FOCUSED QUESTION
Does home and community-based post-acute brain injury rehabilitation (PABIR) for adults with traumatic brain injury (TBI) improve quality of life?


CLINICAL BOTTOM LINE:

Researchers used a Level II, cohort design study to determine if home and community-based post-acute brain injury rehabilitation (PABIR) is effective (p. 1697). There were 603 participants selected from consecutive admissions of traumatic brain injury patients in community-based rehab programs. Participants were divided into two groups: completed course treatment (CCT) and precipitously discharged (PD). The participants in the CCT (intervention) group received a complete course of treatment in which services targeted one or more functional goals, such as independence in activities of daily living (ADLs) and increased community participation. Participants received clinical case coordination and services in at least two other clinical disciplines (occupational therapy, social work, speech–language therapy, recreational therapy, physical therapy, and/or psychological therapy). The CCT group received a full course of prescribed rehabilitation treatment, and was compared to the PD (comparison) group. The PD participants received therapy in the same manner, but were discharged before they completed their individualized prescribed rehabilitation programs, either unexpectedly or with less than a week of planning time (pp. 1698–1699).

Participants were not randomly divided into groups. Most participants were in the CCT group, while a fraction of participants were in the PD group due to the decisions of physicians, family members, or themselves, or factors beyond their control (e.g., funding, transportation issues). These programs took place in seven unspecified geographically diverse states in the United States. The participants’ treatment teams used the Mayo-Portland Adaptability Inventory (MPAI-4) to report the effectiveness of PABIR for participants, and the researchers used the information in a retrospective analysis. Personalized PABIR was delivered to the patients at their homes and in community settings by licensed clinicians. The MPAI-4 Participant Index was then completed via telephone at 3 and 12 months after discharge, collecting data from participants or their significant others (pp. 1697–1699). The results of this study indicate that
fully completed PABIR in home and community settings resulted in significant positive changes in community participation and full MPAI-4 scores for participants in the intervention group, as compared to a group discharged before program completion (pp. 1699–1703).

One limitation of this study design is the lack of randomization in both participant selection and assignment to treatment vs. control groups. However, randomization of participant selection would have been unethical, as all participants needed to have a form of treatment provided. A second limitation is possible error when the researchers administered the MPAI-4 follow-up questions via telephone. Participants and their significant others provided information instead of a treatment team familiar with the MPAI-4 (p. 1703). Another limitation is the study’s lack of descriptive statistics regarding how many participants received each type of therapy (e.g., occupational therapy), and the frequency/duration of treatment.

Although the study has a number of limitations, it has positive implications for clinical occupational therapy. First, occupational therapy is a gradual process, often requiring treatment over a period of weeks or longer to achieve occupational and functional goals. However, services are sometimes abruptly ended due to reimbursement issues. The intervention group was given enough treatment time to finish their prescribed rehabilitation programs, resulting in increased quality of life and improved personal routines, as shown by their increase in total MPAI-4 and MPAI-4 Participation Index (community participation) scores compared to the precipitously discharged group (pp. 1697, 1700–1702). Thus, this article can be used by clinicians who advocate for more insurance coverage for their clients. Second, the intervention group was allowed to complete their course of therapy in a community-based setting, helping clients achieve functional goals, establish routines, and increase community participation in an environment that encourages generalizability to their personal environment in a way that an inpatient clinic cannot. Thus, health care professionals can facilitate improved well-being by incorporating some form of community-based therapy in treatment planning.

**RESEARCH OBJECTIVE(S)**
List study objectives.

Determine if goal-based home and community-based post-acute brain injury rehabilitation (PABIR) is more effective than a traditional inpatient PABIR program.

**DESIGN TYPE AND LEVEL OF EVIDENCE:**
Level II: Quantitative, quasi-experimental cohort design

Limitations (appropriateness of study design):
Was the study design type appropriate for the knowledge level about this topic? Circle yes or no, and if no, explain.

YES/NO  The study design (cohort) was appropriate in that it addressed the research question. It lacked the quantitative rigor of a randomized controlled trial because there was no randomization or treatment-free “control” group, so all participants received some form of community rehabilitation treatment. However, this cohort design was preferable to a randomized controlled trial.
because it was ethically sound, so no participants were denied rehabilitative treatment.

