Journal of Multidisciplinary Healthcare Dovepress

Open Access Full Text Article ORIGINAL RESEARCH

An Innovative Preventive and Rehabilitative Model for Acute Care: The Independence Model

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Purpose: The Independence Model (TIM) is a new rehabilitative model of care implemented in an acute care hospital to address patients' functional decline and a high vacancy rate for rehabilitation therapists.

Methods: TIM was developed by a team with expertise in evidence, scope of practice and roles, population care needs, and current state related to rehabilitation. TIM utilizes rehabilitation assistants, supervised by physical therapists, occupational therapists or speech-language pathologists, to assist patients in functional areas such as ambulation, activities of daily living (ADLs), cognition and communication. The planning team ensured patient engagement, utilized change management principles, and evaluated the effectiveness of care.

Results: Preliminary evaluation of TIM was positive, with staff reporting improved caseload quality and patients feeling more prepared for discharge.

Conclusion: This study suggests innovative models of care, such as TIM, can help address the functional needs of patients while navigating the global health human resource crisis.

Keywords: multidisciplinary, optimization, health human resource crisis, model of care, function, hospital

Introduction

Patients admitted to acute care are at significant risk of functional deterioration without appropriate interventions, including early mobilization.[1,2] Acute care settings report an "epidemic of immobility".[3] Low physical activity and bed rest during hospitalization are associated with serious adverse outcomes, such as functional decline, hospital-acquired disability and, increased length of stay.[4] It is estimated that patients spend approximately 83% of their time lying in bed when admitted to hospital,[5] and multiple studies have shown a severe loss of muscle strength after several weeks in bed,[4–6] with strong evidence supporting the benefits of mobilization while in hospital.[7] According to Liu et al[6] each day spent immobile is associated with one to five percent loss of muscle strength in an older person, which can quickly result in the loss of the ability to transfer and ambulate independently. Globally, mobility focused programs have been established to successfully address this significant impact. Examples of these are the "End PJ Paralysis" global initiative,[8] or the Mobilization of Vulnerable Elders in Ontario (MOVEON) program that has expanded across other provinces in Canada.[6] Both programs target mobility only and are reliant on physical therapists to deliver interventions.

Although mobilization programs improve aspects of function which rely on the ability and capacity to move, many other functional skills are neglected, and a more holistic approach is required to address overall function and independence.[9] Eating, performing personal care tasks or activities of daily living (ADLs), reorientation and socialization, are all necessary to preserve the independence of patients.[9,10] In the literature, however, few programs extend the focus beyond early mobilization toward broader functional goals. One of the very few programs identified was the Eat Walk Engage program in Brisbane, Australia,[11] which targets mobility, nutrition and cognition through interventions delivered by an interdisciplinary team and championed by allied health professionals. Although the Eat Walk Engage

Received: 20 August 2024
Accepted: 10 October 2024
Published: 29 October 2024

program broadens the scope of early mobilization programs, it focuses on preventing mobility decline, malnutrition, and delirium in the elder population. There was therefore an opportunity to expand this preventive approach to include a younger patient population at risk of functional decline, and cover additional key areas of function such as activities of daily living (ADLs), cognition and communication.

Although there is a lack of formal data related to patient function, some anecdotal observations and informal data related to challenges in addressing functional needs of patients has been gathered in recent years at the urban tertiary care hospital where the authors practice. Particular difficulties are usually noted on the medicine units due to a growing population of patients with complex medical and social needs.[12] An internal audit conducted by speech-language pathologists (SLPs) in 2018 on the medicine wards concluded that only 32% of the patients screened were sitting in a chair or wheelchair for meals, which has been identified as the safest position to eat for frail patients at higher risk of experiencing dysphagia.[13] This percentage is in line with other similar results seen in the literature.[14] A patient survey of patients admitted to all acute care units at the study site revealed that only 53% of respondents were able to take a shower when they wanted during their stay. Furthermore, a research project conducted in an elder care unit at the study hospital in 2012 showed that only 7.5% of dependent patients had documentation in their chart that oral care was provided.[15]

