Journal of Occupational Rehabilitation (2019) 29:569–584
https://doi.org/10.1007/s10926-018-9820-8

A Systematic Scoping Review of Work Interventions for Hospitalised Adults with an Acquired Neurological Impairment

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Published online: 4 December 2018

Abstract
Purpose Addressing return to work early after neurological impairment from stroke or moderate and severe traumatic brain injury may improve likelihood of returning to employment, yet little is known about how best to organize work interventions for delivery in the inpatient hospital setting. The purpose of this scoping review was to identify knowledge gaps and inform program development in hospital-based work interventions. *Method* We searched MEDLINE, CINAHL, OTSeeker and Embase for English-language articles published from database inception until March 2018. Citations were then manually searched using reference lists of included papers and Google Scholar. Articles were included if they described programs providing return to work intervention within a hospital to adults with newly acquired neurological conditions, such as traumatic brain injury or stroke. After identifying and selecting relevant studies, we charted the data and then synthesized the results. *Results* Twenty-eight articles explored work intervention in an inpatient hospital setting. Interventions targeted a diagnostically heterogeneous population, mostly including adults who had suffered either a traumatic brain injury or stroke. Most interventions included a structured process for assessment, highlighted the importance of collaboration, and aimed to improve performance of work skills that could be facilitated within a hospital setting only (as opposed to all work skills). Thematic analysis of included studies resulted in four themes: structure, collaboration, clinician training, and belief in future work capacity. *Conclusion* Return to work intervention appears to be an important component of neurological rehabilitation. While studies to date have identified enablers for the integration of work interventions into the inpatient hospital setting, there is limited description of specific components of programs, and a lack of studies evaluating program effectiveness.

Keywords Return to work · Rehabilitation · Vocational · Rehabilitation · Inpatient

Background

Acquiring a neurological impairment during adulthood leads to significant disruption in a person's life [1]. Neurological conditions such as traumatic brain injury (TBI) and stroke affect both cognitive and physical skills, making returning to work challenging [1, 4]. Over half of the adults who acquire a neurological impairment are of working age, yet reportedly few ever return to work [2]. Intensive rehabilitation delivered early and primarily targeting impairments (such as walking, memory, speech etc.) [3] is vital to achieve the greatest amount of recovery possible [4]. However often inpatient rehabilitation focuses exclusively on impairment-based therapies, potentially ignoring the possibility of addressing return to meaningful activities (such as work).

Inpatient rehabilitation services have been shown to enable clients to return to activities of daily living [3], and so it is expected that addressing work skills during inpatient rehabilitation may also enable them to return to work after neurological injury [5, 6]. While return to work, in the capacity of returning to previous employment, new or supported employment or return to school is assumed, there has been very little attention placed on the role of the inpatient therapy program or on the recovery of work skills that could occur during inpatient rehabilitation [7].

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In fact, inpatients are generally encouraged to focus on the recovery of self-care and home-based skills instead of work, regardless of the importance of work to the individual [7–9]. Clients reported that during inpatient neurological rehabilitation clinicians seemed to avoid discussing their pre-injury work or work-related goals [8], setting up an avoidable cycle whereby (a) clients assume that work is unattainable and do not pursue returning to work [8, 10], and/or (b) clients return home without knowledge of available supports or funding to assist with their return to work [8]. Both result in clients unable to or fearful of accessing return to work rehabilitation even if they are ready to return to work [8, 10]. These may be key reasons for the very low return to work rate, evident worldwide after significant neurological impairment in adults [2].

Working and being part of a workplace remains just as important to clients after neurological impairment as it was pre-impairment [11]. Clients perceive work as a means to re-establish their self-identity and often a mark of recovery after neurological impairment [12]. Those who return to work report higher quality of life compared to those who do not [13], suggesting wide-reaching benefits of being engaged in work after neurological impairment. It is therefore not surprising that clients find it more meaningful and motivating to practice work activities rather than domestic activities (such as cooking or shopping) during inpatient rehabilitation [10]. Clients also report that practicing work skills better prepares them for the demands of life after inpatient rehabilitation, regardless of how soon they plan to return to work [8, 14].

Although return to work interventions for clients after a neurological impairment (inclusive of both traumatic brain injury and stroke) has been highlighted in the literature, there are no clear guidelines on how work interventions should be delivered in the inpatient setting, nor on the efficacy of such interventions [15]. Inpatient rehabilitation has not traditionally provided return to work intervention. Instead, return to work interventions generally occur once the client has returned to community living [10]. In the few instances that return to work interventions are delivered during inpatient rehabilitation, specific interventions are reported in little or no detail [16–19]. As a result, there is little guidance for clinicians about what work interventions are suitable to implement in the inpatient setting, nor on how best to facilitate return to work interventions during this early phase.

This scoping review explores return to work interventions which commence during inpatient rehabilitation. We aim to identify the details including assessments and interventions, highlight factors which enable the integration of return to work rehabilitation in the inpatient setting, and summarise knowledge gaps to inform intervention development and quality improvement.

Method

A scoping review method was chosen, so that all return to work interventions which commence during inpatient rehabilitation could be explored. This scoping review followed the guidelines set out by Arksey and O'Malley [20], commencing with identifying the research questions, identifying and selecting studies according to an apriori established search criteria. Then charting the data and evaluating the quality of research to date before summarising and reporting results.