SAMPLE SELECTION
How were subjects selected to participate? Please describe.

Although the exact method of the selection process was not reported, the researchers selected participants from consecutive admissions of patients (into a community-based post-acute rehabilitation program) with traumatic brain injury. Therapy was provided by the Commission on Accreditation of Rehabilitation Facilities (CARF)-accredited home and community-based rehab programs in 7 geographically diverse states in the U.S. owned by Gentiva Rehab Without Walls.

Inclusion Criteria
Participants had to be medically stable; have the potential to achieve specific rehab goals in a home or community setting; reside in a safe, accessible environment; have behaviors that were manageable during treatment; and be able to consent to treatment (by proxy or self).

Exclusion Criteria
People unable to participate in rehabilitative therapy (e.g., those in a coma), unable to consent, and those who failed a preadmission screening assessment (face-to-face interview and review of medical records to check for inclusion criteria) were excluded from the study.

SAMPLE CHARACTERISTICS
N = 603; 489 intervention group, 114 precipitously discharged group

% Dropouts
356 dropouts by the 3-month follow-up (59%), 471 dropouts total at the 12-month follow-up (78%)

#/ (%) Male #436/ 72 (%)  
#/ (%) Female #167 / 28(%)  

Ethnicity Not specified

Disease/disability diagnosis Mild to highly severe traumatic brain injury

Check appropriate group:

<table>
<thead>
<tr>
<th>&lt; 20/study group</th>
<th>20–50/study group</th>
<th>51–100/study group</th>
<th>101–149/study group</th>
<th>150–200/study group</th>
</tr>
</thead>
</table>

INTERVENTION(S) AND CONTROL GROUPS
Add groups if necessary
Group 1: Intervention/Completed Course Treatment Group

Brief description Each person received a complete course of individualized rehabilitative therapy treatment. Individual need, determined by expectations and outcomes as determined by an individual and his or her treatment team, and a comprehensive needs assessment were used to direct treatment and
prescriptions from physicians. During the initial treatment meeting for each client, at least one individual interdisciplinary treatment goal was developed. Goals focused mainly on ADLs, decreased need for supervision, and improved cognitive functioning. Therapy included two or more of the following disciplines: occupational therapy, physical therapy, speech therapy, psychological intervention, social work, therapeutic recreation, and case coordination.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Participants’ work, school, home, community locations, and public facilities in seven geographically different states in the U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who delivered?</td>
<td>All therapeutic interventions were provided by trained professionals.</td>
</tr>
<tr>
<td>Frequency?</td>
<td>Not specified (individual treatment)</td>
</tr>
<tr>
<td>Duration?</td>
<td>Not specified (individual treatment)</td>
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</table>

### Group 2: Precipitously Discharged/Control Group

**Brief description**

Each person received individualized rehabilitative therapy treatment. Individual need, determined by expectations and outcomes as determined by an individual and his or her treatment team, and a comprehensive needs assessment were used to direct treatment as well as prescriptions from physicians. During the initial treatment meeting for each client, at least one individual interdisciplinary treatment goal was developed. Goals focused mainly on ADLs, decreased need for supervision, and improved cognitive functioning. Therapy included two or more of the following disciplines: occupational therapy, physical therapy, speech therapy, psychological intervention, social work, therapeutic recreation, and case coordination.

Participants were allowed less than 1 week of preparation time before discharge, or discharge was unanticipated. This included situations in which the participant or the family, physician, and/or staff decided to discharge the patient before program goals were met.

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</tr>
</tbody>
</table>
**Intervention Biases:** *Circle yes or no and explain, if needed.*

### Contamination

| YES/NO | This was not addressed in the article, but the individualized nature of treatment for each participant made contamination a possibility. Depending on the length of community rehabilitation for each participant and the proximity of those in the precipitously discharged and completed course treatment groups, it is possible that participants in different groups may have discussed their experiences with each other. Sharing of information between participants may have been a source of contamination. |

### Co-intervention

| YES/NO | This was not addressed in the article, but co-intervention bias was a likely factor due to individualized treatment for each participant. If participants were receiving outside services or medication, those factors outside the study may have influenced MPAI-4 results as well as the community rehabilitation treatment groups. |

### Timing

| YES/NO | This was not addressed, but timing bias was likely because participants each received individualized treatment. Factors regarding individualized treatment (length of rehabilitation, frequency, treatment types received, etc.) were not controlled for in the study. |

### Site

| YES/NO | |

### Use of different therapists to provide intervention

| YES/NO | |

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**MEASURES AND OUTCOMES**

Measure 1: The Mayo-Portland Adaptability Inventory (MPAI-4) was primarily used to measure outcomes.

