

Quality of hospital care for Māori patients in New Zealand: retrospective cross-sectional assessment

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Summary

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Background New Zealand has a substantial indigenous minority—the Māori—that has considerably worse health status than the majority population. We aimed to assess possible disparities in quality of hospital care for Māori with data on preventable adverse events as an indicator of suboptimum treatment.

Methods We undertook a nationally representative cross-sectional survey of admissions to general public hospitals with more than 100 beds providing acute care. A sample of 6579 patients admitted in 1998 to 13 hospitals was selected by stratified systematic list sample. We did a two-stage retrospective assessment of records by structured implicit review. Outcome measures were occurrence, effect, and preventability of adverse events.

Findings Māori accounted for just greater than 15% of admissions and were on average younger, were more likely to be from deprived areas, had a different case mix, and were in hospital for a shorter stay compared with patients of non-Māori/non-Pacific origin. Overall, after age standardisation, 14% of admissions for Māori were associated with an adverse event, compared with 11% for non-Māori/non-Pacific patients ($p=0.01$ for difference between groups). For preventable, in-hospital events, this disparity persisted after controlling for age, other sociodemographic factors, and case mix (adjusted odds ratio 1.47; $p=0.05$). Analysis of potential causal factors showed no markedly or consistently different pattern between the groups.

Interpretation Despite a predominantly publicly funded hospital system, our findings suggest that hospital care received by Māori is marginally poorer than that received by New Zealand citizens of non-Māori/non-Pacific origin. Although no cause specific to Māori was evident, various policy and system issues can be addressed.

Introduction

Quality of care (defined as the degree to which health services increase attainable health outcomes and are consistent with professional knowledge) can differ substantially between ethnic groups.¹ However, whether these differences are due to variations in access, clinical need, appropriateness of treatment, and patients' preferences, or whether they are disparities in quality—that is, attributable to the potentially discriminatory effects of the delivery system and those who staff it—is unclear.¹ Moreover, whether these differences affect indigenous groups is not evident, since indigeneity tends not to be identified as a separate factor, but absorbed into ethnic affiliation in such analyses.

New Zealand has a large indigenous minority—the Māori—that has substantial disadvantages in health status compared with the majority population, which is principally of British migrant origin.^{2–4} For example, Māori life expectancy at birth is about 8.5 years lower than for non-Māori individuals.⁵ Sizeable Asian and Pacific minority groups also exist; the latter largely being descendants of migrants indigenous to the immediate region of the South Pacific. Although the government has committed to a strategy of enhancing access to primary care and improvements in quality of care for Māori, little information is available on disparities by indigeneity in the quality of treatment.^{6–8}

New Zealand's health-care system is predominantly tax funded, with family doctors managing access to specialist

and hospital care. Hospital care is available free of charge and is generally distributed in a fairly uniform and coordinated fashion across the country, with 90% of the population living within an hour's drive of a district hospital.⁹

One difficulty in assessment of disparities is the tendency for most existing measures of quality of care to be confounded by the quantity of care that is available and accessed. For example, research might identify low rates of use of a procedure by ethnic minority groups, but higher rates of use in the majority group could be due to overuse rather than clinical necessity.¹

Preventable adverse events are measures of quality that are less susceptible to this methodological problem, since they indicate outcomes of care—ie, harm to patients—that can be caused by acts of both omission and commission during treatment.¹⁰ Such events also meet the definition of quality of care, albeit with a narrow interpretation: they are undesirable health outcomes produced by health-service interventions and, because of their preventability, indicate potentially remediable deficiencies in professional knowledge and practice. Although arguably based on a narrow interpretation of quality, they provide powerful evidence of suboptimum treatment and can be indicative of broader quality issues that are systemic in origin. We assessed whether preventable adverse events were more frequent among Māori patients than in other patients in public hospitals in New Zealand.

Methods

Study design and population

Detailed information on the sample design and data collection has been reported elsewhere.^{11,12} Medical records were taken from a representative sample of 13 general public hospitals selected from 20 institutions with 100 or more beds. Sampling followed stratification by hospital type and geographical listing of institutions from north to south across New Zealand. The national sample consisted of: all six large tertiary service facilities; a probability proportional to size (PPS) sample of four smaller secondary service facilities with more than 300 beds; and a PPS sample of three secondary service facilities with less than 300 beds (where PPS involved selection proportional to the number of beds in the institution to ensure that every admission had an equal chance of being selected).

