

Prediction of unplanned hospital admissions using the interRAI DIVERT scale among community-dwelling older adults in Aotearoa New Zealand

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ABSTRACT

AIM: We aimed to validate the interRAI Detection of Indicators and Vulnerabilities for Emergency Room Trips (DIVERT) scale in predicting unplanned hospital admissions following emergency department (ED) visits among community-dwelling older adults in an urban Aotearoa New Zealand population.

METHODS: We conducted a retrospective cohort study of adults aged ≥ 55 years who underwent interRAI home care (HC) version 9.1 assessment between May 2021 and April 2022. The DIVERT score, derived from HC assessment data, categorised patients into risk levels. Hospital records were reviewed for unplanned hospital admissions via ED within 90 days of assessment. Statistical analyses, including survival and regression models, were used to evaluate predictive validity and explore risk factors.

RESULTS: Between May 2021 and April 2022, 2,006 patients were assessed, with a mean age of 79.8 years (range 55–103). Admission rates within 90 days increased with higher DIVERT scores, from 18.2% (score 1) to 41.9% (score 6). Among high-risk groups (scores 5–6), a higher comorbidity burden was significantly associated with admission ($p < 0.001$), while age, ethnicity and deprivation showed no statistically significant association. Primary causes of admission included infections, heart failure and falls. Mortality rates were notably higher in admitted patients at both 30 and 90 days.

CONCLUSIONS: This study confirms the predictive validity of the interRAI DIVERT scale for unplanned hospital admissions among community-dwelling older adults in urban Aotearoa New Zealand. The strong association between higher scores and increased admission rates supports its use in risk-stratification within this population.

Older adults constitute a sizeable proportion of emergency department (ED) presentations.¹ They often present with complex, undifferentiated symptoms that can lead to diagnostic uncertainty, delays in care and an increased risk of hospital-acquired complications, functional decline and mortality.^{1,2} In response to these challenges, healthcare systems are increasingly focussing on strengthening community-based care to support older adults with complex needs, with the goal of preventing avoidable hospital presentations and their associated risks.³

In Aotearoa New Zealand, the interRAI home care (HC) version 9.1 assessment is mandated to assess the health, functional status and social needs of older adults receiving publicly funded home and community care.⁴ From this assessment, the Detection of Indicators and Vulnerabilities for Emergency Room Trips (DIVERT) scale was developed to identify individuals at risk of ED use.⁵ The DIVERT tool stratifies risk based on factors such as cardio-respiratory symptoms, mood, functional

decline and comorbidities.⁴

The DIVERT scale was originally derived and validated in a large Canadian HC cohort of 361,942 older adults, where 41% had an ED visit within 6 months; risk increased stepwise across the six DIVERT levels, and the model achieved an area under the receiver operating characteristic curve (AUC) of 0.62 (95% confidence interval 0.61–0.62).⁵ Subsequent external validations in over one million Canadian clients⁶ and in Finnish HC populations⁷ reported similar discrimination (AUC 0.61–0.66) and confirmed that clients in the highest DIVERT classes had the shortest time to hospitalisation and greatest overall risk. Compared with other RAI HC-derived indices—such as Changes in Health, End-Stage Disease, Signs, and Symptoms Scale (CHESS), Activities of Daily Living (ADL) Hierarchy or Method for Assigning Priority Levels (MAPLe)—the DIVERT scale demonstrated superior or comparable performance for predicting unplanned admissions. Locally, an Aotearoa New Zealand study of frail

community-dwelling older adults receiving transitional care reported 42% readmission within 3 months despite multidisciplinary support, underscoring the importance of accurate early risk stratification and preventive approaches.⁸ However, the DIVERT scale has not yet been validated within the country. This is particularly relevant in Aotearoa New Zealand, where population characteristics differ substantially, with a high burden of multimorbidity and marked health inequities affecting Māori and Pacific peoples.

Local validation of the DIVERT scale is essential to assess its performance across ethnic and socio-economic groups within the Aotearoa New Zealand context. This study therefore aims to confirm the validity of the interRAI DIVERT scale in predicting unplanned hospital admissions following ED presentation among older adults in an urban Aotearoa New Zealand population.

