experience mood swings and behaviour and impulse control difficulties as a result of their brain injury, the distress or frustration with their living circumstances becomes manifest in challenging behaviours such as screaming, swearing, property destruction, and verbal and physical assault. Similar conclusions were drawn by Winkler and colleagues, who investigated the extent of challenging behaviours among younger people residing in RACFs in Victoria (Winkler et al., 2006). A total of 626 aged care facilities provided data on 478 people aged under 60. Challenging behaviour, defined as verbal or physical aggression, was the most common complex care need identified, and was endorsed for 63% of people in the sample. High levels of challenging behaviour were considered by the researchers to reflect significant psychological distress and/or frustration arising from the boredom, loneliness and disempowerment associated with limited opportunity to participate in the community. These sorts of findings are not unique to Victoria. A recent investigation of accommodation options available in New South Wales for people with ABI also found that, in nursing home environments, cognitive problems and challenging behaviours were the most common difficulties faced by staff (Strettles et al., 2005).

**Why Are These Placements Disagreeable?**

Inappropriate placement of people with severe brain injury and challenging behaviour is problematic for
three key reasons: First, this practice is contradictory to the principles of the Disability Act (2006) and the International Classification of Functioning, Disability and Health (ICF; World Health Organisation, 2001) which aim to promote maximum social inclusion of people with disability in community life. Second, these facilities do not promote remediation of behaviour to acceptable community standards. In many situations, the person deteriorates in these environments. Third, the placement of this group in RACFs, psychiatric facilities or prison is often a waste of resources, given their expense and inadequate neurobehavioural treatment. The development of specialist facilities for this group will enable places and resources in conventional rehabilitation settings, aged care facilities, mental health settings, and prisons to be deployed for the population that they are set up to serve.

ABIspecific Group Homes

There are fewer than 10 ABI-specific shared supported accommodation (SSA) services in Victoria for people who are publicly funded. ‘Group homes’ consist of a house where four to six people live under the one roof. ‘Co-located units’ consist of a number of individual units where people have more privacy and share support services. Most of these facilities provide 24-hour care with either active or inactive overnight support (Victorian Government Department of Human Services, 2005). These facilities provide an important long-term accommodation option for those who are behaviourally stable, and may only need lower levels of specialised support such as additional 1:1 input from disability support workers, the use of security equipment and occasional outreach behaviour management intervention. However, these services do not typically have the level of specialisation (see discussion below) to accommodate people with higher levels of challenging behaviour who instead tend to be evicted.

About the Brain Disorders Unit

In Victoria there is a facility that warrants mention in the current discussion. This 30-bed facility exists to provide neurobehavioural rehabilitation for persons between the ages of 16 and 65 with the dual disabilities of brain impairment and psychiatric disturbance (www.bdpv.org). People with ABI and challenging behaviour are often admitted to the unit after a series of failed placements in RACFs. Although this meets the needs of a small subset of the target group described in this article, there are a number of substantial limitations: beds are restricted to those with both brain impairment and comorbid psychiatric diagnosis, only a handful of people are admitted each year (discharging existing patients is very slow due to a lack of suitable long-term accommodation options), and patients often have limited access to therapy, attendant care and community access.

Potential Service Solutions

We envisage that a long-term accommodation and support system that can effectively treat and manage the people described in this article would have three main components: (a) adequate community supports for those who can live in their own/family residences with sufficient specialised assistance and resources; (b) group homes or co-located units similar to that described previously that are able to cope with less severe challenging behaviour, and with 24 hour specialised support; and (c) a specialised residential treatment facility for people with ABI and very serious challenging behaviours. With respect to the cases currently referred to the Consultancy we estimate that the proportion of referrals that would suit each of these components is approximately 50%, 45%, and 5% respectively.

We emphasise that this is not merely a call for additional resources (increased quantity), it is a call for quality of service — specialised neurobehavioural services in each of the three components — so that appropriate services are available to support the client and protect others, and so that expensive inappropriate placements can be avoided. It is beyond the scope of this article to detail all aspects of each of these three components. However, with the aim of being concrete and definite, some core features that are more or less relevant to all components will be elaborated upon.