In addition to a lack of models of care to holistically address functional decline and deterioration in hospital, a global health human resource crisis has resulted in unprecedented challenges in recruiting and retaining nursing and allied health staff, further affecting health care organizations' ability to deliver rehabilitation-related care on acute inpatient units. In 2021, data from the study hospital indicated significant shortages of all rehabilitation professionals, with a 28% vacancy of physical therapists (PTs) on the medicine program. These challenges are partially the result of increased demand for healthcare workers, and staff shortages. As of 2023, the demand for healthcare workers worldwide was of 80 million, with a global shortage of 15 million.[16] In the 38 member countries of the Organization for Economic Co-operation and Development, health and social work employment on average increased by 49% between 2000 and 2019.[16] By 2037, the Canadian population aged 65 and older is expected to increase by 68%.[17] Choice of practice setting is further affecting the supply of rehabilitation professionals in the publicly funded Canadian health care system, with evidence showing that the percentage of PTs choosing private practice in Canada rose from 48% in 2012 to 59% in 2021.[18] Addressing these challenges requires urgent attention and strategic initiatives to attract, retain, and support qualified professionals in these essential roles, and ensure patient needs are met.

The shortage of rehabilitation therapists at the study hospital, challenges meeting the functional needs of patients, and lack of models in the literature to target holistic function resulted in the development of an innovative model of care, The Independence Model (TIM).

Methods

The Independence Model

TIM was developed using a framework from the Agency of Clinical innovation (ACI) in New South Wales, Australia.[19] ACI's process involves five phases: project initiation, diagnostic, solution design, implementation, and sustainability. In the project initiation phase the focus is identifying a need, making a case for change and obtaining sponsorship. The diagnostic and solution design phases revolve around understanding the problem and identifying a solution. Implementation involves supporting the necessary changes to put the care model into action, and in the final sustainability phase, the care model is optimized and results are evaluated. This section will describe the development of TIM using the ACI framework and outline the components involved in each phase of the model's evolution. The Standards for Quality Improvement Reporting Excellence (SQUIRE V.2.0) guided the writing of this manuscript.

TIM was initiated in response to a lack of rehabilitation therapists at the study hospital, and subsequent challenges in meeting the functional needs of patients. To address these issues, a case was made for a new care model that would alleviate the health human resource crisis and provide more rehabilitation services. Additionally, an argument was developed for the economic benefits of rehabilitation, including how the model could contribute to reducing the length of stay and healthcare costs.[20] Endorsement and sponsorship for a pilot model of care were secured from the professional

practice office and the medicine program, with the agreement to use a surplus from unfilled therapy positions to fund the new model.

During the diagnostic and solution design phases, from July to November 2021, the practice office conducted a thorough review of the literature and consulted rehabilitation and subject matter experts to gain a comprehensive understanding of the problem and identify a solution. A novel care model was designed with the goals of promoting independence from the day of admission, improving outcomes in multiple areas of function, enhancing the patient experience and alleviating workloads for nurses and therapists. A pilot was implemented in November 2021 in the medicine wards of our hospital. The model was named TIM because the focus of the program was on promoting independence, with an aim to improve functional outcomes and the patient experience, while enabling therapists and nurses to focus on specialized interventions.

Two patient and family partners with lived experiences on the medicine program were engaged to provide their perspectives and experiences. Patient engagement was critical because the literature clearly indicates engagement improves health outcomes, and patients and families are necessary when redesigning care.[21] Patient partners described a lack of care related to maintaining independence, with one partner reporting insufficient support for toileting and another partner experiencing limited care for maintaining independence after acute medical symptoms were resolved. Their insights significantly contributed to understanding the gaps in care and influenced the design of TIM.

Determining which occupation could best meet the goals of TIM was a crucial part of the design solution phase. Rehabilitation therapists, nurses, rehabilitation assistants (RAs) and patient care aides were considered for the model. Skills, competency and education of the different occupations were evaluated, and a matrix was developed to map the care needs of patients to the optimal provider. Although therapists could perform most of the tasks in the model, they sometime lacked knowledge in other areas to provide holistic care (eg PTs had limited knowledge of oral care). Moreover, therapists were highly specialized and difficult to recruit. Patient care assistants had some training in functional care but lacked the rehabilitation knowledge required to encourage independence. Nurses had the skills to meet the needs of patients but had limited rehabilitation-specific training and time for rehabilitation-focused interventions. After reviewing of the curriculum for RAs from two colleges in British Columbia, it was determined that RAs had the necessary training and competence to meet the needs of TIM.[22] In addition, RAs were easier to recruit than therapists, and so this occupation became a central part of the model. Communication was carried out on the medicine wards and the different departments involved (eg, nurses, PTs, occupational therapists (OTs), SLPs) through posters and informative sessions. The leadership on the medicine program, as well as the professional practice leaders of the rehabilitation disciplines, acted as champions of TIM, and encouraged their teams to attend the sessions and to use the new model of care.

