

New Zealand hospital stroke service provision

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ABSTRACT

AIM: To describe stroke services currently offered in New Zealand hospitals and compare service provision in urban and non-urban settings.

METHOD: An online questionnaire was sent to stroke lead clinicians at all New Zealand District Health Boards (DHBs). Questions covered number and location of stroke inpatients, stroke service configuration, use of guidelines/protocols, staffing mix, access to staff education, and culture appropriate care.

RESULTS: There were responses from all 20 DHBs. Differences between urban and non-urban hospitals included: access to acute stroke units (55.6% non-urban vs 100% urban; $p=0.013$), stroke clinical nurse specialists (50% vs 90%; $p=0.034$), stroke clot retrieval (38.9% vs 80%; $p=0.037$) and Pacific support services (55.6% vs 100%; $p=0.030$). There were also differences in carer training (66.7% non-urban vs 100% urban; $p=0.039$) and goal-specific rehabilitation plans in the community (61.1% vs 100%; $p=0.023$). Access to TIA services, stroke rehabilitation units, early supported discharge, psychologists, continuing staff education, and culturally responsive stroke care were suboptimal irrespective of hospital location.

CONCLUSION: Hospital location is associated with differences in stroke services provision across New Zealand and ongoing work is required to optimise consistent access to best practice care. These results, in conjunction with an ongoing (REGIONS Care) study, will be used to determine whether this affects patient outcomes.

In New Zealand, stroke is the third most common cause of death, and the leading cause of adult disability. The importance of organised stroke care, both in the acute and rehabilitation settings has been well documented, with patients more likely to survive, regain independence and return home when managed in an organised unit.¹ A 2009 acute stroke service audit in New Zealand found significant regional differences in the implementation of best practice care and highlighted the need for organised inpatient care to be addressed as a priority.² A 2013 stroke rehabilitation survey in New Zealand highlighted two main concerns: the intensity of rehabilitation provided in the inpatient setting, and the delays in provision of community rehabilitation on discharge from hospital.³ It is important to review whether appropriate changes have been made since the publication of these studies. Another important consideration is the delivery of culturally appropriate stroke care.

Māori and Pacific Peoples experience stroke at a younger age and have had a slower rate of decline in stroke incidence and one-year mortality after stroke, compared with New Zealand Europeans.⁴

REGIONS Care is a Health Research Council funded (HRC 17/037), prospective, observational study assessing the effect of ethnicity and geography on service access and patient outcomes following stroke. It involves a nationwide stroke audit with a sub-set of patients recruited to undergo extended follow up assessments at six and 12 months, and data linkage with health administrative data. As part of the REGIONS Care project we undertook an organisational survey of all New Zealand hospitals managing acute stroke patients with the aim to provide a current description of stroke services offered and to assess the availability of resources for managing stroke. In particular, we aimed to report differences by urban and non-urban locations.

Methods

The organisational survey was developed based on the Australian National Stroke Audit survey. A section on community rehabilitation services and New Zealand culturally specific questions were added. Data collection was undertaken in REDCap, an open-source online database, and was accessible to stroke lead clinicians from each district health board (DHB) over a six-week period from mid-April 2018. DHBs have responsibility for funding health services in their area, with hospitals providing these services. Six DHBs have one or more smaller, rural hospitals providing stroke care in addition to the main centre resulting in a total of 28 hospitals admitting people with acute stroke in New Zealand. We requested that each individual hospital complete a separate survey. Respondents were identified via the National Stroke Register Database, representing the lead stroke doctors and, where available, also the lead stroke nurse at each hospital. The respondents were invited to consult with their local allied health and hospital management staff as required. We sent reminders to respondents in two weekly intervals and the survey closed on 31 May 2018.

Questions covered inpatient and community stroke service configuration (n=57 questions), use of guidelines or protocols to address common stroke-related problems (n=8 questions), staffing mix (n=8 questions) and access to ongoing education for staff (n=5 questions). In addition, six questions were specifically relevant to New Zealand, including whether Māori and Pacific support services were available and if stroke information was offered in Te Reo Māori and Samoan, among others. We also

included questions about the number of patients with a stroke diagnosis that were in the hospital on 1 May 2018.