To guide the review, we established three research questions:

1. Which work assessments have been implemented during inpatient rehabilitation, and what aspects of work performance do they assess?
2. What is the nature of return to work interventions that have been implemented during inpatient rehabilitation?
3. What enables return to work intervention to be embedded in inpatient rehabilitation (from the perspectives of both clients and clinicians)?

To identify relevant studies to answer these research questions, a systematic search, of four databases (Medline, CINAHL, OT Seeker and Embase) as well as reference lists of included studies was conducted. All sources were searched from inception of database until March 2018 using the following keywords and relevant MeSH headings: (work or "return to work" or "work rehabilitation or "vocational rehabilitation" or "work role") and (brain injury or ABI or stroke or CVA or "traumatic brain injury" or TBI). To examine as broad a knowledge base as possible, it was decided that in line with the methodology of a scoping review, all peer reviewed published literature was included, including relevant guidelines. Where systematic and review articles were identified, these were not included but screened for primary articles relevant for inclusion. Searches were restricted to English language articles and were conducted by one author (SO).

Once the searches were complete, the inclusion criteria were applied by two authors (SO and NL); these criteria were established apriori:

Population confirmed diagnosis of moderate or severe acquired neurological impairment (inclusive of traumatic (e.g. TBI) or non-traumatic (e.g. stroke) causes) as indicated by a clinical statement or measure (e.g. a Glasgow Coma Score of 3–12 on admission to hospital); aged between 18 and 65 years; and were working prior to injury.

Intervention: return to work interventions or assessments which were commenced during the inpatient phase

of rehabilitation (i.e. clients had to be in hospital at the time of assessment or intervention).

First, the title and abstract of each retrieved study was independently screened for eligibility against the research questions by two reviewers and second, the full-text of studies were screened to determine inclusion. In the event of disagreement, a consensus was reached in consultation with a third independent reviewer (MS).

Charting and Synthesising Data

The first author (SO) charted the general information from each article (including authors, date, location of study, study population, number of participants, study aim, study method and author conclusions) and used the 'The Standard Protocol Items: Recommendations for interventional trials' (SPIRIT) [21] checklist to capture specific features of each intervention or assessment. The checklist extracted detail regarding each intervention/ assessment domain, key components, resources required, enablers of in-hospital return to work intervention, and delivery mode (including clinician where used), and were then charted to provide a full description of each study *(copy of checklist available from authors on request)*. Where necessary study authors were contacted for additional information regarding the study method, participants and results. The first and fourth authors (SO and NL) then performed a thematic analysis by reviewing (independently) the individual features of the different interventions along with the described barriers and enablers to facilitating work intervention. Similar intervention/ assessment features along with barriers/enablers were grouped together using a content analysis approach with thematic coding [22]. Common intervention/assessment features were then condensed, by the first and third author (consensus achieved) into fewer intervention categories. All authors discussed condensed categories and reached agreement prior to the development of themes [22]. The following findings are the results of this process.

Results

The systematic search resulted in 1609 studies with 75 duplicates (Fig. 1). After screening the title and abstract of all retrieved studies, 241 were read in detail and evaluated against the inclusion criteria, before the 28 included studies were synthesized (study details are charted in Table 1). Included studies were published between 1999 and 2018, and represent the following methodologies; 13 qualitative, 8 quantitative, 3 mixed method, 2 guidelines and 2 case reports.

Of the included studies, only seven distinguished inpatient return to work interventions from community-based return to work interventions [23–29]. A further 11 studies, reported interventions that spanned both the inpatient hospital and community setting but did not distinguish any

