

3 Year Stroke Survivors: The Impact of Stroke on Cognition and Factors Associated with Long Term Recovery

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Overview

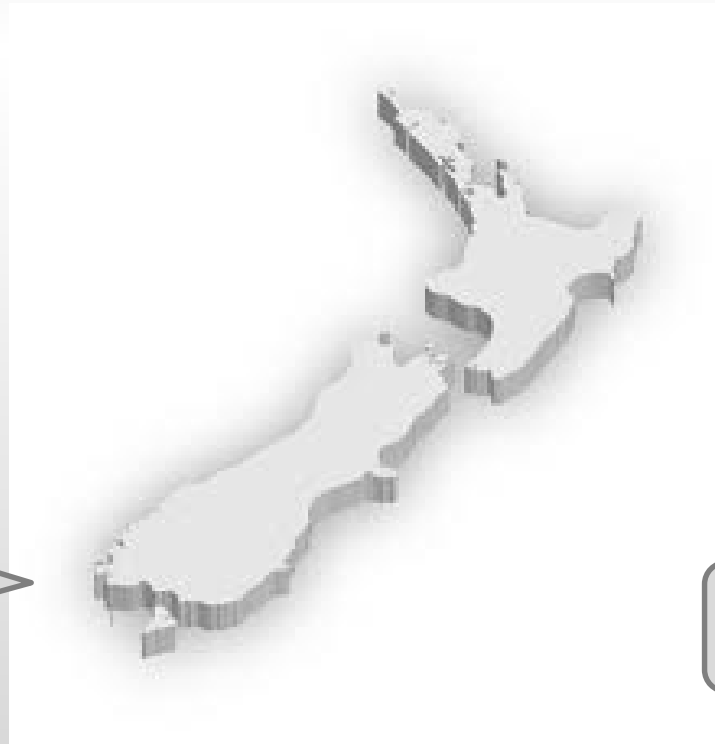
- Background
- Current Epidemiological Evidence
- Objectives
- Method
- Results
- Conclusion



Background

7000 to 8000
people annually

Cognitive
impairment:
2/3 of survivors



Quality of life

Society

Caregivers

Impact of
cognitive deficits

Independence

Work

Rehabilitation



Background



- Cognitive Impairment post stroke:
 - occurs through dynamic changes in blood flow across widely distributed areas in brain
 - reperfusion of blood flow can improve cognitive performance in acute ischemic stroke
 - Deficits in cognition function vary
 - language, memory, executive function, processing speed, attention, and visuo-spatial function.
- Existing data on cognitive outcomes within the stroke population is limited and varied
- * **No previous population-based longitudinal study has been conducted in NZ, which has evaluated the long term effects of cognition and associated predictors**





Current Epidemiological Evidence

- Variability in findings
 - ◆ Poor study design (cross sectional)
 - ◆ small sample sizes
 - ◆ poor assessment methods (use of Mini Mental State Examination) which does not account for executive function)
 - ◆ short term follow up (usually within 1 year)

Auckland Stroke Outcomes Study: ASTRO (2002-2008)

- Examined cognitive and functional outcomes at 5 years post stroke (n=307)
- 30-50% participants exhibited lower levels of neuropsychological functioning (Information processing speed and executive functioning)
- Depression was significantly associated with functional outcomes but not neuropsychological impairment
- Limitations use of cross sectional data, could not determine changes in cognition over time, did not examine fatigue, sleep, psychosocial factors



Current Epidemiological Evidence

- **South London Stroke Study 1995-1998)**
 - Examined the natural history of cognitive impairment following stroke over four years
 - Compared cognitively impaired participants (MMSE <24 n=248) with cognitively intact participants (MMSE 24-30 N=397)
 - Followed up at 3 months, 1, 2, 3 and 4 years
 - Long-term cognitive impairment was associated with death or disability
 - Recovery was compromised by visuospatial neglect and right hemispheric lesion (near-significant)
 - Limitations in (used mmse, lack of statistical power, study design)



Current Study

- **Extension** of the Auckland Regional Community Outcomes Study ARCOS-IV (2010 to 2015)
- Incidence and outcomes Study
- Prospective, population-based stroke register
- All new strokes, March 2011-Feb 2012 (n=2090)
- Auckland residents 16+ years (population 1.3 million)
- Demographic & clinical data collected, cognitive assessment and health-related outcomes
 - baseline, 1, 6, and 12 months
- Collect cognitive and health-related outcomes **at 3 to 4** years post stroke



Objectives



Determine the prevalence and profile of cognitive impairment at 3 to 4 years post stroke



Examine whether cognitive performance changes over time



Identify the long term effects of stroke on cognition & associated factors that may influence recovery



To determine whether we can predict how participants perform at 3 years; from screening at 28 days

Awaiting analysis

What does stroke look like in 3 to 4 year survivors?