Data were cleaned and exported into Stata 16.0 for analysis. Hospitals were grouped into urban and non-urban centres. A hospital was defined as 'urban' if located within 25km of an urban centre of more than 100,000 people regardless of DHB population..

Pearson's chi-squared test was used to compare dichotomous variables between hospital locations. Wilcoxon rank-sum test was used to compare non-normally distributed continuous variables between hospital locations.

The study received ethics approval by the Central Region Health and Disability Ethics Committee (17CEN164).

Results

Responses were received from stroke lead physicians and nurses in all of the 28 New Zealand hospitals contacted within the 20 DHBs: 10 urban and 18 small or medium sized non-urban hospitals. This comprises all hospitals providing acute stroke care in New Zealand.

On 1 May 2018, there were 331 patients reported to be in hospital: 159 in an acute and 172 in a rehabilitation ward. Of the 159 acute stroke patients, 139 (87.4%) were in a hospital with an acute stroke unit (ASU), of whom 104/139 (74.8%) were in an actual ASU on that day. Table 1 shows proportion of hospitals with ASUs grouped by urban versus non-urban.

Dichotomous acute stroke service features comparing availability between urban versus non-urban hospitals are depicted in Table 1.

Table 1: Availability of acute service interventions/resources comparing urban versus non-urban hospitals.

	Total (N=28)	Non-urban (N=18)	Urban (N=10)	p
Hyper-acute services - N (%)				
EMS pre-notification†	26 (100)	16 (100)	10 (100)	-
AST pre-notification	16 (57.1)	8 (44.4)	8 (80)	0.07
In-hospital 'code stroke' alert †	19 (70.4)	9 (52.9)	10 (100)	0.01
Thrombolysis	28 (100)	18 (100)	10 (100)	-
Telestroke used	12 (42.9)	10 (55.6)	2 (20)	0.07

Table 1: Availability of acute service interventions/resources comparing urban versus non-urban hospitals (continued).

Access to stroke clot retrieval	15 (55.5)	7 (41.2)	8 (80)	0.04
CT scan <1 hour	28 (100)	18 (100)	10 (100)	-
Acute stroke services - N (%)				
Rapid access to specialist TIA care (<1 day)	17 (60.7)	10 (55.6)	7 (70)	0.45
Acute stroke unit	20 (71.4)	10 (55.6)	10 (100)	0.01
Able to manage patients post-thrombolysis/stroke clot retrieval in stroke unit	17 (60.7)	9 (50)	8 (80)	0.12
Protocol for transferring patients to other hospitals	19 (67.9)	11 (61.1)	8 (80)	0.31
IDT review within 24 hours	23 (82.1)	14 (77.8)	9 (90)	0.42
Named stroke lead physician	23 (82.1)	13 (72.2)	10 (100)	0.07
Named stroke lead nurse	22 (78.6)	13 (72.2)	9 (90)	0.27
Members of acute stroke inter-disciplinary team - N (%)				
Neurologist	19 (67.9)	9 (50)	10 (100)	0.007
Geriatrician	23 (82.1)	13 (72.2)	10 (100)	0.07
General physician	27 (96.4)	17 (94.4)	10 (100)	0.45
Rehabilitation physician†	12 (44.4)	4 (23.5)	8 (80)	0.004
Stroke CNS	18 (64.3)	9 (50)	9 (90)	0.03
Stroke research nurse	7 (25.0)	1 (5.6)	6 (60)	0.001
Stroke nurse educator	11 (39.3)	4 (22.2)	7 (70)	0.01
Psychologist†	10 (37.0)	6 (33.3)	4 (44.4)	0.57
Senior medical registrar†	8 (29.6)	1 (5.9)	7 (70)	<0.0001
Junior medical registrar	22 (78.8)	12 (66.7)	10 (100)	0.04
Physiotherapist	28 (100)	18 (100)	10 (100)	-
Occupational therapist	28 (100)	18 (100)	10 (100)	-
Speech language therapist	28 (100)	18 (100)	10 (100)	-
Dietician	28 (100)	18 (100)	10 (100)	-
Social worker	28 (100)	18 (100)	10 (100)	-
Involvement of patient/carer - N (%)				
Clinical management	27 (96.4)	17 (94.4)	10 (100)	0.45
Goal setting	22 (78.6)	13 (72.2)	9 (90)	0.27
Discharge planning†	23 (85.2)	14 (77.8)	9 (100)	0.13
Information provision - N (%)				
Stroke care and recovery	20 (71.4)	13 (72.2)	7 (70)	0.90
Secondary prevention	20 (71.4)	13 (72.2)	7 (70)	0.90
Local community care arrangements	18 (64.3)	11 (61.1)	7 (70)	0.64
Community stroke support groups	19 (67.9)	13 (72.2)	6 (60)	0.51
Personal recovery plan	14 (50)	8 (44.4)	6 (60)	0.43
Hospital contact for post-discharge queries†	14 (51.9)	6 (35.3)	8 (80)	0.03