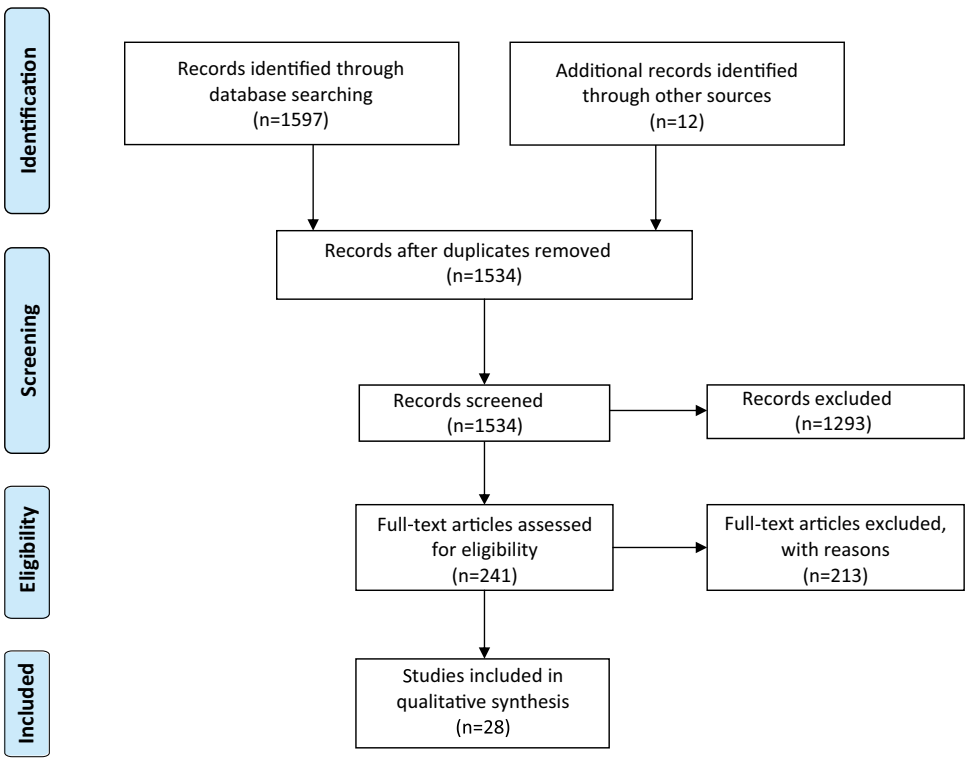

Fig. 1 PRISMA flow diagram

Table 1 Characteristics of included studies

Author/date/origin	Participants (sample size)	Design	Intervention/assessment (timeframe)	Aim
Braverman et al. (1999) USA	TBI (67)	Quantitative Treatment arm of RCT	Inpatient only intervention (8 weeks)	Description of a military based RTW program
Buffington and Malec (1997) USA	TBI (80)	Mixed method Prospective cohort	Intervention spanned hospital and community (up to 12 months)	Evaluation of a specialised RTW coordination service for people following neurological impairment
Bush et al. (2016) USA	TBI (5) Family (6) Employer (1)	Qualitative Descriptive case study		Description of the RTW experience of five people with neurological impairment, their families and employers
Chappell et al. (2003) Canada	Not specified	Assessment protocol	Work skills assessment protocol for occupational therapists (2–5 days)	Description of RTW assessment protocol following neurological impairment
Donker-Cools et al. (2018) The Netherlands	Stroke and TBI (10) Employer (7)	Qualitative Descriptive qualitative		Exploration of the perspective of the person and employer of the barriers to RTW after neurological impairment
Gilworth et al. (2009) UK	Stroke (13)	Qualitative Descriptive qualitative		Description of the experience of hospital based RTW for people after stroke
Hayden et al. (2000) USA	TBI (61)	Quantitative Retrospective cohort (15 months)	Inpatient specific rehabilitation with vocational component (average of 4 weeks)	Description and evaluation of an environmental focused RTW program
Hellman et al. (2016) Sweden	Stroke (5) Clinician (22) Employer (5)	Qualitative Descriptive qualitative		Description of the RTW process from the perspective of the person with a neurological impairment, employer and rehabilitation clinician
Holmes et al. (2016) UK	Clinicians (5)	Qualitative Phenomenological		Clinician experience of a work rehabilitation training package for people following TBI
Kershcke and Witas (2013) USA	Neurological impairment- not specified (1)	Qualitative Descriptive case study		Description of a RTW intervention within inpatient rehabilitation environment
MacDonald and Johnson (1996) Canada	TBI (1) Work colleagues (43)	Quantitative Single subject design	Ross test of higher cognitive processes	Description and clinical utility of a RTW assessment of work readiness
Man et al. (2013) Hong Kong	TBI (40)	Quantitative Prospective RCT	Inpatient specific virtual reality skill training program (12 sessions)	Evaluation of the effectiveness of a virtual reality RTW skill training program
Mateer and Sira (2006) Canada	TBI (2)	Case Report	Intervention spanned both hospital and community	Description of RTW interventions used within rehabilitation
Medin et al. (2006) Sweden	Stroke (6)	Qualitative phenomenological		Description of the RTW experience for people after stroke
Roth and Lovell (2014) USA	Stroke (not reported) Clinician (not reported)	Qualitative Descriptive qualitative		Description of the RTW experience of people and clinicians after stroke

Table 1 (continued)

Author/date/origin	Participants (sample size)	Design	Intervention/assessment (timeframe)	Aim
Salazar et al. (2000)	TBI (67)	Quantitative RCT	Inpatient cognitive rehabilitation program (8 weeks)	Evaluate the efficacy of inpatient cognitive rehabilitation (with RTW component) among military personal following TBI
Sarajuuri et al. (2005)	TBI (39)	Quantitative RCT	Inpatient neuropsychology and psychotherapy with vocational interventions for people considered to have return to work potential (6 weeks)	Evaluate a comprehensive neurorehabilitation program (with RTW component) in comparison with standard care on RTW outcomes
Scott and Bondoc (2015) USA	Stroke (not reported)	Qualitative Descriptive qualitative		Exploration of the role of occupational therapy within the RTW process
Smith (1983) Canada		Case Report	Intervention spans inpatient and community	Describe the importance of training core work skills early in preparation for RTW
Sinclair (2014) UK	Stroke Clinicians (not reported)	Mixed method Triangulation approach	Interventions identified span both inpatient and community	Identification of existing provision of early RTW rehabilitation following stroke
Soeker (2011) South Africa	Stroke and TBI (10)	Qualitative Descriptive qualitative		Description of the RTW experience of people after neurological impairment
Soeker (2012) South Africa	Stroke and TBI (10)	Qualitative Grounded theory		Description of the methodology used to develop the model of occupational self- efficacy
Soeker (2016) South Africa	Stroke and TBI (10)	Qualitative Case study design		Description of the experience of people with a neurological following the model of occupational self-efficacy to assist with RTW
Stergiou- Kita et al. (2011) Canada		Clinical practice guideline		To analyse and develop the processes relevant to return to work assessment to assist evaluators to make decisions regarding readiness to RTW after TBI
Thomas and Mendz (1997) USA	TBI (149)	Quantitative Prospective cohort	Vocational Assessment Protocol (13 item questionnaire)	Validation of the *Work Assessment Protocol* a RTW assessment process
van Velzen et al. (2015) Netherlands	Stroke and TBI (23) Clinicians (9)	Mixed Methods Prospective pre- post cohort evaluation	Return to work intervention protocol commencing in inpatient setting and continuing to community (up to 2 years)	Evaluation of an early RTW intervention
van Velzen et al. (2011)	Stroke and TBI (12)	Qualitative Descriptive qualitative		Description of the RTW experiences of people following neurological impairment