Aim

The aim of this study was to confirm the validity of the interRAI DIVERT Scale in predicting the risk of unplanned hospital admissions following ED presentations for home and community care patients in Counties Manukau, an urban population in Aotearoa New Zealand.

Our hypothesis was that patients with higher DIVERT scores (5 and 6) would be more likely to be admitted to hospital than those with lower scores. Understanding the characteristics and presenting complaints of older adults with high DIVERT scores in the ED could provide a better understanding of the common conditions that lead to unplanned hospital admissions.

Methods

This study is reported in accordance with the Strengthening the Reporting of Observational studies in Epidemiology (STROBE) guidelines.⁹ The interRAI HC version 9.1 assessment tool is mandated by the Aotearoa New Zealand government for all older adults who are being assessed for publicly funded home support services or aged residential care, and no other tool is used for this specific purpose. It is not administered to all older adults in the community, but rather to those with identified health or functional needs. The assessment is typically repeated annually, or earlier if there is a significant change in health status.⁴

Study design

This retrospective cohort study validated the interRAI DIVERT scale's ability to predict unplanned ED visits and hospital admissions among older adults in Counties Manukau. The study also investigated the risk factors and reasons for admission. Additionally, a *post hoc* analysis was performed using survival analysis and regression models to evaluate the time to admission or death.

Setting

This was a community study conducted in the catchment area of Middlemore Hospital between 1 May 2021 and 30 April 2022.

Participants

All community patients aged over 55 years for Māori or Pacific people, and over 65 years for others, underwent an interRAI HC version 9.1 assessment between 1 May 2021 and 30 April 2022 in the Counties Manukau area and received a DIVERT score (Table 1). We retrospectively reviewed these patients' files. This study included only interRAI HC version 9.1 assessments, which are administered to older adults living in the community who are being evaluated for publicly funded home support or potential residential care placement. Individuals already residing in aged residential care facilities, as well as those assessed with other interRAI tools such as the Contact Assessment or Long-Term Care Facilities Assessment, were excluded.

Variables

The primary outcome was an unplanned hospital admission via the ED within 90 days of the assessment. Only the first ED presentation within this period was considered. An unplanned admission was defined as any hospital admission that was not scheduled electively. In our health system, virtually all unplanned acute medical and surgical admissions for community-dwelling patients are processed through the ED; direct admissions from primary care are exceptionally rare. Although previous validation studies of the DIVERT scale used a 6-month follow-up, a 90-day period was selected for this study to reflect the shorter review cycles and intervention windows typical of Aotearoa New Zealand community-care services. This timeframe captures hospitalisations most relevant to immediate care-planning decisions while maintaining consistency with the timing of interRAI reassessments.

interRAI is an internationally validated suite of tools for assessing health functionality and social needs across various settings.⁴ Costa et al. have developed and validated the DIVERT scale, which is derived from the interRAI HC version 9.1 assessment tool.⁵

DIVERT scores range from 1 (lowest risk) to 6 (highest risk), highlighting key determinants including cardiorespiratory symptoms, cardiac conditions, mood symptoms and functional decline.⁴ Both international research and local studies indicate that individuals with higher DIVERT scores are more likely to exhibit a greater likelihood of experiencing unplanned hospital admissions.⁶⁻⁸ DIVERT scores can aid in resource allocation, chronic disease management and symptom control.⁵ The tool can be used to guide early intervention and tailored support, aiming to reduce hospital visits and improve patient outcomes by addressing specific health risks and enhancing primary-care connections.⁵

Two investigators reviewed admission and discharge summaries for patients admitted to the hospital during the study period to discern their primary reasons for admission. A primary diagnosis and secondary diagnosis were recorded for each case (secondary diagnosis was recorded as none if there was no secondary diagnosis). Diagnoses were categorised as follows: infection, decompensated heart failure or other cardiac problem, falls with no injuries, falls with injuries, unmanaged pain, acute surgical problem, anaemia, delirium or dementia, problems with constipation or catheters, acute neurological problems, problems with lack of adequate social supports or other. These diagnosis categories were based on some of the symptoms that contribute to the DIVERT score as well as our clinical experience of common reasons for admission.