EMS = emergency medical services; AST = acute stroke team; CT = computed tomography; TIA = transient ischaemic attack; CNS = clinical nurse specialist; IDT = inter-disciplinary team; p = p-value for Chi-squared test. †Missing values: EMS pre-notification (n=2); in-hospital code stroke (n=1); access to stroke clot retrieval (n=1); psychologist (n=1); advanced registrar (n=1); rehabilitation physician (n=1); discharge planning (n=1); hospital contact for post discharge queries (n=1).

Urban and non-urban hospitals differed significantly ($p=0.05$) in terms of the team providing acute stroke leadership. Nineteen of 28 (67.8%) acute stroke services are led by a general medical team: 16/18 (88.9%) at non-urban hospitals and 3/10 (30%) at urban hospitals. Of the remaining seven urban hospitals, medical care is provided by a neurology team in 3/10 (30%) hospitals, and in one hospital (10%) each by either a shared neurology/general medicine, shared general/geriatric medicine, geriatric medicine or another team (not further defined). The median frequency of acute stroke inter-disciplinary meetings at urban hospitals is six (interquartile range (IQR) 4–24) per month and at non-urban hospitals four (IQR 4–8) per month. The most frequently discussed topics are discharge planning (92.9% of hospitals),

social needs (89.3%), activities of daily living (ADL) (89.3%) and swallow dysfunction (89.3%), with no significant difference between urban and non-urban hospitals.

With regards to transitioning out of the acute care setting, 15 of 27 (55.6%) responding hospitals have a standardised process for assessing suitability for further rehabilitation and the responsibility for this lies most frequently with the acute IDT (at 75% of hospitals). The predominant mode of medical follow up after discharge from acute hospital services is by general practitioner (GP) only (35.7% of hospitals), followed by specialist clinic (28.6% of hospitals).

Inpatient and community rehabilitation variables are shown in Table 2 for urban and non-urban hospitals. Medical follow-up after inpatient rehabilitation discharge

Table 2: Rehabilitation services.

	Total (N=28)	Non-urban (N=18)	Urban (N=10)	p
Access to rehabilitation services - N (%)				
Standardised rehabilitation assessment process [†]	15 (55.6)	9 (52.9)	6 (60)	0.72
Inpatient rehabilitation	28 (100)	18 (100)	10 (100)	NA
Outpatient rehabilitation	24 (85.7)	14 (77.8)	10 (100)	0.11
Day hospital	3 (10.7)	3 (16.7)	0 (0)	0.17
Community-based rehabilitation provided in the home	21 (75.0)	14 (77.8)	7 (70)	0.65
Stroke specialist ESD	3 (10.7)	1 (5.6)	2 (20)	0.24
Key aspects of inpatient rehabilitation care - N (%)				
Stroke rehabilitation unit [†]	8 (29.6)	3 (17.7)	5 (50)	0.08
Stroke rehabilitation lead physician	20 (71.4)	10 (55.6)	10 (100)	0.01
Stroke rehabilitation lead nurse	10 (35.7)	8 (44.4)	2 (20)	0.19
Lead allied health clinician	11 (39.3)	9 (50)	2 (20)	0.12
Regular IDT meetings	26 (92.9)	16 (88.9)	10 (100)	0.27
Formal goal setting process	23 (82.1)	14 (77.8)	9 (90)	0.42
Rehabilitation environment [#]	21 (75)	14 (77.8)	7 (70)	0.65
Therapy in a group setting [†]	22 (81.5)	14 (77.8)	8 (88.9)	0.48
1 hour of physical therapy*/day	25 (89.3)	17 (94.4)	8 (80)	0.24
3 hours of physical therapy*/day	2 (7.1)	1 (5.9)	1 (12.5)	0.57
Routine provision of carer training to carers requiring it	22 (78.6)	12 (66.7)	10 (100)	0.04
Hospital contact on transfer to the community	19 (67.9)	10 (55.6)	9 (90)	0.06
Routine review by hospital staff member after discharge	13 (46.4)	8 (44.4)	5 (50)	0.78

Table 2: Rehabilitation services (continued).