Table 1 (continued)

Author/date/origin	Participants (sample size)	Design	Intervention/assessment (timeframe)	Aim
Watanabe (2013)	TBI (300)	Quantitative Retrospective cohort	Inpatient rehabilitation with vocational component including supported employment (8–25 weeks)	Description of the work outcomes after inpatient vocational rehabilitation post TBI

RTW return to work, *TBI* traumatic brain injury

difference in the return to work intervention provided in each setting [8, 10, 30–37].

Enablers for the integration of return to work intervention during inpatient rehabilitation were identified in 19 studies. One study reported enablers primarily from the clinician perspective [38], while nine studies identified enablers from the client perspective [8–10, 14, 30, 34, 39, 40]. Three studies discussed enablers from both clinician and client perspectives [32, 35, 37] and three studies compared the experiences of the client, the clinician and the employer [41–43]. Three quantitative studies reported enablers for providing return to work intervention in their findings [23, 24, 27].

Return to Work Assessment

Return to work assessments were reported in eight studies, including being recommended in a clinical guideline (Table 2). Collectively, return to work assessment measured the following domains; pre-injury work history and performance [37, 40, 44, 45], core-work skills [26, 44, 46–48], work-specific skills [23, 26, 37] and personal perspective of work (including importance) [37, 44, 46].

Pre-injury work history was generally assessed first during the initial interview with either the client or their family [32, 40, 49]. In one study the employer was contacted for detailed information about the work environment and task requirements [37], while another study accessed an online database for more specific work requirements [40]. During the assessment of pre-injury work history, some consistent information was generally collected, including level of education [26, 44], a detailed work description [44], list of work specific tasks and skills [37, 40, 44], as well as, environmental (social and physical) considerations [37, 44, 46]. The client's performance in pre-injury work tasks (current work skills) was measured across two broad domains: core-work skills [26, 32, 37, 44, 46, 47] and work-specific skills [26, 37, 44, 46]. Core-work skills included those skills that are identified as necessary for all work roles, such as problem solving, organising a schedule and managing conflict. Work-specific skills were skills that are more unique to each client's pre-injury work, such as; interpreting site plans for a construction worker or building furniture for a cabinet maker. Of the two skill areas, core-work skills were more frequently measured, and this most commonly occurred by observing clients' participation and responsibilities on the ward [32, 37, 44, 46]. Wherever possible, work-specific skills were assessed using simulated tasks or environments that resembled the client's pre-injury work [24, 44, 46]. Such tasks were graded for difficulty by the clinician, and repeat assessments were conducted throughout admission [24, 44–46]. It was recommended that all assessment results be shared freely across the interdisciplinary team to ensure

Table 2 The nature of RTW assessment

Article	Components of work assessment						
	Core-skill assessment	Work-specific assessment	Work history	Perspective of work	Resources	Mode of delivery	Clinician
Braverman et al. [23]	Navigation Transport use Follow directions and coping with multiple distractions (crowds, noise)	Work site assessment Self-assessment of work performance	n/a	n/a	Work therapy journal	Community outing	Occupational Therapist and Speech Pathologist
Buffington [26]	Cognitive, socials and physical skills Psychosocial adjustment	General Aptitude Test Battery Strong Interest Inventory Work site assessment	Measurement of work environment and responsibilities	n/a	Work coach	Immediate feedback on work performance	RTW coordinator
Chappell et al. [46]	Self-awareness Inter-personal skills Response to change Response to supervision Management of emotions Following directions Attention and memory Money and math skills Foresight and planning Dividing attention and multi-tasking Physical work positions Fine motor skills Tolerance activities	Simulation of work task to observe; physical, cognitive, behavioural and interpersonal skills	n/a	Perceived work capacity	Work specific equipment/ tools	Administered in a variety of work-like environments, including quiet and distracting Use of standardised tests to identify baseline physical and cognitive function Use of work simulation activities that reflect pre-injury work Community outings	Occupational Therapist
Hayden et al. [24]	Self-organisation Time sharing Tolerance for imposed stress Community mobility Visuomotor reactions	Simulated work tasks	Work equipment Simulated work environment Video software	Repeated observation of work related tasks	n/a	Environmental simulation Video feedback of task performance is provided	n/a
MacDonald and Johnson [47]	Communication and problem solving Ross test of higher cognitive process (RTHCP)	n/a	n/a	n/a	Quiet environment	Written instructions with test items Graded level of difficulty	n/a

Table 2 (continued)