Diagnosis classification and inter-rater agreement

Two investigators independently reviewed admission and discharge summaries to determine the primary and secondary reasons for hospital admission. Agreement was reached in 93 of 132 cases (70.5%). For the remaining 39 cases, a third investigator adjudicated, agreeing with one of the initial reviewers in 31 instances. The remaining eight cases were discussed collectively until consensus was reached. Because the diagnostic categories were discrete and mutually exclusive, agreement was summarised as percent concordance rather than using Cronbach's alpha, which

is not applicable to categorical classification data.

Data sources/measurement

Data were obtained from the Aotearoa New Zealand interRAI data warehouse. All interRAI HC version 9.1 data are collected as part of the mandatory national assessment for older adults receiving publicly funded community services in Aotearoa New Zealand. De-identified data were accessed under ethics approval; individual participant consent was not required. We collected the following data: age at the time of interRAI assessment, gender, ethnicity (Māori, Pacific peoples, European, Asian, and Other), deprivation quintile and comorbidity index. Ethnicity was coded using the prioritised (first order) ethnicity classification in accordance with Stats NZ Tatauranga Aotearoa and interRAI New Zealand conventions.

Among patients with DIVERT scores of 5 and 6, we explored potential risk factors for admission by comparing the characteristics of those who were admitted to hospital with those who were not.

Deprivation quintiles were derived from routinely collected data by government agencies as well as census data at the neighbourhood level using custom designed data zones. These zones are ranked from 1 (least deprived) to 6,181 (most deprived). These zones are then grouped in five quintiles, with quintile 1 representing the 20% least deprived, while quintile 5 represents the 20% most deprived data zone in Aotearoa New Zealand.¹⁰

With regards to comorbidity index, we initially planned to use the Charlson Comorbidity Index (CCI).^{11,12} However, due to difficulties in obtaining complete and coded diagnostic data, we developed a simplified scoring system where each of the following comorbidities was assigned one point: solid tumour, cerebrovascular disease, chronic kidney disease, chronic obstructive pulmonary disease (COPD), diabetes mellitus, leukaemia/lymphoma, liver disease, myocardial infarction, peptic ulcer disease and peripheral vascular disease.

Although we were unable to apply the full CCI due to data limitations, prior research has shown that simple counts of selected chronic conditions correlate well with CCI scores and can serve as a valid proxy for multimorbidity burden in older adults.¹³

Hypertension and dementia were not included in this simplified index. Hypertension was

excluded as it is highly prevalent in this population and may not meaningfully discriminate risk in this high-risk cohort. Dementia was excluded due to inconsistent recording in available datasets and the difficulty in reliably distinguishing it from delirium or cognitive decline in clinical summaries. These conditions, however, were captured as primary or secondary reasons for hospital admission when relevant.

Statistical methods

Data were recorded in REDCap. Statistical analyses were performed using R studio version 4.2.2, OpenEpi and Stata version 13. Descriptive statistics show Chi-squared unless otherwise stated. Univariable and multivariable associations were tested with Cox regressions. Kaplan–Meier plots were used to show time to admission analysis, where time is days since interRAI assessment, and the event is hospital admission. Tests were two-sided and p-values <0.05 were considered statistically significant.

The project was registered with the Counties Manukau Health Research Office, registration number #1765. Ethical approval was obtained, reference number AH25500, date 22 May 2023. Locality approval was given by the Auckland Health Research Ethics Committee (AHREC). All analyses used de-identified data extracted from the interRAI New Zealand database.

Results

Part 1: the relationship between DIVERT scores and the rates of admission

A total of 2,007 eligible patients had an interRAI

HC version 9.1 assessment with a DIVERT score, in the community, between 1 May 2021 and 30 April 2022, inclusive. As shown in Table 1, the percentage of patients admitted within 90 days of assessment rose with each increment in DIVERT score, from 18.2% for those with score 1 to 41.9% for score 6 ($p<0.001$).