During the sustainability phase, which extended from implementation to securing long-term funding, a modification to TIM was necessary to guarantee its success. Initially, the model relied on nurses and allied health professionals to identify suitable patients for TIM. After several months and ongoing education, nurses and allied health staff were not referring an adequate number of appropriate patients for TIM. To improve coordination and support for the RA team and ensure the identification of appropriate patients, the model was refined.

A transdisciplinary therapy lead (TL) was added to the model after careful consideration of the program's goals, which aimed to address multiple areas of function. The TL was recruited from multiple rehabilitation disciplines (ie OT, PT, or SLP) and designated to screen all patients admitted to the medicine unit for functional decline and identify those suitable for TIM. The TL liaised closely with the unit therapists to develop and enhance clinical capabilities and scope to target multiple areas of function. The TL independently screened patients who might require a broad range of interventions. Additionally, the TL connected with nursing staff through care team rounds and collaborated with rehabilitation therapists to provide education on TIM, functional decline and rehabilitation interventions.

Evaluation of the Model of Care

Electronic Health Record

Data from the electronic health records (ie, Cerner, USA) was extracted and analyzed by the department of data analytics at the study hospital: Length of stay (LOS), number of consults to PT, OT and SLP, and days in alternate level of care

status (ALC), which occurs when a patient is medically stable but remains hospitalized in an acute care bed, were compared between patients followed up by TIM and patients not associated to TIM.

RA Tracking Tool

TIM RAs collected daily data on patients seen, reasons for referral, and interventions performed. This data was later analyzed.

Medicine Staff Survey

One year after the implementation of TIM, a staff survey was conducted on the four medicine wards at the study hospital. The purpose of this survey was to measure staff satisfaction with TIM, impact of TIM on other staff's caseloads, and staff perception of discharge readiness of the patients that worked with TIM RAs. A wide range of professionals (eg, nurses, nurse leaders, educators, managers, PTs, OTs, SLPs, RAs, social workers, dietitians, and students) working on the medicine wards participated in the survey, which included Likert-scale and open-ended questions. Consent was verbally obtained prior the completion of each anonymous survey, and no confidential data was collected. The survey was developed and validated by the Canadian Foundation for Healthcare Improvement.[23] The questions included were modified to be specific to TIM and are shown in Table 1.

Patient Experience Survey

The Patient Experience Survey (PES) for acute inpatients is conducted by a provincial office and questions are sent to patient post-discharge to gather data regarding the experience of patients admitted to acute care. After implementing TIM, leaders at the study site requested the provincial survey office to include four function-related questions in the survey for patients admitted to the medicine wards. The questions focused on the experience related to three areas of function covered by TIM RA tasks, plus one question about discharge readiness. These are shown in Table 2.

Results

Electronic Health Records

No decrease was observed in LOS, days spent as ALC, or the number of consultations with rehabilitation therapists when comparing patients followed by TIM with those not followed by TIM. In fact, increases in all these outcomes were observed.

Table 1 Responses to Select Questions from the Staff Survey Conducted During Implementation of the Independence Model in the Medicine Wards

Question	% Responses Reported (Agree or Strongly Agree) (n= 42)
I know when a patient needs TIM (Agree or Strongly Agree)	81
Overall, I am satisfied with the TIM program (Yes)	86
TIM has added (extra work) to my caseload (Agree or Strongly Agree)	89
TIM helps me be more effective in/focused on my work (Agree or Strongly Agree)	76
Using TIM, I am more confident that patients and their caregivers are adequately prepared to return home (Agree or Strongly Agree)	83

Table 2 Responses to Select Questions from the Patient Experience Survey (PES), from Patients Admitted to the Medicine Wards, Conducted After Being Discharged