Specialised Versus Nonspecialised Services

A clear distinction must be made between ‘specialised’ and ‘nonspecialised’ services. Alderman (2001) characterises nonspecialised services as lacking the structure to manage challenging behaviour resulting from neurobehavioural disability, and lacking the specific arrangements that enable effective implementation of neurobehavioural principles. This can be the case even in services well designed to meet the physical care or basic functional needs of clients. This distinction is very relevant to the Victorian public service system where services are almost exclusively nonspecialised in the sense Alderman conveys. He argues that nonspecialised services are constrained in critical ways that inhibit successful management of challenging behaviour. A sample of these constraints includes inappropriate
physical environments (such as rehabilitation units set within busy, bustling hospitals), staff difficulties (insufficient staff numbers, insufficient training in neurobehavioural disability and rehabilitation, poor understanding of client presentations, low expectations of the client), insufficient specialised support (from neuropsychologists, neurologists, and neuropsychiatrists), and insufficient routine and appropriate behavioural programming with which to promote more positive behaviours.

Physical Environment
The particular features of an environment will depend upon which of the three components is being addressed (treatment facility, group home, supported independent living). When safety and control over behavioural contingencies are critical, settings are ‘closed’ self-contained environments, and secure where necessary. Safe zones (secure areas) and exit routes from aggressive situations provide staff safety. De-escalation and time-out areas assist with problems of overstimulation and aggression. Where rehabilitation potential is to be capitalised on, specific facilities can be made available for physical (gym, pool), occupational (kitchen, dining), and social (shared space, group activities) therapy. To aid with organisation problems and distraction, and to promote procedural learning, client living spaces are predictable, uncluttered and simple. Ideally, open, spacious, and aesthetically pleasant natural surrounds are available to act as broad behavioural determinants (such as reducing agitation). In more independent/less controlled environments, more naturalistic settings are advantageous. Clients have their own room and ensuite, the environment is as homelike as possible, and strong use is made of visual cues (e.g., timetables, orientation boards) and other compensatory measures and equipment. Detailed descriptions of neurobehavioural rehabilitation and specialised facilities are readily available (Eames et al., 1995; Eames & Wood, 1985; Gardner et al., 2003; Giles, Wager, Fong, & Waraich, 2005; Malec, Smigielski, DePompolo, & Thompson, 1993; Peters et al., 1992; Treadwell & Page, 1996; Wood & McMillan, 2001).

Operation
The focus of supportive environments is to promote socially effective behaviours, and diminish undesirable ones, thereby facilitating rehabilitation and improving the likelihood of community reintegration. These environments operate according to the principles of applied behaviour analysis (ABA), and are informed by an understanding of the diverse sequelae of ABI. There are two important variations of ABA, one focussing on contingency and consequence management, and the other on antecedent management. These approaches reveal different sensitivities to the particular neurobehavioural sequelae, personality characteristics, and environmental controls. Antecedent management has been highlighted in cases of people with particular frontal injuries whose learning from consequences is impaired. The interested reader is referred to a collection of literature describing ABA variations (Giles & Manchester, 2006; Giles et al., 2005; Wood & McMillan, 2001; Ylvisaker & Feeney, 1998; Ylvisaker et al., 2007). No doubt the approaches are complementary, and the emphasis in treatment would be determined by client presentation.

A number of key operational aspects for specialised facilities have been identified by Wood and Worthington (2001), some of which are noted here: (a) a clearly identifiable set of rules related to social behaviour is in operation along with consequences for breaching the rules, (b) there is consistent application of rules by staff, (c) regular practice of functional social skills occurs, to promote clarity and consistency of expected behaviours, (d) skill practice occurs in real social settings (with other people, in supervised community access), (e) regular feedback is provided regarding successful behaviour, and (f) an effective communication system exists among staff with respect to clients, their long- and short-term goals, and behaviour management interventions.

Staff-to-client ratios are greater in specialised than in nonspecialised settings, perhaps 2:1, and sufficient to provide security for staff and client alike, and to adequately implement behaviour management plans. All staff, regardless of their specialist role (such as physiotherapist, occupational therapist, or personal care attendant) are governed by the behaviour management plan. Rehabilitation is focussed on achieving social outcomes (which would be seriously compromised or impossible in other settings due to the challenging behaviour). In a facility for very severe behaviour, length of stay can be expected to be measured in months or years rather than weeks. In SSAs and ‘supported independent’ settings, length of stay may be many years.

Staff
Staff warrant special mention. They function as ‘behaviour change agents’ (Kazdin, 2001). They are responsible for the application of the operational approaches, and the success or failure of a behaviour-management intervention depends largely on the extent to which they are able to implement them. Key issues in gaining quality staff
revolve around two key themes: training and retention. Staff require ongoing regular training, not only in implementing technical aspects of behaviour change (such as antecedent manipulation, time out, contingent reinforcement, and contracts), but in a range of other domains that influence client behaviour (cognitive skills, medical problems, communication difficulties), and particularly the impact their own behaviour has on clients. A number of papers address issues related to staff culture and attribution issues (Giles & Manchester, 2006; Jackson & Manchester, 2001).