Article	Components of work assessment						
	Core-skill assessment	Work-specific assessment	Work history	Perspective of work	Resources	Mode of delivery	Clinician
Roth and Lovell [32]	Getting ready for and travelling to work Community access	n/a	n/a	n/a	n/a	n/a	n/a
Scott et al. [40]	n/a	n/a	Online work role database Pre- injury work tasks Pre- injury work skills	n/a	n/a	Client- clinician interview	Occupational Therapist
Soeker et al. [34]	Cognitive Psychosocial Physical	n/a	Work environment Pre- injury as well as all prior work skills	n/a	n/a	Honest feedback of performance	Occupational Therapist
Stergiou-Kita et al. [44]	Communication Cognitive, physical and psychosocial adjustment Getting ready for work Travel to work Physical and sensory abilities in relation to work Pre- injury intelligence Ability to manage multiple tasks at once	n/a	Education history Credentials and Licenses Work performance Strengths and challenges Work description Tasks responsible Skill (physical and cognitive) requirements Physical environment Social environment	Understanding of RTW process and rights Work interests and preferences Perception of pre-injury and current work performance and importance Anticipated challenges of RTW Own evaluation of impact of not working	Simulated work environment	Pre–injury history – Interview Core skills – observation of routine ward activities Work skills – simulation of work tasks	n/a
Thomas rt al [45]	Self -awareness Social/emotional\ Regulation Social-adaptive skills Interpersonal skills	Interview and job search skills Simulated work performance	Work and education history pre-injury work strengths	Perceived pre-injury work performance	Employer	Pre–injury history – Interview	Neuropsychologist Social worker Work rehabilitation specialist Psychologist
van Velzen [37]	Personal skills Social skills Dynamic movements Static movements Transportation	Ability to work standard hours Ability to adjust to work environment	Work demands and environment Development of specific work goals	Perception of future work capacity	n/a	Pre–injury history – Interview client and employer Work skills- work place assessment	n/a

RTW return to work

consistency in return to work interventions and feedback being provided to the client and family [8, 9, 33].

Return to Work Interventions

Return to work interventions were identified in 16 of the included studies (see Table 3). While the intervention components, resources and mode of delivery varied across studies, four common domains of intervention appeared in the literature. These being: the practice of core-work skills, practice of work-specific skills, discharge planning, and education. As with assessment, the practice of core-work skills was discussed more frequently than the practice of work-specific skills. Core-work skills including communication, time management and team work were the most commonly practiced and this occurred within therapy groups and during ward-based routines. The ability to integrate core-work skills into ward-based routines increased the opportunity to practice these core-work skills in the inpatient setting [23].

Work-specific skills were generally facilitated individually, so they could be specifically tailored to each clients' pre-injury work [9, 23, 37, 49–51]. Interventions that targeted work-specific skills required more resources, including designated equipment or environments that could simulate the pre-injury work tasks [9, 27]. Two studies explored the use of virtual reality software that simulated either work tasks or environment [25, 52]. While the software allowed severely injured clients to practice work tasks in the inpatient setting that could not otherwise be simulated [25, 52], it was expensive and not routinely available in inpatient rehabilitation units.

Education was a key component of many interventions, and where used, related to brain injury and return to work processes, and was completed early during admission [31, 32], was most often provided verbally [31, 32], and was an ongoing process rather than a one-off event. As the client's level of awareness and function progressed, the level of detail provided about return to work also seemed to increase.

Planning for discharge was also an essential component of return to work intervention in the inpatient setting and was completed regardless of the clients' readiness to return to work. The referrals made and level of detail, regarding return to work included in the discharge summary quite often determined the services clients accessed in the community for the remainder of their recovery- this suggests that the perceptions held by inpatient clinicians were handed over to future clinicians. The discharge handover process was frequently coordinated by one clinician who was informed of recommendations by the entire treating team [29, 37], so that the handover was interdisciplinary in nature. When clients were more 'work ready' the coordinator liaised with the employer to negotiate an appropriate return to work plan [37]; unfortunately, there was limited information on what 'work ready' entailed.

Enablers for Return to Work Intervention During Inpatient Rehabilitation

Enablers for embedding return to work intervention within inpatient rehabilitation were identified in 19 of the 27 studies and are presented in Table 4. Following thematic analysis, four main themes emerged; structure, collaboration, clinician training, and belief in future work capacity.

The physical and organizational structure of the inpatient setting was both an enabler and barrier for return to work interventions. Return to work interventions were most successfully integrated into usual care when the interdisciplinary team and ward environment were structured to enable clients to practice strategies for responsibility and self-management, as well as create opportunities to demonstrate initiative daily [23, 30, 37, 53, 54]. Where this occurred, pre-injury work was discussed with clients and/ or their family on the day of admission, usually by a designated clinician who established work goals and communicated these back to the team [10, 23, 37]. This same clinician appeared to take responsibility for the coordination of return to work interventions, and the completion of discharge planning. The ward environment was also structured to mimic the expectations of a work place, whereby clients were expected to adhere to a structured morning routine and attend therapy sessions on time [23, 28]. Once the client had capacity to do so, they were expected to manage their own daily timetable, as well as other negotiated ward-based responsibilities [54].

Collaboration

Strong interdisciplinary collaboration between clinicians, clients and their families (and where appropriate their employer) appeared critical to commencing return to work intervention within the inpatient hospital setting. It was best practice to share assessment results, intervention strategies and work goals amongst all clinicians to ensure a consistent return to work intervention approach. Collaboration with clients was perceived as essential; clients reported that when they were empowered with the responsibility of their own return to work process they were more likely to actively engage in work intervention. While collaboration between clinicians and employers was less frequent than between treating clinicians in the inpatient setting, one study identified that early contact with the employer was beneficial to establish reasonable expectations of capacity to return to work [41].