Question	% Responses Reported
During this hospital stay, did you feel you were given the opportunity to get up and walk to the bathroom, whenever you needed to use the toilet? (Usually or Always) (n=149)	93
During this hospital stay, did you feel you were encouraged by staff to get up to eat your meals either sitting at the side of the bed, in a chair or wheelchair? (Usually or Always) (n=143)	70
During this hospital stay, did you feel you were encouraged by staff to do your own self-care (eg, shower, brush your teeth?) (Usually or Always) (n=143)	70
Before you left the hospital, did you feel that you were physically ready to go home? (Quite a Bit or Completely) (n=156)	84

RA Tracking Tool

Data from the tracking tool from March 2022 to March 2023, indicated TIM RAs saw 1131 new patients, with an average of 94.2 new patients each month on the medicine units. In terms of total caseload, the TIM RAs cared for an average of 40.77 patients per day, or just over ten patients per RA. The number of patients seen by TIM Ras per day equated to over 40% of the patients in medicine units at the study hospital. The outcomes section delineates the tasks and interventions executed by the TIM RAs, as illustrated in Figure 1. Notably, cognitive stimulation and socialization emerged as the predominant interventions, comprising 28% of TIM tasks, succeeded by ambulation at 26%, encouragement for functional tasks and provision of supplies (eg,

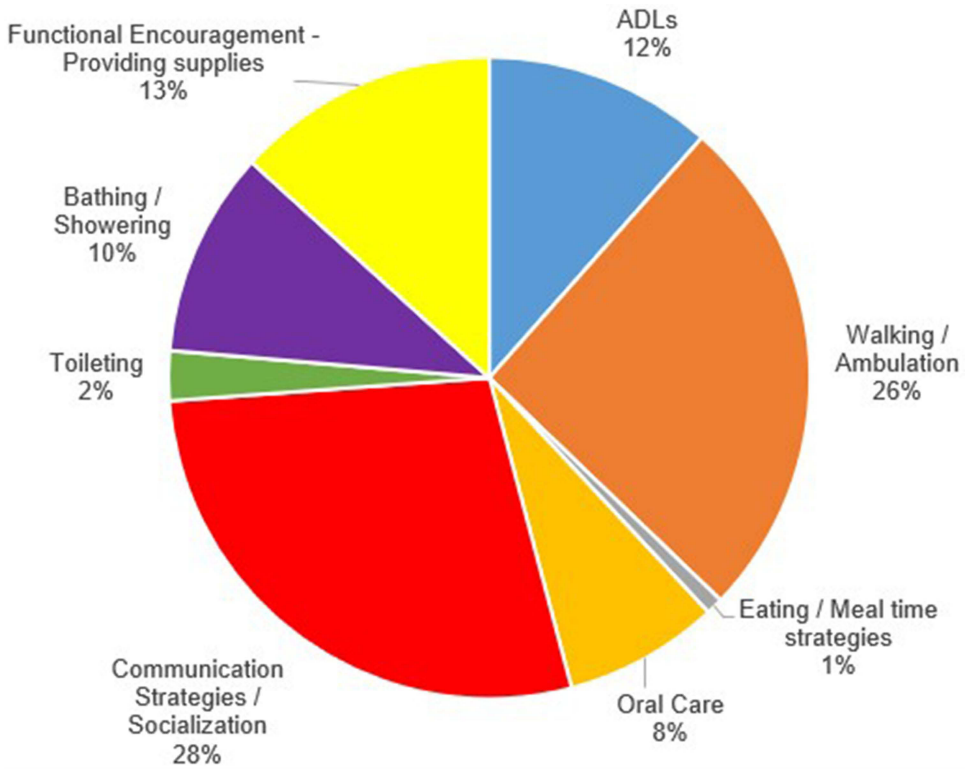

Figure 1 TIM RAs interventions in percentage of total direct care time. Average from March 2022 to March 2023. ALDs: activities of daily living.

toothbrushes, tablets, etc.) at 13%, ADLs at 12%, and miscellaneous activities like assistance with personal hygiene or oral care with comparatively lower percentages.

