Complex Needs & Dynamic Solutions – Metrics that Yield Outcomes in a Post-Acute Stroke Navigation Program

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Background

Post-stroke recovery requires support for a complex combination of physical, cognitive, and emotional impairments experienced by survivors.

With decreasing length-of-stays and disjointed outpatient systems of care, additional support is needed to provide stroke survivors and their care partners with the education, resources, and guidance to navigate the healthcare landscape.

This research explores how demographics, impairments, SDOH, and presence of a care partner interact with survivor engagement and outcomes in a remote post-acute stroke navigation program.

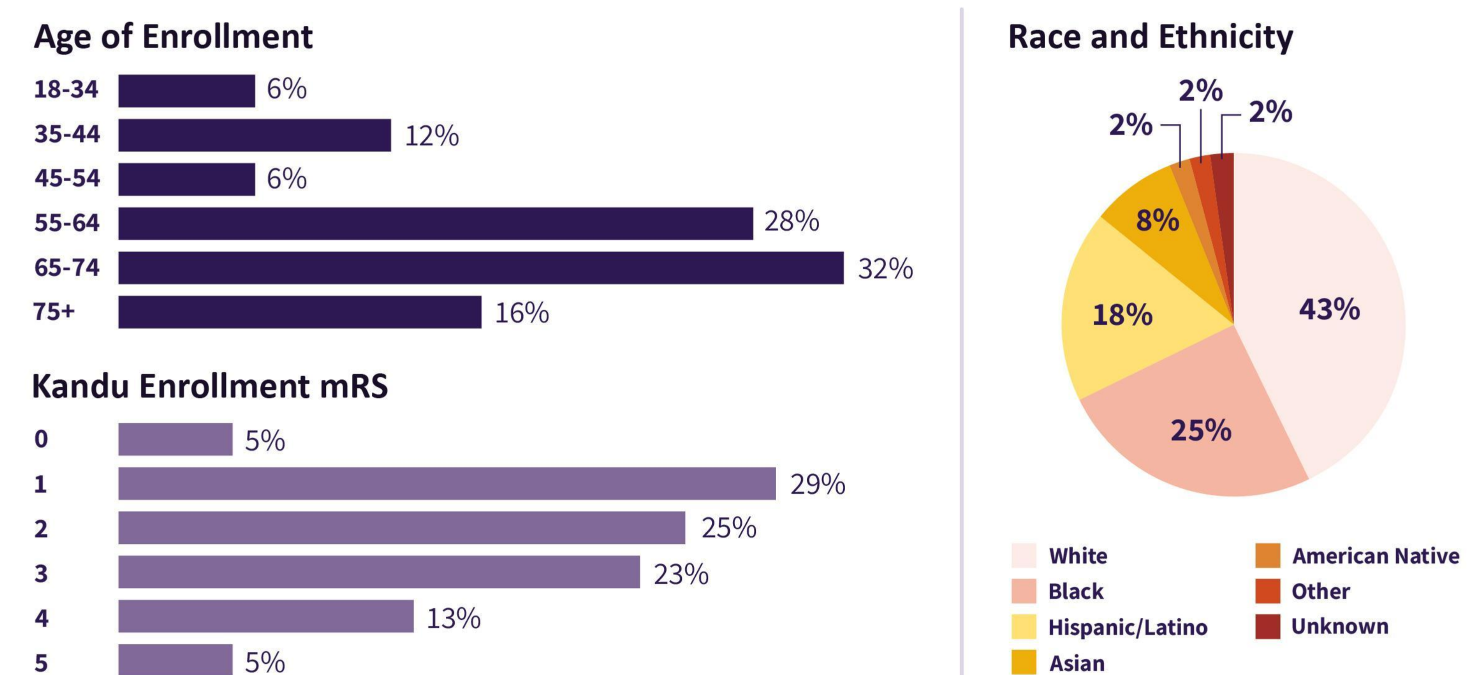
Methods

Participants (n=65) were facilitated by a clinical navigator (occupational therapist or licensed clinical social worker) with the goals of reducing barriers to recovery and increasing survivor health literacy and agency.

Clinicians worked through phone, asynchronous messaging, and video calls with the survivor and care partner who had shared access within the app, with separate profiles. The Kandu app offers a curriculum of accessible learning articles and in-app tools including symptom tracking and other features to support recovery.