Inpatient rehabilitation IDT members - N (%)				
Rehabilitation physician	12 (42.9)	5 (27.8)	7 (70)	0.03
Neurologist [†]	15 (55.6)	6 (33.3)	9 (100)	0.001
Geriatrician [†]	24 (88.9)	14 (82.4)	10 (100)	0.16
Medical registrar	20 (71.4)	10 (55.6)	10 (100)	0.01
Stroke CNS	16 (57.1)	9 (50)	7 (70)	0.31
Physiotherapist	28 (100)	18 (100)	10 (100)	NA
Occupational therapist	28 (100)	18 (100)	10 (100)	NA
Speech language therapist	28 (100)	18 (100)	10 (100)	NA
Dietician	28 (100)	18 (100)	10 (100)	NA
Social worker	28 (100)	18 (100)	10 (100)	NA
Psychologist [†]	13 (48.2)	7 (38.9)	6 (66.7)	0.17
Information provision - N (%)				
Stroke care and recovery	19 (67.9)	13 (72.2)	6 (60)	0.51
Secondary prevention	17 (60.7)	12 (66.7)	5 (50)	0.39
Local community care arrangements	16 (57.1)	12 (66.7)	4 (40)	0.17
Community stroke support groups	13 (46.4)	11 (61.1)	2 (20)	0.04
All information available in aphasia-friendly format	3 (10.7)	1 (5.6)	2 (20)	0.24
Some information available in aphasia-friendly format	5 (17.9)	2 (11.1)	3 (30)	0.21
Community rehabilitation IDT members - N (%)				
Nurse	18 (64.3)	9 (50)	9 (90)	0.03
Nurse practitioner [†]	7 (28)	3 (17.7)	4 (50)	0.09
Doctor [†]	20 (74.1)	11 (64.7)	9 (90)	0.15
Physiotherapist	28 (100)	18 (100)	10 (100)	NA
Occupational therapist	28 (100)	18 (100)	10 (100)	NA
Speech language therapist [†]	26 (100)	17 (100)	9 (100)	NA
Social worker [†]	26 (100)	17 (100)	9 (100)	NA
Dietician [†]	24 (96)	17 (100)	7 (87.5)	0.14
Psychologist [†]	12 (48)	6 (35.3)	6 (75)	0.06
Key aspects of community rehabilitation care - N (%)				
Special prioritisation of stroke referrals ^{†§}	3 (12.5)	2 (11.8)	1 (14.3)	0.87
Standard maximum duration of therapy [†]	12 (44.4)	6 (35.3)	6 (60)	0.35
Provision of homework to increase activity levels	27 (96.4)	17 (94.4)	10 (100)	0.45
Goal specific rehabilitation plan	21 (75)	11 (61.1)	10 (100)	0.02
Regular goal review ^{†§}	18 (90)	8 (80)	10 (100)	0.14
Attend inpatient IDT meetings	18 (64.3)	11 (61.1)	7 (70)	0.63

*Physiotherapy or occupational therapy; #An environment and culture supporting activity over the 24-hour period which facilitates and reinforces therapy goals. ESD = early supported discharge; IDT= inter-disciplinary team; CNS = clinical nurse specialist; p=p-value for Chi-squared test; † Missing values: standardised rehabilitation assessment process (n=1); stroke rehabilitation unit (n=1); therapy in a group setting (n=1); neurologist (n=1); geriatrician (n=1); psychologist – inpatient rehabilitation (n=1); nurse practitioner (n=3); doctor (n=1); speech language therapist (n=1); social worker (n=1); dietician (n=3); psychologist – community rehabilitation (n=3); special prioritisation of stroke referrals (n=1); regular goal review (n=1); § smaller overall total, as question was based on an answer from a previous question: special prioritisation of stroke referrals (N=25); regular goal review (N=21).