Table 3 The nature of RTW interventions

Article	Components of work intervention					
	Core-skill practice	Work-specific practice	D/C planning	Resources	Mode of delivery	Clinicians
Braverman et al. [23]	Time management Morning routine Fitness training (group) Planning and organisation (group) Problem solving skills (group) Pragmatics (group) Psychotherapy (group) Community outing	Work goal setting Work place training	n/a	Work clinic room Reflection Journal Work like clothing Simulated work environment Family	Core skill training was group based Sessions were skill specific not discipline specific Sessions were held at consistent times to create routine	Occupational therapist Allied health assistant Psychiatrist Neuropsychologist Speech pathologist
Buffington et al. [30]	Cognition Emotional management	n/a	Flag barriers for RTW to community services Development of RTW plans Brain injury education to employer and co- workers	RTW coordinator	Integration of work skills into usual rehabilitation therapies	RTW coordinator
Grant et al. [49]	Problem solving Time management Applying for jobs Emotional management Fatigue management Routine management	Work task simulation Worksite visit	n/a	Simulated work environment	n/a	Occupational Therapist
Hayden et al. [24]	Self-organisation Time sharing Tolerance for imposed stress Community mobility Visuomotor reactions	Simulated work situations with video feedback	Follow up with client after discharge	Work equipment/ tools Simulated work environment	Simulation of work environment	n/a
Kerschke et al. [9]	Treadmill training Visual scanning Carrying objects Multi-tasking Balance Community outing	Work place visits Work task simulation Manipulation of work specific tools Enrolment in higher education	n/a	Gym Simulated work environment Worksite Employer Work specific tools	Simulation of environment	Physiotherapist Occupational Therapist
Kirsch et al. [52]	n/a	Work task simulation (Virtual)	n/a	Simulation software Computer access	n/a	n/a
Man et al. [25]	n/a	Work task simulation (Virtual)	n/a	Simulation software Computer access	Individualized Graded Repetitive practice	n/a

Table 3 (continued)

Article	Components of work intervention					
	Core-skill practice	Work-specific practice	D/C planning	Resources	Mode of delivery	Clinicians
Mateer et al. [31]	Attention Memory Problem solving Interpersonal skills Psychological support Education for consequences of brain injury	Work task simulation (Virtual)	Liaison with employer Modification of work environment	Electronic cueing devices Simulation software	Core -group Work specific -Individual	n/a
Roth and Lovell [32]	Memory Organisation Orientation	Education for RTW services and policy	n/a	Assistive technology	n/a	n/a
Salazar et al. [28]	Coping skills Planning and organisation Pragmatics	Work placement			Individual and group	Occupational Therapist, Neuropsychologist, Physiotherapist, Speech Pathologist
Sarajuuri et al. [29]	Coping skills Psychosocial adjustment Self-awareness Pragmatics Education from former rehabilitation participants Emotional support/regulation	Supported work trials	Recommendations for future RTW support Follow up support is arranged		Group and Individual	Neuropsychology, Social Work, Speech Pathologist, Occupational Therapist, Physical Therapist
Smith [51]	Travelling to/from work	n/a	n/a	Work coordinator Simulated work enviro Public transport	Individual and group	Physiotherapist, Occupational Therapist
van Velzen [37]	Cognitive Concentration Planning Organisation	Work goal development Education for RTW process and policy	Written handover to community clinician and employer Educate employer about brain injury and RTW processes	Simulated work environment RTW coordinator Employer	Embedded within usual care	Occupational Therapist Work rehabilitation specialist Cognitive skills specialist
Watanabe et al. [27]	Self- awareness Psychosocial skills Coping Anxiety Mood Self esteem	Simulated work situations	n/a	RTW coordinator	Individual and Group Peer feedback Work	Physiotherapist, Occupational Therapist, Psychologist, Speech Pathologist, Social Worker