The average participant had **10 Navigator touchpoints totaling an average 5.8 hours of one-on-one Navigator time** over the duration of the program **(average 12 weeks)**. Additional time was spent in curating resources, articles and managing the complexities of transitions of care.

Demographics



The Kandu Health program has **served survivors from age 27 to 86 years of age**. In addition, survivors in various stages of function as indicated by the enrollment mRS of 0-5 were able to participate. Survivors were from a diverse population related to socioeconomic status, race, and ethnicity.

Program Philosophy

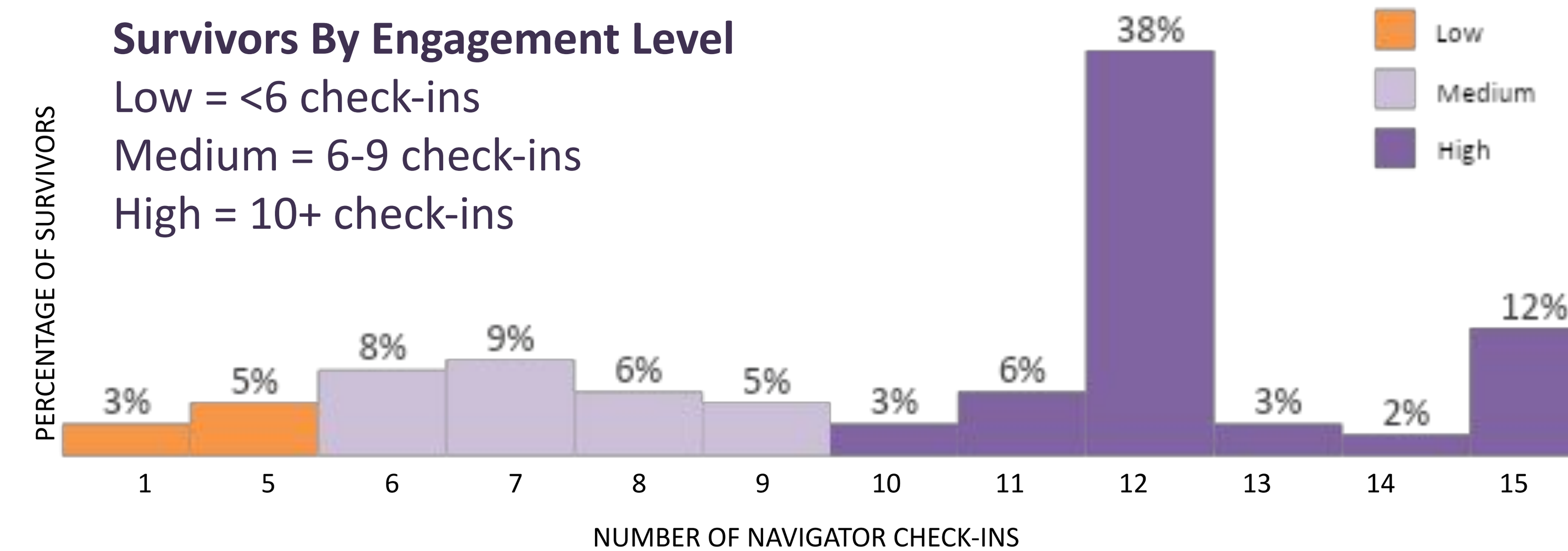
A lens of **self-determination theory** was utilized to encourage participants to "take charge" of their life and health after stroke.

The "Take Charge" intervention is utilized between weeks 6-8 to encourage a sense of purpose, autonomy, mastery and connectedness with others. In several RCTs, **recipients of "Take Charge" have demonstrated decreased dependent disability (mRS 3 to 5) at 12 months** (Fu et al, 2020).

Using a survivor-centric and impairment informed approach, clinical navigators tailored their interventions to the survivor and care partners' needs based on SDOH, impairments and subsequent stroke risk.

Correlations Between Navigator Engagement and Survivor Demographics

With the complexity of post-stroke sequelae and the dynamics of recovery, a "one size fits all approach" is neither possible nor desirable.



64% of Kandu participants were categorized as "high" engagers, with 10 or more check-ins over an average of 12 weeks. 28% were categorized as "medium", with 6-9 check-ins and 8% were "low" engagers with fewer than 6 check-ins .