Predictive performance of the DIVERT scale

The positive predictive value (PPV) for unplanned hospital admission within 90 days increased with each increment in DIVERT score, ranging from 18.2% (score 1) to 41.9% (score 6). Using a threshold of DIVERT ≥ 5 , the PPV was 36.9%, and the negative predictive value (NPV) for DIVERT ≤ 4 was 78.5%. These values indicate moderate discriminative ability, comparable to previous validation studies, with a clear stepwise gradient of risk across DIVERT categories (Table 1).

Part 2: characteristics of patients admitted and not admitted within 90 days

Table 2 presents the characteristics of patients with DIVERT scores of 5 and 6, comparing those who were admitted to the hospital within 90 days with those who were not. The global Chi-squared p-values suggest significant differences were observed in comorbidity scores, with higher scores associated with an increased likelihood of admission ($p<0.001$). In the second part of the analysis, we examined hospital admission within 90 days among patients with high DIVERT scores (5 and 6), stratified by our simplified comorbidity index. Of

Table 1: Unplanned hospital admission within 90 days of assessment, by DIVERT score, and mortality within 30 and 90 days by DIVERT score, N=2,007.

DIVERT score	N (total)	Admitted within 90 days n (%)	Died within 30 days n (%)	Died within 90 days n (%)
1	352	64 (18.2)	N/A	N/A
2	626	118 (18.8)	N/A	N/A
3	339	79 (23.3)	N/A	N/A
4	335	94 (28.1)	N/A	N/A
5	200	66 (33.0)	25 (19.2)	37 (28.5)
6	155	65 (41.9)	24 (18.8)	37 (28.5)
Total	2,007	486 (24.2)	—	—

these, 130 patients were admitted and 224 were not. The comorbidity score ranged from 0 to 5, with each point representing one chronic condition from the predefined list. Patients with no comorbidities (score 0) were significantly less likely to be admitted (14% of admitted vs 29% of non-admitted; relative risk (RR)=0.6, $p=0.002$). The likelihood of admission increased progressively with higher comorbidity scores (score 2: RR=1.3, $p=0.006$; score 3: RR=1.2, $p=0.031$; score 4: RR=2.1, $p=0.0001$). The global p -value (<0.001) confirmed a statistically significant overall association between comorbidity burden and hospital admission. No patients in this dataset had a comorbidity score of 5, and score 1 did not reach statistical significance. Overall, there was a clear positive relationship between comorbidity burden and the risk of unplanned hospital admission among high-risk patients (DIVERT 5 and 6). Those with three or more chronic conditions were approximately twice as likely to be admitted compared with those with none, underscoring comorbidity as a major driver of admission risk in this group. No significant associations were found for age, gender, ethnicity or deprivation quintile. Rate ratios with 95% confidence intervals were calculated to quantify the strength of associations.

We used bivariate analysis to characterise differences between admitted and non-admitted patients in the high-risk group. This exploratory approach was appropriate for hypothesis generation and pattern recognition. While a multivariable logistic regression model could adjust for confounding, the sample size and multicollinearity between variables (e.g., age and comorbidity) limited the utility of such modelling in this context.

Admission and discharge summaries were reviewed by two investigators, with discrepancies resolved through independent adjudication and group consensus as described in the methods section. The final categorisation of primary and secondary admission diagnoses for patients with DIVERT scores 5 and 6 is presented in Table 3.

Part 3: admission diagnosis

Table 3 shows the primary and secondary admission diagnoses for patients with DIVERT score 5 and 6. After “other”, the most common reasons for admission were infection, heart failure or other cardiac problem, falls without injuries, pain, and surgical problems. “Other” as a diagnosis included diverse problems such as metastatic lung cancer for three patients, knee calcium pyrophosphate deposition disease, abdominal

lump, motor neurone disease causing reduced mobility, fungal rash under pannus, oral thrush, hypothermia, heel haematoma, low Glasgow Coma Scale, metastatic ovarian cancer, acute kidney injury, squamous cell carcinoma of the scalp, musculoskeletal pain in the context of fluid overload and chronic kidney disease, alcoholic intoxication and general decline post-coronavirus infection.