Methods

Overall Design: Quantitative longitudinal population based

Population of Interest:

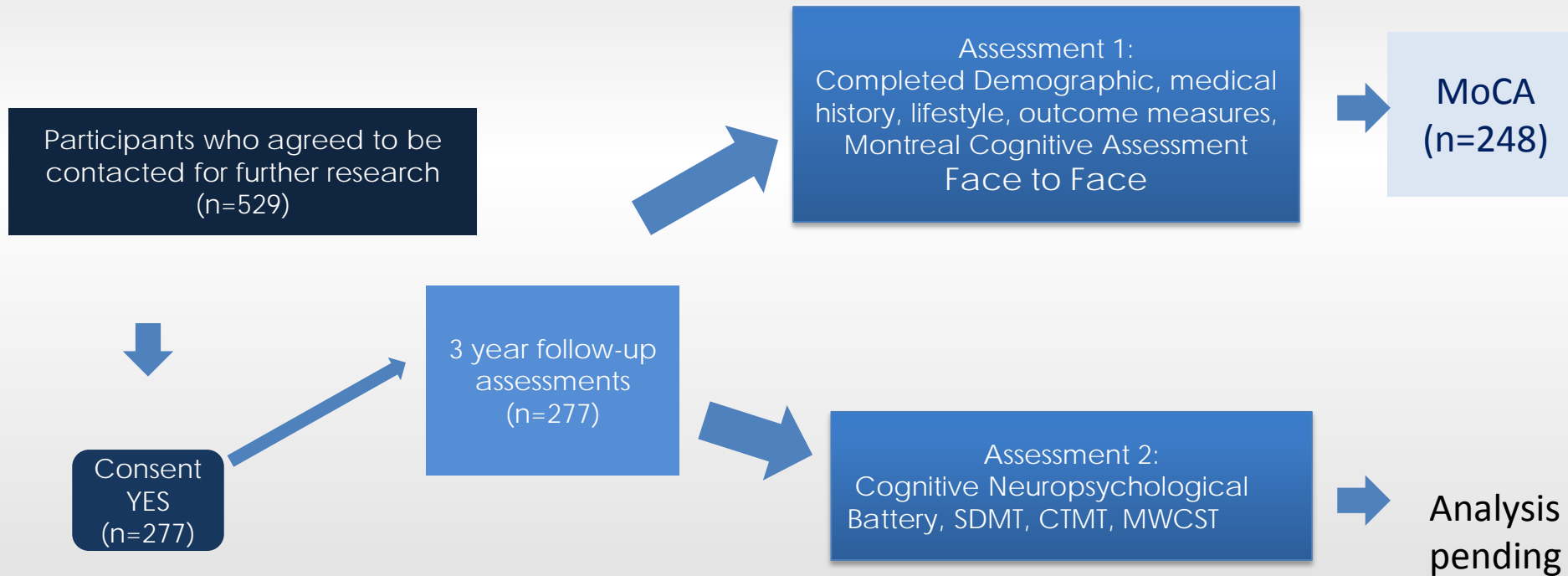
Stroke survivors who participated in the ARCOS-IV study; who agreed to be contacted for further follow up (n =529)

Consented participants completed face to face assessments

Medical/health outcomes
Health-related QOL
Functional outcomes
mood
Cognitive assessments