Table 3: Inpatient rehabilitation therapy duration (minutes) per treatment session and community rehabilitation contacts per week.

	Non-urban (N=18) Median (interquartile range)	Urban (N=10) Median (interquartile range)	P*
Inpatient physiotherapy	38.8 (30–45)	42.5 (30–45)	0.74
Inpatient occupational therapy	33.8 (30–45)	42.5 (30–45)	0.47
Inpatient speech language therapy	30 (30–45)	30 (30–40)	0.84
Community team contacts/week	1.5 (1–2)	2.5 (1–5)	0.21

*p=p-value for Wilcoxon rank-sum test.

is most commonly provided by a GP only (35.7% of hospitals), followed by specialist/registrar clinic (32.1% of hospitals), with no significant differences between urban and non-urban hospitals. Eighty-two percent of hospitals (77.8% non-urban; 90% urban; $p=0.418$) routinely refer patients to the Stroke Foundation of New Zealand for information and post-discharge support.

Links between inpatient and community services were described as “strong—generally effective, a few gaps” by 12 (42.9%) of hospitals, and “average—could be better” by a further 12 (42.9%) hospitals. Among community teams, a standard maximum duration of community rehabilitation is in place at 12 (44.4%) hospitals, while 13 (48.2%) provide care until all goals are met. Of the 12 hospitals that have a standard maximum duration, seven (58.3%) provide therapy for up to six weeks, three (25%) for up to three months, and one (8.3%) each for up to six months and up to one year. There was no statistically significant difference between urban and non-urban hospitals in duration of community rehabilitation ($p=0.33$).

Table 3 presents results on the reported, estimated duration of rehabilitation therapy sessions in minutes and number of face-to-face community rehabilitation contacts per week.

High-quality services include relevant clinical guidelines, provision of continuing stroke education opportunities to ensure staff remain competent in stroke care, and regular quality assurance activities such as clinical audit, data review via the use of

registries, or research.^{5,6} Table 4 compares these measures between urban and non-urban centres.

REGIONS Care has a specific focus on ethnic inequities in stroke service access and outcomes and Table 5 shows differences by hospital type in their provision of culturally appropriate guidelines, patient materials and support services.

Discussion

This survey provides the most comprehensive description of stroke services in New Zealand public hospitals to date. Key differences in the acute setting included fewer acute stroke units (ASUs), less access to stroke clot retrieval (SCR), less availability of a stroke nurse and physician specialist, poorer availability of Pacific support services and less organised hyperacute stroke alert systems in non-urban centres. In the rehabilitation setting, key differences included less availability of a stroke rehabilitation lead physician, lower routine provision of carer training, poorer provision of a hospital contact on discharge to the community and less consistent use of a goal-specific community rehabilitation plan in non-urban centres. Challenges affecting both urban and non-urban hospitals include acute stroke team notification, rapid access to TIA services, standardised rehabilitation assessment, availability of a stroke rehabilitation unit (SRU), availability of psychology services, intensity of community rehabilitation, universal provision of secondary prevention information, availability of early supported discharge (ESD) services,

Table 4: Availability of guidelines, continuing education, and other quality assurance initiatives.