ABI and challenging behaviour is a difficult area in which to work. Retention of staff (and their experience and skills) can be promoted by a number of factors such as: mentoring from skilled specialists and consultants to promote confidence and preparedness to persist with difficult clients, individual professional development plans, staff counselling, salaries commensurate with the demands of the job, and a clear career path, for example, from support worker to senior support worker, to team manager or house manager, and possible retraining into specific clinical areas (nursing, neuropsychology) or administration roles (service/divisional directorships).

These elements have been implemented in residential services catering to people with neurobehavioural disability, and found to be associated with substantially-increased staff retention (Hullin, 2000). Although the importance of well-trained and highly-skilled staff in this difficult area would seem obvious, there continues to be calls, both within Australia and abroad to address skills shortages in staff and to establish at least minimum levels of specialist ABI training (Adrian, Glennen, Howlett, & Naunton, 1996; Jackson & Manchester, 2001; Kelly, Dadson, & Brown, 2000; Strettles et al., 2005; Todd, 2001; Victorian Government Department of Human Services, 2001).

Costs and Benefits of Specialist Neurobehavioural Treatment
Several studies provide evidence of the clinical and cost effectiveness of providing residential neurobehavioural services to those with severe injuries and behavioural disorder. Positive outcomes from these programs have included transitions to more independent accommodation, fewer hours of direct care and support, increased productive activity, and reduced neurobehavioural problems (Eames et al., 1995; Wood, McCrea, Wood, & Merriman, 1999; Worthington, Matthews, Melia, & Oddy, 2006).

Importantly, these studies have all shown substantial gain in clients who are not only very severely impaired, but for whom many years (sometimes decades) had passed between injury and admission (much like the case illustrations above). These studies also provide estimates of the projected lifetime cost savings due to residential neurobehavioural rehabilitation. These vary from approximately £0.3 million to approximately £1.0 million, with a savings advantage apparent for those who receive treatment within about two years of injury. The economic advantages of providing specialist rehabilitation to the severely brain injured has also been demonstrated in those who are treated within 6 months postinjury (Turner-Stokes, Paul, & Williams, 2006). This investigation found that the more severe the disability, the greater the cost efficiency (time taken to offset the costs of rehabilitation), prompting the suggestion that it may be the most disabled clients who stand to benefit the most from rehabilitation (Fleminger, 2006).

Alternatives to facility-based treatment have been suggested, cast as interventions in ‘less restrictive settings’ or ‘community settings’ but often these can, on closer inspection, be seen to include a specialised residential setting with intense levels of client support (Gardner et al., 2003; Peters et al., 1992). One comprehensive case example that did take place in a home-based setting demonstrates success with a young male behaving extremely aggressively towards his mother. In this case staffing resources were a predominant feature. The intervention had a 10-year history of trained staff supporting the client 12 hours/day, every day, at an ongoing approximate cost of US$100,000 per annum (Willis & LaVigna, 2003). Feeney et al. (2001) describe a project in which clients with ABI and behaviour disorders were assisted to move from long-term restrictive settings to community placements. They report 1997 community costs of approximately US$60,000 to US$70,000 per person per annum. This, however, equated to an approximate savings of more than US$20,000 per person per annum compared with the costs of residential treatment or a correctional program.

Summary and Future Directions
Reframe the Accommodation Argument
Often, discussion of living environments turns quickly to a focus on available housing stock and concerns of some funders and service providers about the development of institution-like settings. We would like to suggest an important shift in the focus of these conversations, away from ‘bricks
and mortar’ and onto neurobehavioural disability and ‘supportive environments’. In this way, recognition of the neurobehavioural disability (rather than the lack of accommodation) drives the development of the treatment environment. This will entail devising combinations of certain physical structures, along with appropriate operational approaches, and skilled staffing solutions. This is not groundbreaking activity, it is a reframing, a shift of emphasis and there are many neurobehavioural rehabilitation models that demonstrate variations of how this may be done.

Supportive environments can be considered in the context of the ICF (World Health Organization, 2001), which provides a useful framework and a means of understanding health and health-related states, and their determinants and outcomes. The ICF defines three domains of health: (a) body functions and structures, the physiological functions and anatomical parts of the body; (b) activities, the execution of tasks or actions; and (c) participation, the involvement in a life situation. Health conditions negatively impact on each of these three domains, namely impairments, activity limitations and participation restrictions. The ICF model acknowledges the moderating influence of environmental and personal factors on health outcomes. At several years postinjury the clinician cannot influence the individual’s impairment (the brain injury). Some intervention can be directed at activity limitations (acquisition of new skills). Skills acquisition, however, is often challenging for the individual and resource intensive; Most people are only able to focus on the development of one or two skills at a time and it often takes a long time to consolidate new skills (Sloan, Winkler, & Callaway, 2004).