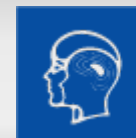


Procedure



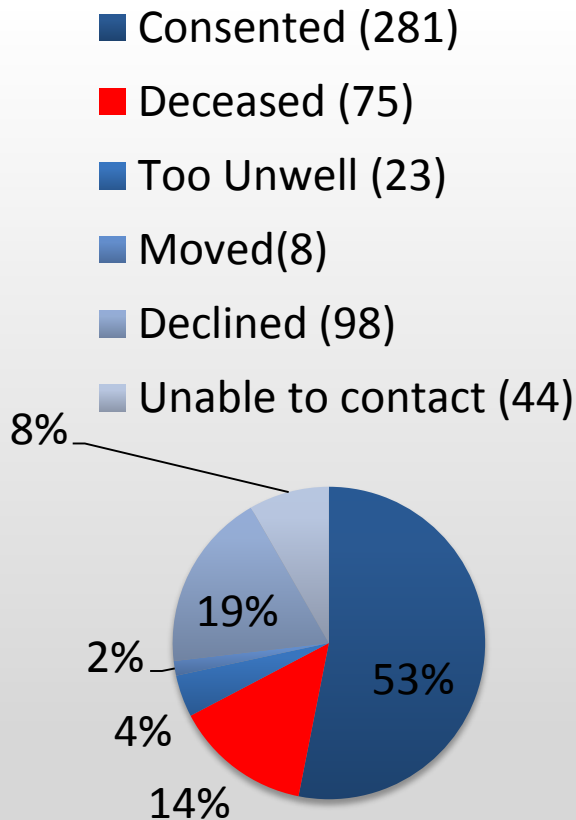


OUTCOME ASSESSMENT	OUTCOME MEASURES
Demographic	Demographic Information, medical history, education level, living status, employment, Mediation adherence (Morisky Medication Adherence Scale), lifestyle, rehabilitation, * Montreal Cognitive Assessment (MoCA)* ⁶⁷
Cognitive Outcomes	Neuropsychological Assessment Battery (NAB) ^{68 69 70 71 72 73} Modified Wisconsin Sorting Test (M-WST) ⁷⁴ Digit Symbol Modalities Test (DSMT) ^{75 76} Comprehensive Trails Making Test (CTMT) ⁷⁷
Stroke Subtype	The Oxfordshire Community Stroke Project classification (OCSP)*
Quality of Life	Euro quality of life- 5 dimensions (EQ-5D)* ⁶²
Level of Independence	Barthel Index (BI)* ⁶¹
Level of Disability	Modified Rankin Scale (mRS)* ⁶⁰
Fatigue	Fatigue Severity Scale (FSS)* ⁶⁴
Sleep	International Classification Sleep Disorders (ICDS)* ⁶⁶
Mood	Hospital Anxiety Depression Scale (HADS)* ⁷⁸
Quality of Life	Short Form- 36 (SF-36)* ⁶³
Social Support	Social Support Questionnaire* ⁷⁹
Community Integration	Community Integration Questionnaire* ⁸⁰
* Denotes previously used measures for ARCOS-IV	

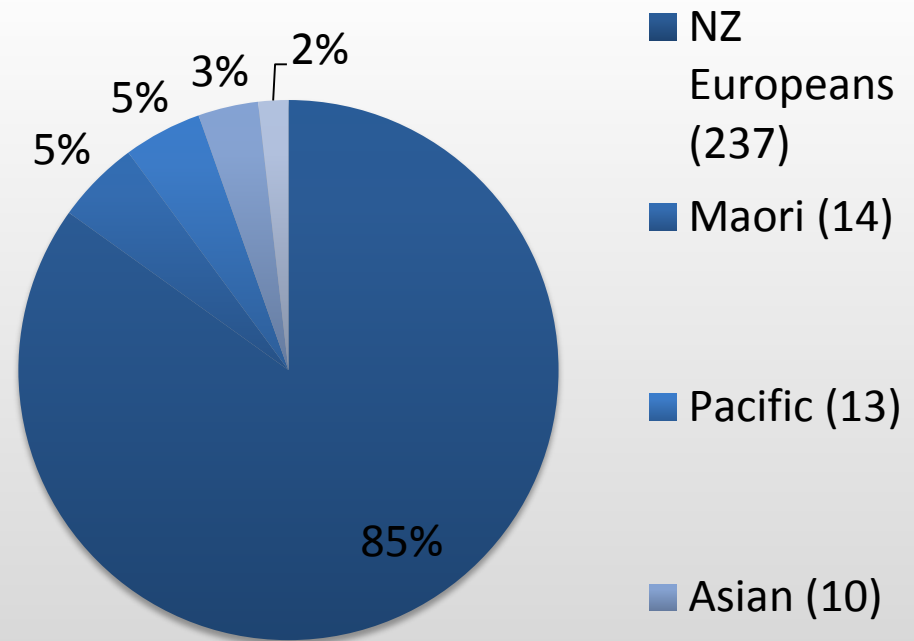


Results: Preliminary Findings

Recruitment (n=529)



Ethnicity



Variable		
		Mean (SD)
Age	Years	73.0 (13.5)
		N (%)
Gender	Males	146 (52.3%)
	Females	133 (47.7%)
Ethnicity	Maori	14 (5.0%)
	Pacific	13 (4.7%)
	Asian	10 (3.6%)
	Other	5 (1.8%)
	European	237 (84.9%)
Marital Status	Married, Civil Union or De facto	176 (84.9%)
	Never Married	4 (1.4%)
	Separated, divorced or widowed	101 (35.9%)
Employment Status	Employed	49 (17.4%)
	Retired	205 (73.0%)
	Unemployed	27 (9.6%)
	TACS (Total Anterior Circulation Stroke)	22 (7.8%)
Stroke Type (OCSP)	PACS (Partial Anterior Circulation Syndrome)	91 (32.4%)
	LACS (Lacunar Syndrome)	81 (28.8%)
	POCS (Posterior Circulation Syndrome)	66 (23.5%)
	IS	245 (87.2%)
Stroke Type (Class)	ICH	16 (5.7%)
	SAH	19 (6.8%)
	Uncertain	1 (0.4%)
	No	230 (82.4%)
Recurrent Stroke	Yes	49 (17.6%)
	Range	Average in Years
Times Since Stroke	3.5 to 4.5 years	4.0