Mortality rates for patients with DIVERT scores 5 and 6 within 30 and 90 days

Both unplanned hospital admission and mortality increased with higher DIVERT scores, with the steepest gradients observed in categories 5 and 6 (Table 1). Among patients with DIVERT scores of 5 and 6, mortality rates were significantly higher for those who were admitted to the hospital compared with those who were not. Within 30 days, 38% (49 out of 130) of admitted patients died, whereas no deaths were observed among non-admitted patients ($p<0.001$). Similarly, within 90 days, 57% (74 out of 130) of admitted patients died, while, again, no deaths occurred among non-admitted patients ($p<0.001$). These findings highlight that patients with high DIVERT scores who are admitted have a profoundly high mortality rate, underscoring the severity of illness and frailty within this group.

Table 4 displays the time from assessment to admission for patients with DIVERT scores of 5 and 6, with the number of admissions for different time intervals. Fifteen percent of patients are admitted within 72 hours and a further 27% are admitted within 14 days of interRAI assessment.

Time to event analysis for patients with DIVERT scores of 5 and 6

A Cox regression indicated that a higher comorbidity score was significantly associated with increased risk of admission, (hazard ratio 1.51, $p<0.001$) after adjustment for age, gender, ethnicity and deprivation quintile. Higher deprivation quintile was associated with increased risk of admission on univariate regression but not on the adjusted model. None of age, gender or ethnicity were significant in univariate or adjusted models.

Figure 1 consists of four graphs, showing time to event analyses separately by age group, ethnicity, deprivation quintile and comorbidity scores. Only comorbidity scores show statistically significant differences in a fully adjusted model.

As shown in Table 4, 15% of admitted high-risk patients were admitted within 72 hours of

Table 2: Characteristics of patients admitted and not admitted within 90 days, DIVERT score 5 and 6.

	Patients admitted n=130 (%)	Patients not admitted n=224 (%)	Rate ratio (95% confidence interval)	p-value	Global p-value
Age at assessment					
>84	38 (29)	94 (42)	0.7 (0.5–0.9)	0.01	0.087
75–84	57 (44)	78 (35)	1.3 (1.0–1.7)	0.08	
65–74	24 (18)	40 (18)	1.0 (0.7–1.5)	0.91	
55–64	11 (8)	12 (5)	1.3 (0.8–2.0)	0.26	
Gender, n (%)					
Female	67 (52)	116 (52)	1.0 (0.8–1.3)	0.98	0.96
Male	63 (48)	108 (48)	1.0 (0.8–1.3)	0.98	
Ethnicity, n (%)					
Māori	22 (17)	27 (12)	1.3 (0.9–1.8)	0.15	0.063
Pacific	32 (24)	37 (16)	1.3 (1.0–1.8)	0.07	
Asian	15 (11)	23 (10)	1.1 (0.7–1.6)	0.73	
Other	61 (46)	137 (61)	0.7(0.5–0.9)	0.01	
Comorbidity score, n (%)					
0	19 (14)	65 (29)	0.6 (0.4–0.8)	0.002	<0.001
1	42 (32)	87 (39)	0.8 (0.6–1.1)	0.22	
2	36 (27)	43 (19)	1.3 (1.0–1.8)	0.006	
3	18 (14)	23 (10)	1.2 (0.8–1.8)	0.031	
4	15 (11)	6 (3)	2.1 (1.5–2.8)	0.0001	
5	0 (0)	0 (0)	0	0	
Deprivation quintile, n (%)					
1	10 (7)	27 (12)	0.7 (0.4–1.2)	0.19	0.196
2	12 (9)	32 (14)	0.7 (0.4–1.2)	0.16	
3	19 (14)	38 (17)	0.9 (0.6–1.3)	0.54	
4	16 (12)	27 (12)	1.0 (0.7–1.5)	0.96	
5	70 (54)	91 (41)	1.4 (1.1–1.9)	0.01	
N/A	3 (2)	9 (4)	0.7 (0.3–1.8)	0.39	

Table 3: Primary and secondary admission diagnoses for patients with DIVERT score 5 and 6.