	Total (N=28)	Non-urban (N=18)	Urban (N=10)	p
Acute stroke care protocols/guidelines - N (%)				
TIA pathway/guideline	24 (85.7)	16 (88.9)	8 (80)	0.52
Thrombolysis protocol	28 (100)	18 (100)	10 (100)	-
Stroke clot retrieval protocol	12 (42.9)	3 (16.7)	9 (90)	<0.0001
Managing shoulder pain	14 (50.0)	11 (61.1)	3 (30)	0.12
Falls prevention	27 (96.4)	18 (100)	9 (90)	0.17
Pressure injury management	27 (96.4)	18 (100)	9 (90)	0.17
Managing urinary incontinence†	20 (74.1)	15 (88.2)	5 (50)	0.03
Rehabilitation protocols/guidelines - N (%)				
Mood†	16 (59.3)	12 (66.7)	4 (44.4)	0.27
Visual impairment†	16 (59.3)	13 (72.2)	3 (33.3)	0.05
Communication†	20 (80)	14 (82.4)	6 (75)	0.67
Motor impairment†	19 (70.4)	15 (83.3)	4 (44.4)	0.04
Sensory impairment†	18 (66.7)	15 (83.3)	3 (33.3)	0.009
Clinician access to continuing stroke education - N (%)				
Acute setting any stroke education	20 (71.4)	10 (55.6)	10 (100)	0.01
Acute setting ≥8 hours per annum†	19 (73.1)	11 (61.1)	8 (100)	0.04
Inpatient rehabilitation any stroke education	16 (59.3)	9 (50)	7 (77.8)	0.17
Inpatient rehabilitation ≥8 hours per annum†	16 (61.5)	10 (55.6)	6 (75)	0.35
Community ≥8 hours per annum†	12 (50)	6 (37.5)	6 (75)	0.08
Quality assurance (eg audit) in prior two years - N (%)				
Acute stroke services	24 (85.7)	14 (77.8)	10 (100)	0.11
Thrombolysis register participation	28 (100)	18 (100)	10 (100)	-
Inpatient rehabilitation services	20 (71.4)	11 (61.1)	9 (90)	0.11
Rehabilitation AROC participation	26 (92.9)	16 (88.9)	10 (100)	0.27
Community team†	11 (42.3)	3 (18.8)	8 (80)	0.002

TIA = transient ischaemic attack; AROC = Australasian Rehabilitation Outcomes Centre p=p-value for Chi-squared test; †Missing values: managing urinary incontinence (n=1); mood (n=1); visual impairment (n=1); communication (n=3); motor impairment (n=1); sensory impairment (n=1); inpatient rehabilitation ≥8 hours per annum (n=2); community ≥8 hours per annum (n=4); community team (n=2).

continuing education for staff and the provision of culturally responsive information and support to Māori and Pacific patients.

Organised ASU care with an interdisciplinary team specialising in stroke management reduces death, dependency and institutionalisation of stroke patients.¹

Low patient numbers in some of the smaller hospitals may make having an ASU unfeasible. While some allowances have been made in New Zealand for care in non-ASU settings in small rural hospitals, the Australian Stroke Guidelines, adapted for use in New Zealand, recommend that patients should be urgently transferred to

Table 5: Provision of culturally appropriate patient support.

	Total (N=28)	Non-urban (N=18)	Urban (N=10)	p
Acute stroke care - N (%)				
Guideline on culturally appropriate care	14 (50)	10 (55.6)	4 (40)	0.43
Interpreter available	27 (96.4)	17 (94.4)	10 (100)	0.45
Māori support service available	28 (100)	18 (100)	10 (100)	-
Pacific support service available	20 (71.4)	10 (55.6)	10 (100)	0.01
Māori appropriate info routinely provided to Māori patients	19 (67.9)	12 (66.7)	7 (70)	0.86
Pacific appropriate info routinely provided to Pacific patients	11 (39.3)	5 (27.8)	6 (60)	0.09
Stroke info available in Te Reo Māori	16 (57.1)	12 (66.7)	4 (40)	0.17
Stroke info available in Samoan	10 (35.7)	6 (33.3)	4 (40)	0.72
Stroke info available in Tongan	8 (28.6)	5 (27.8)	3 (30)	0.90
Stroke info available in Mandarin	5 (17.9)	2 (11.1)	3 (30)	0.21
Stroke info available in Hindi	2 (7.1)	0 (0)	2 (20)	0.05
Inpatient rehabilitation - N (%)				
Māori support service available [†]	25 (92.6)	16 (88.9)	9 (100)	0.30
Pacific support service available [†]	20 (74.1)	11 (61.1)	9 (100)	0.03
Māori appropriate info routinely provided to Māori patients	20 (71.4)	12 (66.7)	8 (80)	0.45
Pacific appropriate info routinely provided to Pacific patients	10 (35.7)	5 (27.8)	5 (50)	0.24
Stroke info available in Te Reo Māori	9 (32.1)	7 (38.9)	2 (20)	0.31
Stroke info available in Samoan	6 (21.4)	5 (27.8)	1 (10)	0.27
Stroke info available in Tongan	4 (14.3)	4 (22.2)	0 (0)	0.11
Stroke info available in Mandarin	2 (7.1)	2 (11.1)	0 (0)	0.27
Stroke info available in Hindi	0 (0)	0 (0)	0 (0)	-

p=p-value for Chi-squared test; †Missing values: inpatient rehabilitation—Māori support service available (n=1); Pacific support services available (n=1).