The outcome measured was the participants’ community participation. The researchers analyzed how a home and community-based PABIR program would affect influenced community participation, a part of everyday function that can be affected by disability. Listed below are specific aspects measured by the MPAI-4. These aspects fall into other areas of occupation, such as ADLs, instrumental activities of daily living (IADLs), leisure, and work. Injury severity of the participants’ traumatic brain injuries also was measured.

Is the measure reliable? **YES**

Is the measure valid? **YES**

*When is the measure used?*

This test was used within 2 weeks of admission to therapy, at discharge, and at 3 and 12 months.
The test was completed by a treatment team in the study within the first 2 weeks of a participants’ admission into therapy, after other clinical evaluations on the participant were conducted. The team was given manuals on the MPAI-4 (and encouraged to refer to it for best reliability), then the team agreed on a professional consensus as the response for each client’s assessment. The test was completed in the same manner by the rehabilitation team when each participant was discharged. The Participation Index section of the test, a section that shares a high correlation with the complete MPAI score, was measured at the 3- and 12-month follow-ups after discharge (conducted via telephone).

Measure 2: Glasgow Coma Scale (GCS)
A particular outcome of the study was not being assessed here; the study used the GCS to measure injury severity of the participants’ conditions. The GCS assessed coma length and length of posttraumatic amnesia to rank the injury severity. “Severe” injury consisted of a coma more than 24 hours long, over a week of posttraumatic amnesia, and a GCS under 9; “moderate” injury involved a coma lasting from a half-hour to 24 hours, posttraumatic amnesia ranging from 24 hours to a week, and a GCS rating of 9 to 12; and “mild” injury was described by a coma under a half-hour long, posttraumatic amnesia of less than 24 hours, and a GCS score over 12. If symptoms were different in a participant, they were given the more severe of the possible labels (p. 1699).

Is the measure reliable? **YES**
Is the measure valid? **YES**
When is the measure used? The GCS was conducted prior to the community-based rehab program for all participants.

Measurement Biases
Were the evaluators blind to treatment status? **Circle yes or no, and if no, explain.**

**Measure 1**
**YES/NO** The evaluators (treatment team) were not aware of which participants were in the Precipitously Discharged and Completed Course Treatment groups.

**Measure 2**
**YES/NO** The evaluators (treatment team) were not aware of which participants were in the Precipitously Discharged and Completed Course Treatment groups.

Recall or memory bias. **Circle yes or no, and if yes, explain.**

**YES/NO**

Others (list and explain):
RESULTS
List results of outcomes relevant to answering the focused question
Include statistical significance where appropriate \( (p < 0.05) \)
Include effect size if reported

The authors concluded that their alternative hypothesis was confirmed: fully-completed post-acute brain injury rehabilitation in home and community settings resulted in greater scores on multiple parts of the MPAI-4 for participants in the intervention (CCT) group as compared to the individuals that were discharged before program completion (PD) group (pp. 1700–1703). This was measured by the full MPAI-4 test and its individual components at admission and discharge. Thus, the experimental intervention was effective. At 3- and 12-month follow-ups, this effect was still evident for the Participation Index (community participation) aspect of the MPAI-4 test, as the experimental group (who completed PABIR programs) continued to improve their community participation scores.

The researchers emphasized that the higher scores on the various parts of the MPAI-4 in the CCT group indicated that the group had better adjustment, community participation, cognitive abilities, and physical abilities. In other words, PABIR in home and community settings improved these daily living aspects in participants who completed a treatment course with one or more ADL goals in this study. The follow-up results showed that the effects of complete home and community PABIR had lasting and increasing positive effects in the area of community participation for those participants.