The survey population was defined as all admissions for calendar year 1998 (excluding day, psychiatric, and rehabilitation-only cases). The sampling frame for each hospital was a list of all eligible admissions in that hospital. We selected a systematic list sample of 575 admissions from each hospital for 1998, with cases ordered by admission date. A total sample of 6579 admissions was available for analysis. The full medical record associated with each sampled admission was assessed for the occurrence, in a public hospital or other setting, of an adverse event. To be included in the analysis an adverse event had to be associated with the sampled admission.

Procedures

The core data collection procedure was a two-stage retrospective review of a representative sample of medical records from all selected hospitals, with review forms closely modelled on the those used in American and Australian studies.^{13,14} The first stage was a screen undertaken by trained registered nurses to ascertain whether the sampled admission met any of 18 screening criteria selected as potentially indicative of an adverse event.

The second stage, undertaken by specifically trained and highly experienced doctors, used a method relying on structured implicit review. In this protocol, reviewers were guided to an informed professional judgment—for example, whether an adverse event occurred, or one that occurred was preventable—by following a series of questions designed to assist them to interrogate the patient's record in a systematic and structured way. The objective was to ascertain whether an adverse event was associated with the sampled admission and, if so, to characterise its cause, preventability, and effect on length of stay and morbidity. The reviewers were aware of the indigeneity of patients, but not of the study's hypothesis of disparities in outcome.

To qualify as an adverse event for this analysis, an incident had to be related to, or have occurred during,

the sampled admission. An adverse event that occurred during a hospital admission was defined as in-hospital. For this, and all other, variables derived from the study protocol rather than administrative sources, judgements about definition and classification were made by the study reviewers.

An adverse event was defined as an unintended injury that resulted in disability, with any evidence of causation by health-care management rather than the underlying disease. Adverse events were categorised by broad clinical classifications, and by their relation to systems failure. Systems failure was defined as: defective equipment or supplies; equipment or supplies not available; inadequate reporting or communication; inadequate training or supervision of doctors or other staff; delay in provision or scheduling of services; inadequate staffing; inadequate functioning of hospital services; or absence of protocol, or failure to implement protocol or plan. Adverse events were also classified by specialty (surgery, medicine, other) and by whether they occurred inside or outside a public hospital.

An adverse event was defined as having a severe effect if it resulted in permanent disability (lasting more than 1 year) or death. Attributable bed days were defined as extra bed days associated with an adverse event that were spent in the study hospital during one or more admissions. The number of extra days was estimated from the medical record by study reviewers.

An adverse event was judged preventable if there was any evidence of an error in health-care management due to failure to follow accepted practice at an individual or system level. Areas for which effort could be directed to prevent recurrence of adverse events (termed areas of effort) were identified and categorised as system, consultation, education, resources, quality assurance, or other. The term system incorporated issues relating to policies or protocols, access to or transfer of information, communication, discharge procedures or protocols, and organisation management. Resources referred to matters of personnel, equipment, and other physical resources. Consultation referred to consultation with specialists or peers. The group termed other included issues such as credentialling (defining scope of practice) and retraining.

Patient-related factors that might be associated with adverse event occurrence were obtained from the hospital records: indigeneity (Māori, non-Māori/non-Pacific); age (0–24 years, 25–44 years, ≥45 years); sex (female, male); area deprivation score (NZDep96 deciles 1–5 [low] or 6–10 [high], an area-based index of social deprivation¹⁵ derived from patient's domicile code); major diagnostic categories (derived from Australian National Diagnosis Related Groups classification 3.1).¹⁶

Ethnic affiliation refers to a sense of distinct peoplehood within a nation state. Individuals of Māori ethnicity were classified as indigenous, being the first settlers of New Zealand. Individuals of Pacific origin

	Māori (n=1013)	Non-Māori/non- Pacific (n=5326)	Total* (n=6579)
Sociodemographic characteristics			
0–24 years old	503 (49%)	1413 (27%)	2013 (31%)
25–44 years old	260 (26%)	1081 (20%)	1417 (22%)
≥45 years old	250 (25%)	2832 (53%)	3149 (48%)
Female	568 (56%)	2914 (55%)	3611 (55%)
Deprived†	838 (82%)	3035 (57%)	4083 (62%)
Clinical attributes			
Acute	657 (65%)	3494 (66%)	4310 (66%)
Hospital stay in days for sampled admission, mean (SD)	4.3 (7.6)	5.3 (8.4)	5.1 (8.3)
Major diagnostic category‡			
Pregnancy	165 (16%)	528 (10%)	736 (11%)
Respiratory	122 (12%)	416 (8%)	563 (9%)
Musculoskeletal	108 (11%)	614 (11%)	741 (11%)
Neonatal	104 (10%)	356 (7%)	487 (7%)
Digestive	86 (8%)	559 (11%)	667 (10%)
Circulatory	65 (7%)	795 (15%)	881 (13%)
Other	363 (36%)	2058 (39%)	2504 (38%)