a hospital with an ASU if none is available locally.⁷ Our survey found that the majority of hospitals without an ASU have a patient transfer protocol, although how regularly patients are transferred is unclear. It is concerning that only 75% of stroke inpatients at ASU hospitals were being managed in the ASU on the day the survey was completed. This falls short of the 80% national Ministry of Health (MoH) indicator for ASU care and is only slightly higher than the 64% reported in a previous New Zealand acute stroke audit in 2009.²

There is no reason why a code stroke could not be implemented in all hospitals and this is something that services should explore. We know from other work that stroke thrombolysis treatment rates have steadily improved since 2009⁸ and it is pleasing that all 28 stroke hospitals offer this service. However, it is concerning that stroke clot retrieval remains challenging to access for patients presenting to non-urban hospitals. With the right infrastructure and organisation, stroke clot retrieval via a drip and ship model is possible for all centres,⁹ but

requires a national approach. A MoH effort had been underway to support this, but this has stalled over the past 18 months. In terms of specialist nursing staff in the acute setting, there is less availability of stroke CNS, stroke nurse educators and stroke research nurses in non-urban centres, although of the number of these positions has increased since 2009.² There was no significant difference in reported stroke nurse leadership. Overall numbers of stroke specialist doctor has also improved with an increase from 43% to 82% in the current survey.²

Other challenges in the delivery of best practice care appear to affect both urban and non-urban centres. Acute stroke team pre-notification should be in place universally and should be easy to implement. While 86% of hospitals have a TIA pathway or guideline, an increase from 67% in the 2009 audit,² TIA care still appears inadequate. Rapid access specialist TIA care has a strong evidence base in reducing the stroke burden¹⁰ and the uncovered limited access requires urgent further exploration and remediation.

All patients should have their rehabilitation needs assessed using a standardised assessment process. Only half of the hospitals have this in place, raising the concern that patients may have unmet rehabilitation needs. Rehabilitation should be provided in a SRU or comprehensive stroke unit as this improves patient outcomes.¹ There appears to be no change in SRU availability since the previous New Zealand rehabilitation audit,³ but there is currently a focus on optimising best practice stroke rehabilitation care as part of the National Stroke Network Work Plan and work is ongoing. Access to psychology services is limited across all areas of stroke care in both urban and non-urban centres, acute and rehabilitation. This needs to be addressed as psychologists add significant value for patients with common post-stroke impairments of mood, cognition, perception and attention.

An important part of stroke rehabilitation is that therapy should be structured to provide the highest intensity (frequency and duration) possible.⁷ In the previous New Zealand rehabilitation audit, intensity of inpatient rehabilitation was identified as an area of concern, with less than half of the primary rehabilitation units providing one hour of physical therapy per day for

at least five days per week.³ This appears to have improved with nearly 90% of hospitals now reporting this. The challenge to provide intensive therapy in the community remains, regardless of hospital location. There is strong evidence that early supported discharge (ESD) services can provide a similar level of intensity as inpatient rehabilitation in selected patients, and reduce length of stay and improve patient outcomes.¹¹ There are strong recommendations in clinical guidelines to provide this service.¹ Our survey shows that very few hospitals in New Zealand provide an ESD service, with the number having reduced since 2013.³ Reasons for this are unclear but should be addressed.