This study was adequately powered. The sample size was large enough to yield significant differences between the intervention and precipitously discharged groups. Appropriate analytic methods were also utilized in this study given what the purpose of the study was. Researchers stated that an analysis of covariance (ANCOVA) was conducted, a parametric form of quantitative statistical analysis. This ANCOVA, a between-subjects analysis, was appropriate for this study because it compared two groups, CCT and PD, and used the MPAI-4 test as a covariate. No significant difference in MPAI-4 scores was found at admission between the CCT and PD groups. The outcomes of the study indicated significant differences between the groups in several areas upon discharge: Participation Index, Ability Index, Adjustment Index, and the full MPAI-4 scores were higher in the CCT group, with moderate effect sizes. The data were further analyzed by the additional covariates of chronicity and length of stay, and they also showed significant differences between the two groups (CCT and PD). Overall, the CCT group improved about one standard deviation on MPAI-4 scores from admission to discharge, while the PD group only improved about a half of a standard deviation in that time period.

The study had a number of limitations. First, there was a large dropout rate when the follow-up MPAI-4 tests were administered at the 3- and 12-month post-intervention time intervals. A large percentage of subjects were lost to follow-up primarily because follow-up was conducted using limited clinical resources without specific funding for this activity. At the 3-month follow-up, 202 of 489 CCT participants and 45 of 114 PD participants were contacted. However, because the number of CCT participants contacted at follow-up was relatively large, these data are reported. Participants were then also lost to follow-up at 12 months. Only 112 of the original 489 CCT subjects and 20 of the original 114 PD subjects were contacted at this time. Another limitation of this study was that follow-up assessments were administered
differently than admission and discharge assessments, leaving room for error. At follow-up, a participant or his or her significant other, instead of a personalized treatment team from the rehabilitation program, completed the Participation Index of the MPAI-4 by telephone. Additionally, the study did not control for the individualized nature of treatment for each individual and its various factors (length of rehabilitation, frequency, types of therapy administered, etc.). There were no tables indicating how many participants received each type of treatment (e.g., occupational therapy, physical therapy) or frequency of treatment. Last, contamination, co-intervention, and timing biases were all likely to have happened in the study due to the individualized treatment.

Was this study adequately powered (large enough to show a difference)? *Circle yes or no, and if no, explain.*

**YES/NO** The sample size was large enough to yield significant differences between the intervention and precipitously discharged groups.

Were appropriate analytic methods used? *Circle yes or no, and if no, explain.*

**YES/NO**

Were statistics appropriately reported (in written or table format)? *Circle yes or no, and if no, explain.*

**YES/NO**

Was the percent/number of subjects/participants who dropped out of the study reported?

**YES/NO**

Limitations: What are the overall limitations?

The study had a number of limitations. First, the sample size (N = 603) was large, but a larger sample would have yielded more accurate results. Second, follow-up assessments were administered differently as compared to admission and discharge assessments leaving room for error. At follow-up, a participant or his or her significant other of a personalized treatment team from the rehabilitation program completed the Participation Index of the MPAI-4 by telephone instead. Additionally, the study did not control for the individualized nature of treatment for each participant and his or her various factors (length of rehabilitation, frequency, types of therapy administered, etc.). There were no tables indicating how many participants received each type of treatment (e.g., occupational therapy, physical therapy) or frequency of treatment. Next, contamination, co-intervention, and timing biases were all likely due to the individualized treatment. Finally, there was a large dropout rate when the follow-up MPAI-4 tests were administered at the 3-month and 12-month post-intervention time intervals.
CONCLUSIONS
State the authors’ conclusions that are applicable to answering the evidence-based question.

Researchers concluded that their alternative hypothesis was confirmed: fully completed PABIR in home and community settings resulted in significant positive changes for participants in the intervention group as compared to a group that was discharged before program completion. This was measured by the full MPAI-4 test and its individual components at admission and discharge. Thus, the experimental intervention was effective. At 3- and 12-month follow-ups, this effect was still evident for the Participation Index (community participation) aspect of the MPAI-4 test, as the experimental group (who completed PABIR programs) continued to improve their community participation scores. Although some aspects of the actual PABIR interventions are unclear, and there are notable limitations, the evidence of MPAI-4 score improvements from home and community-based PABIR in the study participants is promising for those seeking a form of client-centered, functional, goal-directed treatment.