Percentages and means weighted to account for stratified cluster sample design. *Includes Māori, Pacific, and non-Māori/non-Pacific patients. †Deciles 6–10 of NZDep96;‡ five Māori and 71 non-Māori/non-Pacific cases could not be coded. ‡Ordered by proportion of Māori admissions. Other consisted of the remaining 19 categories, each containing <5% of admissions, including: nervous system; kidney and urinary tract; skin, tissue and breast; and injury, poisonings, and drugs.

Table 1: Sociodemographic and clinical characteristics of patients by indigeneity

were excluded from the analysis because they represent groups that are indigenous to the immediate region rather than to New Zealand. The remaining ethnic affiliations were aggregated into one comparator group, non-Māori/non-Pacific. In 1998, patients' ethnic identities were recorded at admission as Māori, Pacific, or other. If a patient had more than one ethnic affiliation, we assigned them one affiliation, giving priority first to Māori, then to Pacific, then to other. Māori have been substantially undercounted in official statistics.²

Statistical analysis

We adjusted percentages, means, odds ratios, and variance estimates to account for the stratified cluster sample design.¹⁷ Each hospital was assigned a weight inversely proportional to its selection probability. Variances were estimated with a Taylor expansion approximation. SAS 9.1 survey procedures were used for these analyses. Where indicated, percentages and means were also directly age-standardised to Segi's world population,¹⁸ with the weights 0.48 for age group 0–24 years, 0.26 for 25–44 years, and 0.26 for 45 years and older. Age standardisation was judged necessary because of the clear difference in age distribution between the two groups being compared. We estimated adjusted odds ratios by multiple logistic regression, with adverse event occurrence as the binary outcome. The adjusted odds ratios show the effect of each factor controlling for the effects of the other factors in the model. Differences described in the text are not statistically significant, unless so stated.

Role of the funding source

The sponsor of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication.

Results

Table 1 shows, by indigeneity, key sociodemographic and clinical characteristics of the patients in the study sample. Māori patients made up just greater than 15% of the sample; patients of non-Māori/non-Pacific origin made up 80%. Māori patients were younger (about half younger than 25 years), tended to live in more deprived areas (more than 80% in the more deprived half of the distribution), and showed corresponding age-related differences in case mix (more in the diagnostic categories of pregnancy and respiratory, fewer in circulatory), compared with the non-Māori/non-Pacific group.

Table 2 outlines the clinical attributes and incident characteristics (age-standardised) of identified adverse events. The proportion of adverse events during surgery was significantly lower in Māori than in the comparator group. A slightly greater proportion of adverse events in Māori were in-hospital and system-related, whereas

	Māori	Non-Māori/ non-Pacific	Difference (SE)	p
Adverse events (n=850)*	135 (16%)	683 (80%)
Clinical attributes				
Acute	94 (69%)	449 (65%)	3.4% (5.6)	0.55
Hospital stay in days for sampled admission, mean (SD)	7.6 (13.9)	10.0 (15.0)	-2.4% (1.4)	0.12
Incident characteristics (age-standardised)†				
In-hospital	121 (90%)	535 (82%)	7.7% (3.6)	0.06
Preventable	80 (58%)	428 (59%)	-1.1% (5.9)	0.86
Severe	14 (10%)	107 (12%)	-2.0% (2.0)	0.36
Surgery‡	66 (49%)	400 (63%)	-14.7% (4.8)	0.01
Systems failure	42 (30%)	197 (28%)	2.0% (5.3)	0.71
Attributable days stay, mean (SD)§	8.7 (1.8)	8.5 (19.6)	0.23% (1.5)	0.89

Percentages, means, and SEs adjusted to account for stratified cluster sample design. *Includes Māori, Pacific, and non-Māori/non-Pacific patients. †Age-standardised to Segi's world population. ‡Includes all surgical specialties plus anaesthetics and obstetrics. §Four Māori and six non-Māori/non-Pacific patients had missing data.