Of concern nationally are the gaps in cultural responsiveness of services across the continuum of stroke care. Ethnic inequities in health and health outcomes exist in New Zealand, are particularly evident between Māori and New Zealand Europeans, and Māori report higher levels of racial discrimination in the healthcare setting.¹² It is therefore worrying that only half of New Zealand stroke services report having a guideline on culturally appropriate care and that just over two thirds of hospitals in the acute setting and approximately 70% of rehabilitation services routinely provide culturally responsive information and support to Māori patients. Equally concerning is the availability of information on stroke care and recovery in Te Reo Māori in both acute and rehabilitation settings. A higher (non-significant) proportion of non-urban hospitals have information available in Te Reo Māori. A further concern is the limited availability of Pacific support services, particularly in non-urban hospitals, and the provision of culturally responsive information and support delivered to this group of patients. While this may be because nearly 80% of Pacific peoples live in the Auckland and Wellington regions,¹³ it still represents a gap affecting the 20% living in provincial New Zealand. Despite the difference in support service availability, it is interesting that in the inpatient rehabilitation setting a (non-significant) higher percentage of non-urban hospitals had stroke information available in Samoan and Tongan. It is imperative that hospital stroke services identify and address the cultural

needs of Māori and Pacific patients and their families to reduce inequities in healthcare and health outcomes. A place to start would be ensuring that guidelines on delivering culturally appropriate care are in place and in use by all stroke teams.

Continuing education for staff is important to maintain competence, and a minimum of eight hours of formal stroke education each year has been identified as a minimum requirement in New Zealand for all core staff working with stroke patients.¹⁴ While access to continuing stroke education for inpatient rehabilitation staff remains below 60% in our survey, this is an improvement since 2013 which showed that only 32% of rehabilitation sites provided staff education.³ We found differences by hospital location in the availability of ongoing staff education. In some smaller hospitals, it may be difficult to achieve the required number of hours of stroke-specific education as these health professionals often need to be generalists, providing services to a diverse range of patients. However, the concern with a lack of formal stroke specific continuing education is whether staff have and can maintain the most up-to-date knowledge to deliver best-practice stroke care.

The strengths of this survey are that all hospitals that are routinely involved in stroke care in New Zealand took part, providing excellent coverage across the country. Secondly, the survey included questions across the continuum of care, including community rehabilitation, whereas previous New Zealand surveys have focused on inpatient stroke services. In addition, we included New Zealand culturally specific questions, an important component of care. A limitation of the survey is that the answers rely on reporting accuracy of respondents and were provided primarily by inpatient staff, which may explain a higher frequency of missing data for the community care sections of the survey.

In summary, differences by hospital location continue to exist in the provision of best practice stroke care in New Zealand, as do challenges irrespective of hospital location, and there is clearly more work needed. What remains unclear is whether these differences and departures from best practice care are impacting patient outcomes. Data from this survey will be used in conjunction with data from the broader REGIONS Care project to address this question and inform stroke care practice in New Zealand moving forward.

Appendix

Appendix Figure 1: Page one of the organisational survey. View the entire survey at https://uploads-ssl.webflow.com/5e332a62c703f6340a2faf44/5fc56fb8b9bf507fc9cb7959_Annemarei%20Ranta%20-%20organisational%20survey%20hospital%20stroke%20services.pdf.

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Organisational Survey - Hospital Stroke Services

Hospital Details

Your hospital name

How many total inpatient beds are there in your hospital?

(Include all inpatient beds including mental health and paediatrics, maternity, day-stay, ICU/PACU, ED, Clinical Trial Unit etc and even currently unresourced/unstaffed beds.)

How many acute medical and surgical beds are there in your hospital?

(Excluding ICU/PACU, ED, paediatrics, mental health, maternity, day-stay, rehabilitation, but including MAPU and any beds currently not resourced.)

How many of the acute medical/surgical beds are currently fully resourced/staffed?

(i.e. exclude any beds that are routinely kept vacant)

How many inpatient rehabilitation beds are there in your hospital (include >65 and < 65 beds)?

How many of the inpatient rehabilitation beds are currently resourced/staffed (i.e. available for use)?

ACUTE STROKE SERVICE

Does your hospital have an acute stroke unit?

Yes No

If yes, is your 'acute stroke unit' dedicated to stroke (ie. not a shared space)?

Yes No

Do you have a mobile inpatient stroke team?

Yes No

Does your stroke unit team routinely provide clinical care or advice for patients not on the stroke unit?

Yes No

How many beds are in the acute stroke unit?

How many patients with acute stroke were admitted to your hospital in the last year (approx)?

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Competing interests:

Prof. Cadilhac is the Data Custodian for the Australian Stroke Clinical Registry.

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