RTW return to work

Table 4 Enablers for early RTW intervention

Author	Enabler
	Structure
Braverman et al. [23]	RTW intervention is embedded in usual care Client is allocated ward-based responsibilities that mimic work requirements (being dressed to attend breakfast, washing and putting away own utensils)
Buffington and Malec [30]	RTW intervention is embedded in usual care A RTW coordinator is assigned to each person
Donker-Cools et al. [57]	The client is actively involved in setting own RTW goals The client and family are educated about the consequences of brain injury The client is provided opportunity to practice work tasks to gain an understanding of capacities Frequent communication between employer and clinician
Gilworth et al. [39]	RTW policy and processes are discussed with the client and their family *Expectation* Possibilities of RTW are discussed early with the client
Hellman et al. [41]	A RTW Coordinator is appointed to take responsibility for the overall RTW process The client is provided opportunities to practice/ trial work tasks to develop an understand of own capacity Consideration for the client's entire life situation, including; transport, finances and family life
Van Velzen et al. [37]	Embedded in usual care RTW is addressed as soon as possible after the person enters rehabilitation A RTW coordinator oversees the RTW process
Watanabe [27]	Designated spaces to simulate work environments for RTW intervention Belief in future return to work
Bush et al. [42]	The client needs to have strong motivation for RTW The focus for RTW intervention needs to be on strengths and not lost abilities
Donker-Cools et al. [57]	The client has a strong drive to RTW The client is provided opportunities to develop self-awareness of capacity The client is supported to accept consequences of neurological impairment to explore new worker roles The client is educated about the consequences of brain injury on work
Hellman et al. [41]	Provide opportunities for the client to test capacity and discover what they can do through doing work tasks
Medin et al. [8]	Providing opportunities to practice work tasks regardless of level of function
Roth and Lovell [32]	Actively establish belief in return to work capacity Discuss work early in admission
Soeker et al. [10]	Encourage client to accept brain injury Practicing work tasks improves belief in work capacity
Soeker et al. [14]	Fostering self -belief enhanced engagement in work interventions
Van Velzen et al. [36]	Motivation and strong will influenced RTW outcomes
	Training
Hellman et al. [41]	Clinicians have knowledge of RTW policy and procedure Clinicians have knowledge of the impact of neurological impairment for RTW Employer is provided with education on brain impairment and recovery
Holmes et al. [38]	Training for clinicians needs to include multiple methods (case studies, role play, pre reading, homework, mentoring)
	Training
Sinclair et al. [33]	A RTW pathway/ guideline provides for inpatient clinicians to follow Clinician awareness of RTW policy and guidelines Work rehabilitation specific training for clinicians Routine collection and feedback of RTW outcomes
Van Velzen et al. [36]	Clinicians have specialised knowledge of RTW intervention and processes
Van Velzen et al. [37]	Formal clinician training improves confidence in delivering RTW interventions RTW protocol with reminders of when to address work improves clinician confidence providing intervention Clinicians are provided examples of positive RTW outcomes
	Collaboration
Buffington and Malec [30]	RTW interventions are designed and implemented by the multi- disciplinary team The client is responsible for setting own RTW goals
Hayden et al. [24]	All rehabilitation professions are responsible for providing RTW intervention

Table 4 (continued)

Author	Enabler
Hellman et al. [41]	All stakeholders (client, family, clinicians, employer and insurer where applicable) understand each other's roles Clear communication of level of function between inpatient clinician, community rehabilitation and employer Continuity of intervention between inpatient and community rehabilitation service
Kerschke and Witas [9]	Consistent use of RTW intervention strategies across all professions
Medin et al. [8]	Consistent use of RTW intervention strategies across all professions Involvement of workplace/employer
Scott and Bondoc [40]	Client is enabled to take control of RTW process
Soeker [34]	Client is central to process Transparency with the employer
Soeker et al. [10]	Transparency with employer Respectful interaction with client and family
Sinclair et al. [33]	Clear communication of information from inpatient to community services Collaboration between inpatient clinicians, community clinicians and employer
Smith [51]	Client directs process

RTW return to work

Clinician Training

Five studies highlighted the importance of providing structured and ongoing training to clinicians in work assessment and interventions [9, 33, 33, 38, 39, 49]. Clinicians often reported that they lacked confidence to discuss work with clients and had limited knowledge of work assessment and/or intervention that could be facilitated within an inpatient setting [37, 38]. Training was most useful to clinicians when provided both formally and informally. Clinicians believed that they benefited from interactive group sessions where there were opportunities to problem solve with each other as well as supervised sessions [37, 38, 51]. When training was provided in this format it appeared to increase the frequency that clinicians would provide work intervention [38]. Training resources such as intervention templates, worksheets, and written guidelines/ pathway were also used to prompt clinicians to provide work intervention [37, 38, 55].

Belief in Future Work Capacity

The expectations and belief in future work capacity following neurological impairment was discussed frequently by clients. When reflecting on their experiences of return to work intervention having a strong sense of self-belief in the possibilities of working again in the future was paramount for remaining motivated and engaged in the rehabilitation process [8, 10, 14, 32, 41, 43, 56]. Furthermore, when clients expressed a strong belief that they would return to work in the future, they were more successful at relearning work skills and thus more likely to be successful with eventual return to work [10, 14, 43, 56]. While some clients had innate self-belief, it was also discussed that clients can be supported by clinicians to develop belief in their future work possibilities through a process of acceptance of the consequences of neurological injury and reflection on improvements made during rehabilitation [34, 35, 41]. Indeed, clients expressed that it was also important that their treating clinicians had belief in their ability to one day return to work, however they felt this was rarely the case [8, 10, 14]. Clients voiced that in many instances, clinicians avoided discussing their pre-injury work and setting work goals with them, demonstrating that the clinician believed, return to work would not be possible [8]. When clinicians avoided addressing work during hospitalization, clients assumed that this meant that returning to work would not be possible, thus eliminating their own belief in returning to work, even amongst those clients who commenced rehabilitation with strong self-belief in future work participation [8].

Discussion

Inpatient clinical teams often discharge people from hospital without providing any return to work intervention or support [33]. The findings from this review suggests that delaying return to work may reduce clients' own self-belief in their return to work ability [32–35, 43]. Importantly, the review also demonstrated that it is feasible to integrate work interventions into an inpatient setting when working with clients with a brain impairment from stroke or traumatic brain injury. Studies suggest that the concept of work can be reduced to key components during the inpatient admission; for assessment these include pre-injury work history, core work skills, work specific skills and the personal perspective of work; and for work intervention, these included core work skills, work specific skills, education and discharge planning.