Total Needs	Engagement by Needs		
	LOW	MED	HIGH
0	14%	36%	50%
1-3	4%	29%	68%
4+	7%	13%	80%

Total Impairments	Engagement by Total # of Impairments		
	LOW	MED	HIGH
0		50%	50%
1-2	20%	30%	50%
3-5	4%	35%	61%
6+	7%	20%	73%

Survivors with higher social needs (SDOH) utilized a greater number of navigator touchpoints. The categorization of social needs did not consider the severity of individual needs. 80% of survivors with 4 or more social needs were High Engagers.

Survivors with a larger number of stroke related impairments also utilized more navigator touchpoints. 73% of survivors with 6 or more stroke-related impairments were High Engagers.

Navigator Engagement and Survivor Demographics

Care Partner Status	Engagement by CP Enrolled Status		
	LOW	MED	HIGH
Has CP	5%	23%	73%
No CP	13%	36%	52%

Enrollment mRS	Engagement by Enrollment mRS		
	LOW	MED	HIGH
0-1	9%	35%	57%
2-3	7%	17%	77%
4-5	8%	42%	50%

The involvement of a care partner was associated with a greater number of navigator touchpoints, potentially indicating greater complexity in family dynamics and the need for more education and support**.**

There was not a consistent trend in engagement increasing with mRS scores. The least (mRS 0-1) and most (mRS 4-5) disabled patients had similar engagement, while 77% patients with mRS 2-3 were highly engaged. This possibly speaks to the balance of need and overwhelm in driving desire and ability to engage with Kandu's programing.

Navigator Engagement and Readmissions

Kandu's all-cause readmissions rates for patients referred from hospital discharge were approximately half of the published national average for unplanned readmissions at 30 and 90 days. There was no correlation between readmissions and # of Navigator engagements, likely due to the nature of touchpoints being both proactive and reactive.

Readmissions	Kandu	Published Ranges
30-Day	4.4% (CI 0.0-10.5%)	8.7-12.5%
90-Day	8.9% (CI 0.6-17.2%)	18.9-20.7%

Conclusion

The descriptive statistics demonstrate an increased number of Navigator touchpoints with higher survivor social needs, stroke-related impairments, and care partner participation. Programs designed for stroke survivors should anticipate and adapt to those individual needs accordingly.

In Kandu's program, engagement of survivors was not correlated with 90-day readmission rates. While we assume patients benefit from high proactive engagement, readmissions also demand reactive engagement, resulting in high engagement across both readmitted and readmission-free cohorts. Future research will explore which program attributes are predictive of readmission risk.

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Beyond the mRS – Supporting True Functional and Participation Change Post-Stroke

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Background

The modified Rankin Scale (mRS) is used as a global measure of function after stroke. Its limitations include a need for **granularity in identifying factors that contribute to improvements**. Much of the use of the mRS in the literature has focused on interventional efforts to reduce damage in the acute phase of stroke.

Subacute and chronic outcomes relate more to the management of comorbidities, social determinants of health, and receiving necessary follow-up care to monitor and mitigate risk factors.