Descriptive Statistics for MoCA

Age Group (years) N	Average MoCA Total Score /30
0-44 (n=8)	24.6
45-64 (n=63)	21.6
65-74 (n=76)	21.8
75+ (n=132)	19.2
Total 279	20.7

Score Range		N	Average
6-29	<=25	208	19.5
	>=26	40	26.7
Total		248	20.7

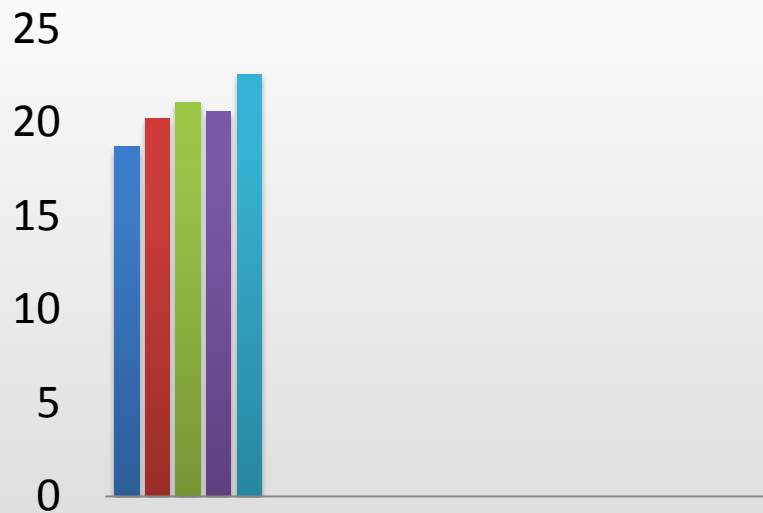
83.9% cognitive impairment

* Cut off < **26** indicates Cognitive impairment



Cognition, Stroke Subtype and Classification

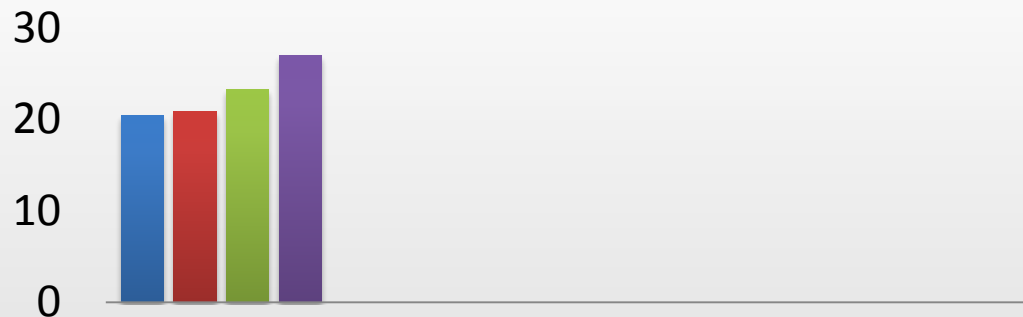
MoCA and Stroke Sub-Type (OCSP)



- TACI
- PACI
- POCI
- LACI
- Uncertain

*Total Anterior circulation strokes had lowest scores

MoCA and Stroke Classification



- Ischemic
- Intercerebral Haemorrhage
- Subarachnoid Haemorrhage
- Uncertain



Multi-Regression Analysis

Total Score		Estimate	Std Error	P-value
Intercept		28.55	1.86	<2e-16
Age		-0.08	0.03	0.0045
	Maori	-2.35	1.23	0.0570
	Pacific	-1.63	1.55	0.2919
	Asian/other	1.42	1.70	0.4051
Employment Status	retired	-2.09	0.91	0.0221
	unemployed	-1.56	1.13	0.1696

- ✧ **Total MoCA score** was significantly associated with age (decreased with older age) and ethnicity (was lower in Maori vs. Europeans, borderline significant effect $p = 0.0570$) and lower in **retired** vs. employed.



Conclusions



- Cognitive impairment is prevalent up to 4 years post stroke (84%)
- Significantly associated with age, ethnicity and employment status
- Cognitive rehabilitation is rarely implemented post stroke, identification of predictive factors vital to the development of effective intervention services to promote recovery following stroke
- Final analysis will determine other factors which may influence long-term outcomes for stroke patients





Study Significance

- ✧ No previous population-based longitudinal study has been conducted in NZ, which has evaluated the long term effects of cognition and associated predictors
- ✧ Early detection of cognitive impairment could provide valuable prognostic information, assist in rehabilitation planning and allow therapies to be targeted to specific cognitive domains in the early phases of stroke