Medicine Staff Survey

A total of 54 staff members on the medicine units responded to the TIM staff survey, including registered nurses, licensed practical nurses, patient care aides, RAs, OTs, PTs, SLPs, registered dietitians and social workers. Among these respondents, 12 staff members who had never used TIM were excluded from the analysis. It was observed that 81% of the staff members directly involved in patient care on the medicine units had a clear understanding of which patients were suitable for a TIM referral, while 19% indicated uncertainty in identifying appropriate referrals. Regarding satisfaction with the TIM program, 86% of the surveyed staff expressed satisfaction, with the remaining 14% reporting otherwise. Additionally, 89% of staff who utilized TIM stated that it did not increase their workload, while 11% disagreed. In terms of effectiveness and focus, 76% of the staff strongly agreed or agreed that TIM aided in enhancing their effectiveness and concentration at work, 16% reported no noticeable impact, and 8% disagreed with the notion that TIM improved their focus. Lastly, 83% of ward professionals either strongly agreed or agreed that utilizing TIM instilled greater confidence in them regarding the preparedness of patients and their caregivers for discharge. Detailed survey results are presented in Table 1.

Patient Experience Survey

The data from the PES utilized in our evaluation spanned from October 2022 to March 2023. Analysis revealed that 93% of patients reported being offered the opportunity to walk to the bathroom always or sometimes, while 7% indicated they were either rarely or never given such an opportunity. Regarding mealtime positioning, 70% of patients stated they were sometimes or always encouraged by staff to eat their meals while seated at the bedside, whereas 30% reported receiving little to no encouragement in this regard. In terms of self-care support, 70% of respondents reported being usually or always encouraged by staff to engage in activities such as showering or brushing their teeth, while 30% indicated occasional or no encouragement. When queried about their readiness to return home upon discharge, 84% of respondents felt "quite a bit or completely" prepared, while 16% felt "partly or not at all" ready. Detailed results are outlined in Table 2.

Discussion

TIM represents a significant advancement in clinical workforce optimization, emphasizing a team-based, preventive, and holistic approach to rehabilitation in acute care. Its development involved the creation of a novel care model to address identified challenges and service gaps. Notably, TIM prioritizes patient-centered care, with input from patient partners from its inception, ensuring a focus on value-based care. Central to the success of TIM is the optimization of RA roles, leveraging their expertise to address functional tasks and expanding their role to cover areas not requiring direct supervision. This change also enhanced the ability of nurses and therapists to provide specialized care.

Change management techniques[24] and effective communication were pivotal throughout TIM's development and implementation phases, particularly in altering the dynamics between therapists and assistants. Concerns regarding the expanded role of RAs prompted consultations with professional colleges to ensure adherence to standards of practice. Resources such as the Competency Assessment, Planning, Evaluation (CAPE) Tool were instrumental in assessing and addressing any knowledge gaps among RAs.[25] Additionally, a task list and decision support tool were developed to guide RAs in delivering interventions effectively and ensuring appropriate consultation with the TL and referrals to therapists. Evaluation of the TIM model was integral to its refinement and sustainability. Feedback mechanisms, including staff and patient surveys, provided valuable insights into the model's impact.

A critical innovation to the model was the introduction of a transdisciplinary TL, which facilitated coordination and increased patient referrals, underscoring the model's effectiveness and demand. Evidence on transdisciplinary teams, which embrace overlapping skills and blur traditional professional boundaries, demonstrates that they can improve time-efficiency and quality of patient care in hospital settings.[26] A transdisciplinary approach was chosen as it allowed the TL to integrate the knowledge and methods from all the rehabilitation disciplines for comprehensive screening, enabling a holistic approach. Unlike multidisciplinary or interdisciplinary frameworks, which maintain distinct disciplinary

limitations, a well-implemented transdisciplinary approach transcends these boundaries while fostering collaboration. This approach allowed the TL to work closely with the unit therapists, promoting innovative solutions and leveraging the strengths and expertise of various rehabilitation fields, thus effectively addressing multiple facets of patient function.

While metrics from the electronic health record did not demonstrate significant improvements related to TIM, largely due to the complexity of the population seen by TIM and of the patients admitted to the medicine program,[27,28] the data collected by the TIM RAs demonstrates the program's success. As a result of implementing TIM, a large number of patients on the medicine units are now receiving holistic care to maintain and improve function. These patients would not have received this type of care prior to TIM which would have likely contributed to functional decline, as seen in the literature.[1–5] Several factors likely contributed to the observed increase in LOS and number of patients on ALC status. One explanation is that TIM RAs often handle care for the most complex, long-stay patients, leading to higher LOS and ALC rates for TIM patients. The rise noted in referrals to rehabilitation therapists might be attributed to improved screening and identification of patients by the TL, along with increased therapist capacity due to transitioning care to the TIM RAs when specialized services were no longer necessary.