Reasons	Primary diagnosis n=130 (%)	Secondary diagnosis n=130 (%)
Other	24 (18.5)	15 (11.5)
Infection, e.g., pneumonia, urinary tract infection, COVID-19	24 (18.5)	9 (6.9)
Decompensated heart failure or other cardiac problem	16 (12.3)	13(10)
Falls with no injuries	10 (7.7)	1 (0.8)
Unmanaged pain, e.g., back pain	10 (7.7)	2 (1.5)
Acute surgical problem, e.g., bowel obstruction	10 (7.7)	1 (0.8)
Decompensated chronic obstructive pulmonary disease or other chronic respiratory illness	9 (6.9)	4 (3.1)
Falls with injuries (excluding skin lacerations)	7 (5.4)	1 (0.8)
Anaemia	5 (3.9)	8 (6.2)
Delirium/dementia	5 (3.9)	5 (3.9)
Problems with indwelling catheters or constipation	5 (3.9)	3 (2.3)
Acute neurological problems, e.g., stroke/seizure	3 (2.3)	2 (1.5)
Problems with lack of adequate social supports	1 (0.8)	8 (6.2)
None	1 (0.8)	58 (44.6)

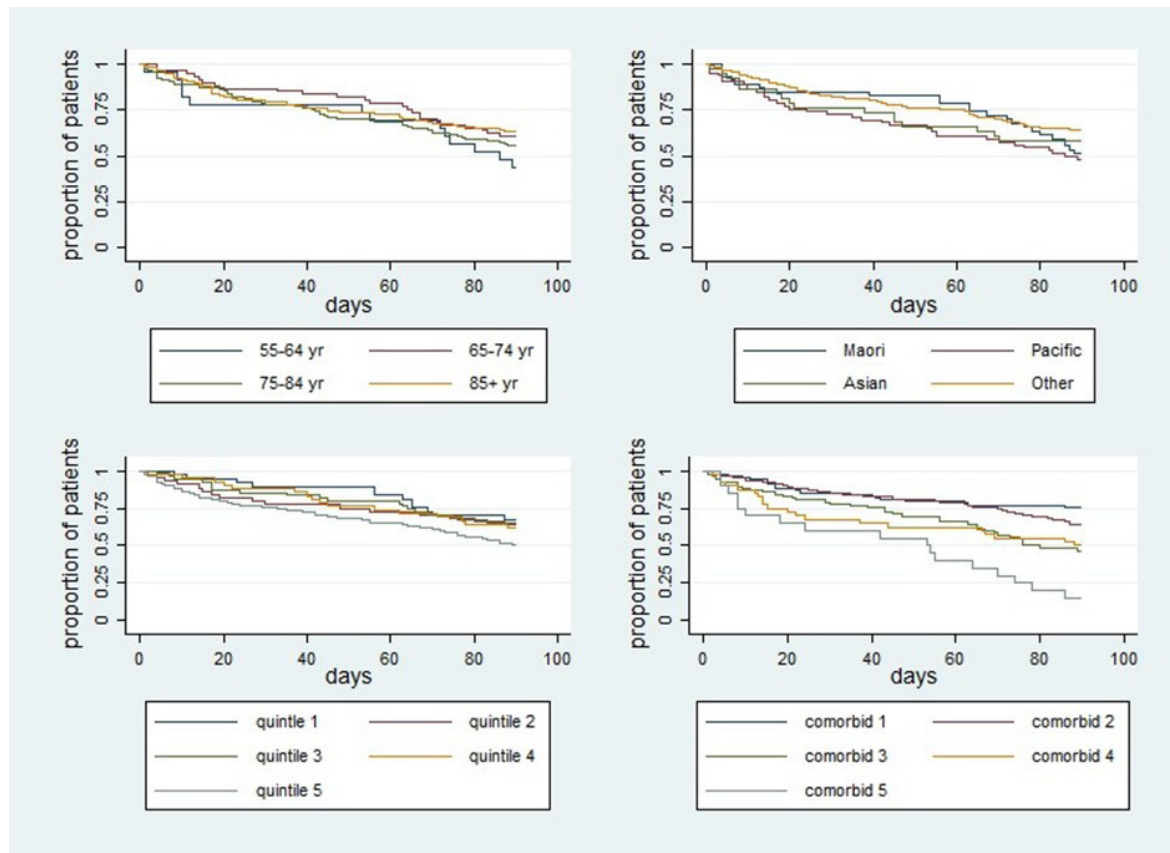
“None” as primary diagnosis was due to a single patient presentation over concern about low oxygen saturation measured at home; the patient was asymptomatic, and saturation was normal in the emergency department.