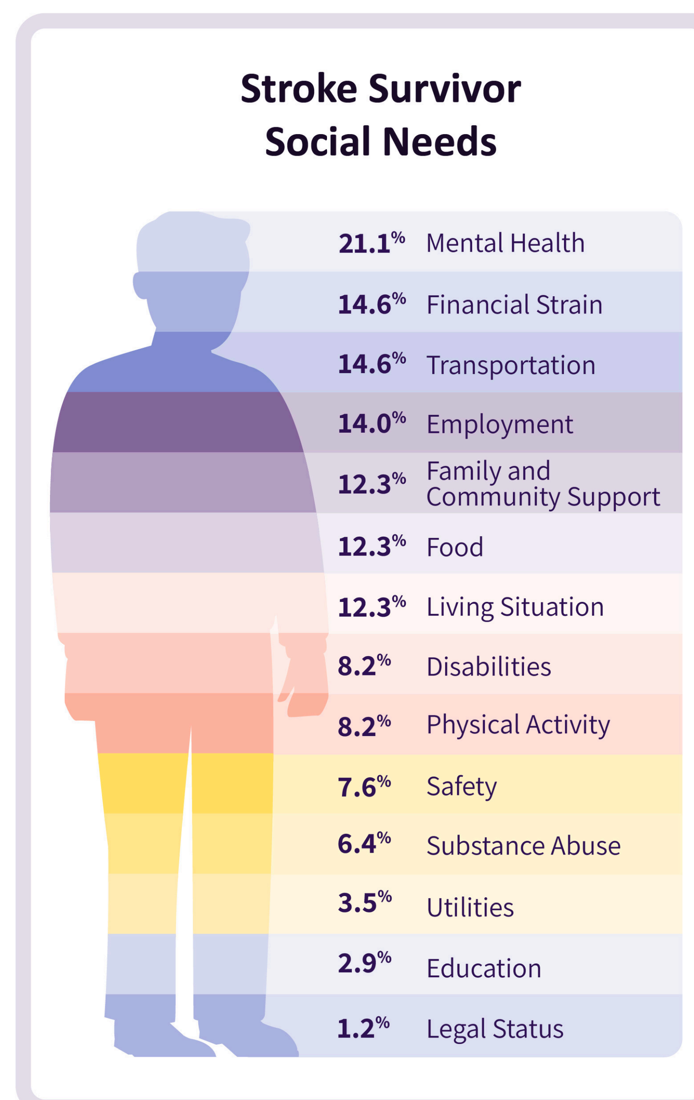
Program Overview

Participants (n=60) were facilitated by a clinical navigator (occupational therapist or licensed clinical social worker) with the goals of reducing barriers to recovery and increasing survivor health literacy and agency.

Survivors were followed for an average of 10 touchpoints, or an average of 5.8 hours over 12 weeks, based on need.

Barriers to Recovery

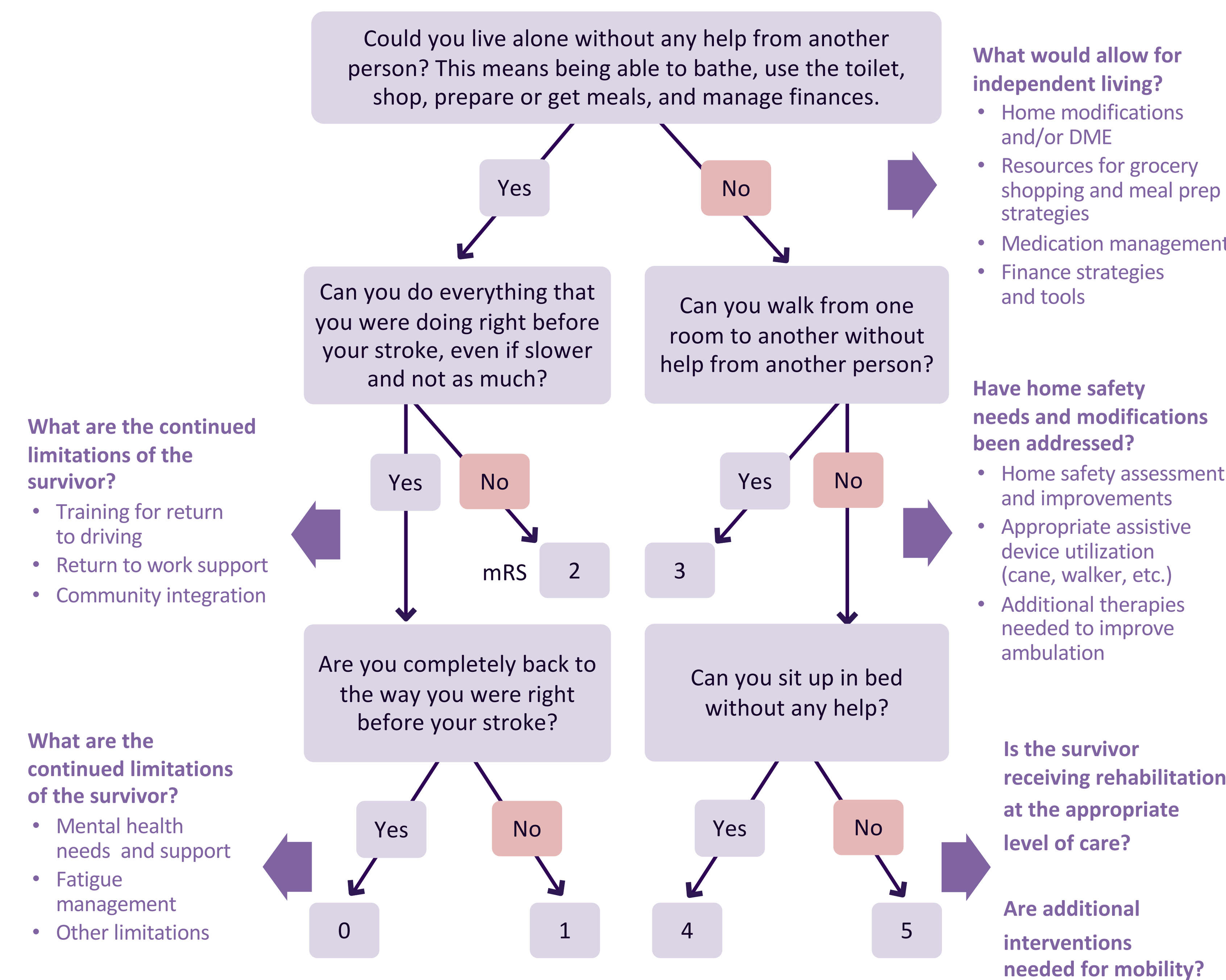
While the follow-up needs of stroke survivors are many, one theme that emerged from this study is the **prevalence of mental health needs post-stroke** as the number one need identified by stroke survivors and care partners. Unfortunately, use of the **mRS does not capture mental health needs or social needs supporting positive outcomes after stroke**.