Staff's feedback highlighted positive perceptions and reduced workloads, noting that TIM had a significantly positive impact on the care team members working with the model. A large majority of professionals that provide direct care in the medicine units at the study hospital reported they knew when a patient needed TIM and felt satisfied with TIM. The time invested by the professional practice office and the TL in communicating the model to all staff, likely helped to gain this understanding. Having nursing and allied health leaders, and clinical educators as champions of the model contributed to this in a significant way. Most staff reported that TIM had not added to their caseloads, and that they were more effective and/or more able to focus on their daily work. These questions were aimed to assess if TIM was decreasing the workload burden for nursing and allied health, and therefore contributing to better satisfaction and ability to meet the patients' care needs. When healthcare workers are relieved of duties outside the primary roles they were specifically trained and hired for, their job satisfaction increases.[29] This improvement in job satisfaction can lead to long-term benefits in staff retention.[30,31]

According to the PES results, a large percentage of patients received the encouragement to maintain function in multiple areas directly related to tasks performed by TIM RAs. Unfortunately, previous data from this same survey predating the implementation of TIM is unavailable for comparison as TIM-specific questions were not included in prior surveys. However, aside from offering a snapshot of patient experiences, comparisons with previous data sources and internal audits further validate the positive effects of TIM on maintenance of function. With 41% of the patients admitted to medicine at SPH under the care of TIM RAs during the study period, the model's impact on patient experiences appears substantial. Discharge readiness is arguably the area in which the strongest comparisons can be made, providing valuable insights into the effectiveness of TIM. Approximately 83% of the medical staff strongly agreed or agreed that patients were better prepared to return home with TIM. This percentage closely mirrors the 84% of patients who reported feeling prepared for discharge on the PES after being discharged from the same wards. The alignment between staff and patient perspectives suggests a strong validation of TIM's impact on discharge readiness. Comparing this to data from a study by Black et al[32] in the same medicine wards at the study hospital in 2021, where 53% of patients reported feeling better prepared for discharge after implementing a patient-oriented discharge summary (PODS), highlights the effectiveness of TIM. Our staff survey and the PES indicate a significant improvement over the PODS implementation, with TIM resulting in significantly higher rates of staff and patient satisfaction related to discharge readiness.

Despite its overall success, the evaluation of TIM faced limitations, including a lack of objective functional outcome measurements. However, ongoing efforts to collect and analyze data on patient outcomes hold promise for further elucidating TIM's benefits and informing its expansion to other units or hospital sites.

Conclusion

In conclusion, TIM represents an innovative approach to addressing the evolving challenges in healthcare, emphasizing proactive, patient-centered care and optimizing the roles of the healthcare workforce. The implementation of this innovative model and the overall positive evaluation of TIM have led to widespread support from patients, nurses,

therapists, and leaders. Continued evaluation efforts, including those currently underway to assess the impact on functional outcomes, will be essential for fully understanding TIM's impact, maximizing its potential across diverse healthcare settings, and understanding how innovative models can enable hospitals to meet patient needs in the context of global health human resource shortages.

Ethics Approval and Informed Consent

Data collection for this study was conducted for program evaluation purposes. Following discussion with our organizational ethics office, our project was deemed to be quality improvement and did not require full ethics board review. With a minimal score on the ARECCI ethics screening, further follow-up with the Providence Health Care Research Ethics Board (affiliated to the University of British Columbia) confirmed that this study was exempt of ethics review as stipulated in the article 2.5 of the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans – TCPS 2 (2022). Organizational privacy policies and the SQUIRE 2.0 Quality Improvement guidelines were followed. For these same reasons, written consent for our staff survey was not required and consent was verbally obtained prior to the completion of each individual survey. No personal or confidential information was included in the survey. The Patient Experience Survey is conducted by the Office of Patient-Centred Measurement of the British Columbia Ministry of Health under the provisions of "consistent purpose" in BC Freedom of Information and Protection of Privacy Act.

Acknowledgments

The authors would like to thank our patient partners, the professionals that held the TIM therapy lead position, the TIM rehabilitation assistants, the leaders of the PT, OT and SLP departments, the directors of professional practice at Providence Health Care, and the operational leaders of the medicine wards at St. Paul's Hospital.

Disclosure

The authors report no conflicts of interest in this work.

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