“None” as the secondary diagnosis was used in cases where only one primary reason for admission was identified in the clinical records, and no clear secondary diagnosis was documented. This applied to 58 patients.

Table 4: Time from interRAI assessment to hospital admission among patients with DIVERT scores of 5 and 6 who were admitted within 90 days (n=130 of 2,007 total patients).

Time from assessment to admission (DIVERT score 5 and 6)	
N (%)	
Fewer than 72 hours	19 (15)
4–14 days	35 (27)
15–28 days	24 (18)
29–60 days	23 (18)
61–90 days	29 (22)

Figure 1: Kaplan–Meier time to event (admission) analyses by age group, ethnicity, deprivation quintile and comorbidity score for DIVERT scores of 5 and 6.



assessment, and 42% were admitted within the first 14 days. This indicates a particularly vulnerable period immediately following the assessment. A Kaplan–Meier analysis confirmed a steep initial rate of admission in the first few weeks.

Discussion

The present study aimed to evaluate the interRAI DIVERT assessment tool in predicting unplanned hospital admissions and identifying opportunities for preventive interventions. The findings contribute to the growing body of literature on the utility of the DIVERT tool and highlight potential areas for targeted interventions to reduce avoidable admissions among older adults.

The study's first part confirmed a significant positive association between higher DIVERT scores and increased rates of unplanned hospital admissions within 90 days of assessment. This finding is consistent with previous research validating the DIVERT scale's predictive ability for

unplanned admissions.⁵

The DIVERT scale showed a strong dose–response relationship with admission risk, though overall discriminative ability was moderate (PPV 18–42%; NPV 79%), supporting its use for risk stratification rather than precise prediction. High admission rates among low scorers highlight the frailty of the interRAI HC population, emphasising the need to interpret DIVERT scores alongside clinical judgement. Trends in admission and mortality across categories further validate its predictive utility. Among high DIVERT scorers (5 and 6), higher comorbidity was strongly associated with 90-day admissions, underscoring the role of multimorbidity and the importance of proactive chronic disease management and coordinated community care.

We observed non-significant trends toward higher admission rates among older adults, Māori and Pacific peoples, and those from more socio-economically deprived backgrounds, possibly due to limited power (n=130 high DIVERT

score admissions) or true null associations. Interestingly, patients over 84 in the high-score group tended to be less likely admitted, which could relate to advance care planning or home support. These findings generate hypotheses for future research, and larger studies are needed to confirm whether targeted interventions for high-comorbidity and vulnerable sub-groups could reduce avoidable admissions. Among high DIVERT scorers, primary reasons for admission were diverse, including infections, heart failure, falls and unmanaged pain, highlighting multiple potential areas for early intervention, particularly prompt infection management.