The Simplified Modified Rankin Scale Questionnaire

The simplified modified version of the Rankin Scale Questionnaire was published in 2011 and verified as having excellent reliability both in person and by telephone. It can be administered in less than 1.5 minutes by a wide variety of raters and correlates with quality of life[1]. This view of the mRS has been supplemented with questions that can be used to understand additional stroke survivor needs to support gains on the mRS.

mRS Decision Tree



Patient Reported Outcome Measures (PROMs) in Stroke

Domain	Measures	
Mental Health	• PHQ2/9, GAD-7 • Beck Depression Inventory	• Geriatric Depression Scale (GDS) • Hospital Anxiety and Depression Scale (HADS)
Social Determinants of Health Needs	• Social Deprivation Index • PRAPARE	• CMS Accountable Communities Social Needs Screening Tool • American Academy of Family Physicians Social Needs Screening Tool
Stroke Impact	• Stroke Impact Scale (SIS) • Stroke Specific Quality of Life (SSQoL)	• Reintegration to Normal Living Index • Stroke Adapted Sickness Impact Profile
Health Related QoL	• SF-36 • PROMIS Global 10	• EuroQoL (EQ-5D) • General Health Questionnaire 28 (GHQ-28)
Unmet Needs	• Longer-term Unmet Needs after Stroke Questionnaire (LUNS) • Post Stroke Checklist (PSC)	

References

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Outcomes

Modified Rankin Capture Rate and Improvement

Clinician-assessed mRS scores were **captured for 95% of participants at 90 days following hospital discharge**. This high rate of success was likely due to ongoing relationship and trust building between survivors and their clinical navigator.

Significant functional improvement was seen, with **81% achieving mRS scores of 0-2 at 90 days**, compared to 57% of participants at mRS 0-2 at the time of enrollment.

Stroke Survivor Health-Related Quality of Life

- **PROMIS Global 10** was utilized to assess health-related quality of life at baseline and program completion.
- The range of minimal important difference (MID) in physical function scores has previously been reported as 2.5-6.52[2].
- Kandu's average change in physical function T-scores was **3.8.**
- Among 26 enrollees presenting with anxiety at enrollment, 12 (46%) showed improvement at program completion, as measured by the GAD-7.

Health Participation and Functional Change

Since participation in the Kandu program:

- 97% report taking their medication as prescribed
- 91% have taken steps to manage their stress better
- 88% have modified their diet to reduce stroke risk

Conclusion

The modified Rankin Scale (mRS) is a limited assessment of function in comparison to the complexity of post-stroke sequelae. Based on the variety of post-stroke needs, supplemental PROMs are utilized both to understand the needs of survivors and care partners as well as to measure outcomes related to function, social needs, stroke impact, lifestyle changes, health-related quality of life, and other unmet needs. Stroke programs attempting to meet post-acute survivor needs and improve program outcomes would benefit from incorporating PROMs in post-discharge follow-up.

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