Administering work assessments and providing work interventions in the inpatient setting were acknowledged to be difficult for clinicians. A number of enablers that can support a work-focus were identified across studies, suggesting that there is opportunity to target these factors and increase the integration of work assessment and intervention into inpatient rehabilitation programs. These enablers included establishing an appropriate physical and cultural structure in the unit, providing clinician training, and holding a strong sense of belief that work is an achievable outcome for people after brain impairment. While no studies targeted all of these enablers, further research could test the efficacy of using interventions to promote enabling factors and the effect on inpatient return to work interventions on return to work rates.

It was clear that clinicians consider work to be a key component of inpatient rehabilitation, but for them to facilitate interventions, the rehabilitation facility needs to be well structured and resourced, both in terms of the physical environment and team culture [8, 24]. All staff need to be aware that they are expected to be addressing work to ensure collaboration and a consistent sense of belief across all the professions. Even in the traditional ward environment, several components of work can be integrated into therapy. Findings appear to suggest that return to work needs to be the domain of all clinicians [24, 33, 41] and that all rehabilitation staff need to feel confident to assess and provide work interventions appropriate to their profession [38, 41]. To enable this, clinicians may benefit from both formal and informal training to strengthen capacity with return to work intervention components. Finally, the facilitation of return to work intervention needs to closely reflect the client's pre-injury work, which in turn requires dedicated, flexible spaces and equipment within the inpatient setting to simulate work tasks. While none of the included studies presented resources found to be useful for rehabilitation, future studies should, so as to increase translation opportunities.

Assessment of work history is recommended to form part of all inpatient rehabilitation assessments, irrespective of the clinical team's belief in likelihood for return to work. Such an assessment would ensure two things: (1) that work becomes embedded as a focus of the client's rehabilitation program, and (2) that a discussion between clinician and client occurs about pre-injury work, which based on our review findings, can work to develop a belief in work capacity after injury. In addition, early education should also be provided to the client about return to work services and entitlements available (relevant to their situation) that may be accessed in the future.

This review highlighted that return to work intervention can be commenced very early during inpatient rehabilitation, regardless of the client's readiness to resume work. By creating an explicit link between routine, ward-based tasks and responsibilities and core-work skills, assessment and practice of these skills may begin to occur frequently. For more significantly impaired clients, much of their inpatient stay may involve only practice of core-work skills, and while these skills apply more broadly to activities than just work alone, the explicit link to work may increase belief in the client. Importantly, work assessment and intervention should be complimentary, with assessment informing the complexity and grading of work interventions prescribed.

It is important that inpatient return to work intervention is considered to be only the commencement of the return to work rehabilitation process, and not the only opportunity available for addressing work needs. Preparation for ongoing work rehabilitation in the community is an essential step for the continued belief in future work potential after neurological impairment. Depending on the client's work readiness, the type of work intervention provided in the community will differ. Unfortunately, the reviewed articles did not provide specific guidance on how to best assess work readiness. It is therefore important that decisions regarding referrals for community (post-discharge) work rehabilitation be made collaboratively between the client, their family and the referring clinical team.

Findings highlight the necessity to support clinicians with not only appropriate training but also the appropriate resources and rehabilitation structure to enable the provision of return to work interventions. Well-designed clinical trials testing the efficacy and cost-efficiency of integrating work interventions within inpatient settings are, however, missing. An early work rehabilitation protocol has been established in the Netherlands [37]. Consistent with this review, the protocol instructed the assessment of pre-injury work history, work skills, and work intervention during the inpatient phase of rehabilitation [37]. While the use of this protocol increased the number of discussions about work between clinicians and ABI survivor's, clinicians still felt that they lacked the time, knowledge and skills to facilitate both work assessment intervention [48].

A significant limitation of the present review was the limited number of studies and small sample sizes of those included. We acknowledge that our search strategy only included studies published in English, potentially excluding relevant papers published in other languages. Another limitation is that we only included papers which delivered their assessment or intervention in a hospital, and poor reporting of an intervention could lead to exclusion. Furthermore, we acknowledge that stroke and TBI are different populations who may differ in outcomes and that return to work interventions may differ across these populations, however at present there is little evidence available regarding the effectiveness of work interventions in inpatient rehabilitation settings, thus it was necessary to explore this data together to identify potential return to work pathways. We anticipate that with

the growth of literature in this field it will become necessary to identify interventions more suited to different populations.

Most importantly, scoping review methods do not provide a critical appraisal of the quality of included studies, therefore, no conclusions about the method, study rigour or bias are made. Nor do scoping review discuss efficacy, and as such, we do not draw claim that early return to work interventions provided in hospitals are effective. While this remains a limitation, it is worth noting the low numbers of randomised controlled trials (n = 4) and variations in outcome assessment methods, and together this strengthens our recommendation that well-planned, randomised controlled trials testing the efficacy of early return to work are needed.

Conclusions

In this scoping review we presented current knowledge on the nature of inpatient return to work intervention and the enablers for integrating this within standard inpatient rehabilitation. The findings of this review have the potential to direct changes in multi- disciplinary practice during inpatient rehabilitation to increase the focus on work intervention. The investment in training and support for clinicians as well as adequate physical and social structure is key to integrate work into inpatient rehabilitation settings. Current evidence suggests this is currently not occurring in practice. The continued focus primarily towards 'home-based' skills during inpatient rehabilitation, undermines the importance of returning to work after neurological impairment across the entire continuum of care. Proactive change is needed within inpatient rehabilitation settings to support and facilitate the consistent multi- disciplinary delivery of return to work intervention to all clients after neurological impairment.

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