Our findings broadly align with prior studies validating the DIVERT scale as a predictor of unplanned healthcare utilisation. Costa et al., who developed the tool, demonstrated that higher DIVERT scores were associated with increased rates of ED visits and hospitalisations in a large Canadian HC cohort.⁵ Subsequent external validation studies in Finland, Canada and Europe have confirmed the scale's predictive performance across diverse populations and health systems.^{6,7} These studies consistently show that individuals with higher DIVERT scores are more likely to experience unplanned ED presentations or hospital admissions. Our study supports international findings by validating the DIVERT scale in an Aotearoa New Zealand population with a high proportion of Māori and Pacific peoples within a distinct publicly funded community care model. Higher DIVERT scores were associated with increased unplanned admission risk, and receiver operating characteristic (ROC) curve analysis showed moderate discriminative ability (AUC=0.68), consistent with prior studies. While our analysis did not find statistically significant differences in admission rates by age or ethnicity within high-risk groups, this may reflect either local care practices—such as early intervention or advance care planning—or limitations in statistical power. Overall, our findings affirm the broader utility of the DIVERT scale and reinforce the importance of considering population context when interpreting its predictive performance.

Falls, both with and without injuries, were also substantial contributors to hospital admissions. This suggests that fall prevention programmes and home safety assessments could play a crucial role in reducing hospital visits.

Additionally, cardiac symptoms and complications from chronic diseases like COPD were prevalent, indicating that enhanced chronic

disease management could be beneficial. These findings are consistent with the literature, highlighting the significance of these factors in contributing to unplanned hospitalisations among older adults.^{14,15}

The *post hoc* analysis revealed a statistically significant difference in mortality rates within 30 and 90 days between admitted and non-admitted groups, with higher mortality rates observed in the admitted group. Patients with a high DIVERT score are frail, often older and comorbid, and the high mortality rate is not unexpected. It is surprising to see that all the deaths within 90 days occurred in hospital. This should not be interpreted as a causal effect of the admission itself, but rather as a validation that the DIVERT score identifies a cohort with such significant frailty and morbidity that they are nearing the end of life. This finding underscores the importance of integrating advance care planning and palliative care approaches for patients identified as high-risk by the DIVERT scale, regardless of whether they are admitted.^{16,17}

The time-to-event analysis showed that close to 20% of patients scoring 5 and 6 on the DIVERT scale were admitted within 20 days of assessment. This finding aligns with previous research suggesting that any interventions must be delivered early during this crucial time frame in order to prevent unplanned admissions.¹⁸ Our analysis shows that 15% of patients admitted were admitted within 72 hours, which would require a very quick response from a community intervention team, and this may not be possible to achieve. However, intervening within 4–14 days should be achievable and this may be able to reduce the risk of admission for many patients. From our analysis we can see that to attempt to reduce admissions an intervention team would need to be able to address acute infections, chronic disease management (particularly cardiac and respiratory illnesses), falls prevention, pain management and advance care planning and palliative care.

Limitations

This observational study has several limitations. Potential biases arose from coding errors and missing data on conditions such as dementia, cognitive impairment and delirium. Immediate interventions by assessors and frailty were not systematically recorded, and our simplified comorbidity index excluded dementia and hypertension. The interRAI Cognitive Performance Scale

was not used, limiting assessment of cognitive impairment. We relied on bivariate comparisons rather than multivariable models, so associations may be confounded. The study validates predictive ability but does not assess interventions or avoidable admissions. Finally, as interRAI HC assessments target older adults needing publicly funded support, findings may not generalise to more independent older populations.

Conclusions

Our study validates the interRAI DIVERT tool

as a significant predictor of unplanned hospital admissions in an Aotearoa New Zealand cohort, with risk increasing across score categories. It effectively stratifies high-risk patients, where comorbidity is a key driver. Common admission reasons—such as infections, heart failure and falls—highlight areas of clinical burden. These findings support the tool's use in local practice and policy. Future research should apply formal predictive modelling and evaluate targeted interventions guided by DIVERT-based risk stratification.

COMPETING INTERESTS

HA is chairperson of the training programme subcommittee—geriatric medicine for the Royal Australasian College of Physicians.

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Data availability statement: De-identified individual-level data were obtained from the Aotearoa New Zealand interRAI data warehouse with ethics approval (AHREC reference AH25500, 22 May 2023). The committee allowed secondary research use but prohibited public release of individual datasets. Aggregated data supporting the findings are available from the corresponding author on reasonable request, subject to interRAI New Zealand governance and privacy regulations.

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