When considering intervention for this population in the context of the ICF framework, frequently the modification of the individual’s physical and social environment is the most effective means of intervention. When environmental manipulation can be made to compensate for cognitive impairments or activity limitations, the individual is left with more energy to address desired goals for participation (Willer & Corrigan, 1994). Providing the optimal environment for this population is frequently the most effective way of maximising their participation (Feeney et al., 2001; Powell, Heslin, & Greenwood, 2002).

The COAG Initiative

The Council of Australian Governments (COAG, 2006) announced an agreement on 10 February 2006 to reduce the number of younger people with a disability living in RACFs. A bilateral agreement between the Commonwealth and the States has now been signed and commits A$244 million in joint funding nationally over 5 years. This initiative is a significant first step in resolving the issue of younger people residing in RACFs. However, at this stage there are no concrete plans to develop any services specifically for younger people in RACFs with higher levels of challenging behaviour. This initiative will only address the needs of a small subgroup of people: those with no or low levels of problematic behaviour, who are under 50 years of age and living in a RACF or at risk of admission to a RACF.

Develop a Specialised Treatment Option for Severe Challenging Behaviours

We are strong advocates of placing people with ABI in the least restrictive environment and treating challenging behaviours in community settings where possible. Nevertheless, with respect to severe behaviour disorders there does seem to be some consensus that ‘the all-embracing and continuous nature of such problems demands that (treatment) be done in a closed setting devoted to the purpose’ (Eames & Wood, 1985, p. 131). This is particularly so when the disruptive behaviour must be brought under control rapidly (Giles & Manchester, 2006), where manual containment would otherwise be necessary (Giles et al., 2005) or when serious comorbidities (psychiatric, drug and alcohol addiction) persist (Feeney et al., 2001). A recent document reports that each of Australia’s State ABI representative organisations endorse, among other services, the need for a specialist unit for people with severe behavioural difficulties (Hearn, 2000). An appropriate high-dependency facility may have as few as 10 beds and be accompanied by a transitional unit prior to longer-term placement.

Develop Specialised Community Residential Facilities

In a more developed system of SSAs we envisage a variety of group homes and co-located units for those with lower levels of challenging behaviours (including people in RACFs). Due to the heterogeneity in client presentations, a variety of settings are required that differ in physical structure, mode of operation, and geographic location. Clients with amnesic syndromes who dangerously wander (see Case 2 above) require different environments than very aggressive clients or those who show sexual predatory behaviour. Clients with persistent alcohol-seeking behaviour (and concomitant community problems such as public
nuisance, theft, assault, and begging) require a different environment again. All, however, need specialised supportive environments, often for the duration of their lives.

**Develop Specialisation by Investing Heavily in Staff Training**

We have argued the importance of developing an ABI-specialised workforce — potentially using comprehensive training programs along the lines proposed by Jackson and Manchester (2001). This applies not only to staff in high-dependency units or SSAs, but also to those supporting clients to live as independently as possible (e.g., in their own home, family home, private rental).

**A Cost–Benefit Evaluation**

It is apparent that dealing with challenging behaviours over the long-term incurs costs and that these will differ depending on the containment or treatment course taken. We believe that development of a more effective and efficient service system would be indicated by a rigorous cost–benefit comparison of the financial costs of treating challenging behaviours over the long term in the three settings we have suggested (facility for serious behaviour problems, specialised SSAs, specialised community resources) with the existing service system (accommodation carousel and associated service costs, prison, RACFs, and psychiatric facilities).

**Conclusion**

This article has addressed an important aspect of ABI — lifelong management of challenging behaviours. We have demonstrated that, in Victoria at least, clients who elsewhere may be placed in specialised facilities for treatment are instead contained (in prison or aged care) but not treated for their neurobehavioural disturbance, or treated by community-based teams. Although outreach services are effective in treating most behavioural disturbances, the more serious cases require containment and treatment in specialised neurobehavioural facilities followed by transitional services to enable their return to community living. The current service system needs to provide alternate accommodation and support options for people with ABI and higher levels of challenging behaviour that end up in prison or residential aged care. We have described three components of a more effective treatment approach: a facility for the most serious behaviour problems, a variety of long-term accommodation options with expertise in managing challenging behaviour, and bolstered community services. This approach is couched in terms of specialised support and supportive environments. Some evidence of the cost effectiveness of some of these approaches is presented, and a call is made for a rigorous cost–benefit analysis of long-term behaviour management alternatives to the current short-term approaches.

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