Table 2: Clinical attributes and incident characteristics of adverse events by indigeneity

	Māori (n=1013)	Non-Māori/non- Pacific (n=5326)	Difference (SE)	p
All adverse events				
Crude	135 (13.9%)	683 (13.0%)	0.84% (0.95)	0.40
Age-standardised*	135 (14.0%)	683 (11.0%)	3.0% (0.98)	0.01
In-hospital adverse events only (age-standardised)*				
All	121 (12.5%)	535 (9.0%)	3.5% (0.83)	0.002
Preventable	69 (7.1%)	324 (5.1%)	2.0% (0.61)	0.009
Preventable and severe	4 (0.4%)	51 (0.6%)	-0.24% (0.08)	0.01

Rates and SEs adjusted to account for stratified cluster sample design. *Age-standardised to Segi's world population.

Table 3: Rates of adverse events by indigeneity

	Adjusted odds ratio*	p†
Indigeneity		
Non-Māori/non-Pacific (reference)	1.00	0.05
Māori	1.47	
Age		
0–24 years (reference)	1.00	<0.0001
25–44 years	1.61	
≥45 years	2.26	
Sex		
Female (reference)	1.00	0.29
Male	0.84	
Area deprivation‡		
Low (deciles 1–5; reference)	1.00	0.64
High (deciles 6–10)	1.02	
Major diagnostic category§		
Other (reference)	1.00	0.0001
Pregnancy	0.52	
Respiratory	0.80	
Musculoskeletal	1.61	
Neonatal	0.65	
Digestive	1.49	
Circulatory	0.77	

Analysis included 388 adverse events vs 5452 admissions for which no adverse event was identified from the medical record. Other—remaining 19 categories, each containing <5% admissions, including: nervous system; kidney and urinary tract; skin, tissue and breast; and injury, poisonings, and drugs. *Odds ratios estimated with multiple logistic regression, weighted to account for sample design, with all patient-related factors in model. Each odds ratio adjusted for effect of other patient-related factors. †Two-way Rao-Scott χ^2 test (accounts for the stratified cluster sample design). ‡Five Māori and 71 non-Māori/non-Pacific cases could not be coded and were excluded from analysis; profiles for other patient-related factors were similar to included cases. §Ordered by proportion of adverse events in Māori.

Table 4: Adjusted odds ratios of patient-related factors for association with a preventable in-hospital adverse event

marginally fewer were preventable, or severe. The age-adjusted occurrence rates for all adverse events and for in-hospital adverse events differed significantly between the groups, showing a disadvantage for Māori (table 3). The results of an adjusted analysis of preventable, in-hospital adverse events are shown in table 4. Higher rates of such events were recorded for Māori, for older patients, and for those in the musculoskeletal and digestive

	Māori (69 adverse events)	Non-Māori/non-Pacific (324 adverse events)
System	43 (47.5%)	206 (47.8%)
Consultation	29 (37.5%)	146 (35.0%)
Education	29 (36.6%)	116 (22.9%)
Resources	8 (10.8%)	71 (15.5%)
Quality assurance	7 (9.3%)	50 (14.6%)
Other	17 (23.8%)	88 (21.4%)

Data are number of adverse events (percentage of all preventable in-hospital adverse events). More than one area could be identified for each event, so percentages do not add up to 100%. Ordered by proportion of adverse events in Māori. Percentages weighted to account for sample design, and age-standardised to Segi's world population.

Table 5: Age-standardised distribution of preventable in-hospital adverse events by indigeneity and areas of effort for prevention

diagnostic categories. Deprivation index was not associated with occurrence of events.

Table 5 shows an analysis of areas of effort for adverse events with any evidence of attributability to health-care management, that took place in-hospital, with any evidence of preventability. For both groups, system factors (relating to policies or protocols, access to or transfer of information, communication, discharge procedures or protocols, organisation management or culture, and record-keeping) were important for nearly half of all events.

Discussion

Our adjusted analysis showed that Māori patients in 1998 had a higher risk of preventable adverse events in hospital than did patients of non-Māori/non-Pacific origin, suggesting that Māori were more likely to receive suboptimum care. The practical implications of this finding are unclear, since we noted few clues as to any distinct pattern of hospital-quality issues for Māori—for example, areas identified as important for prevention of adverse events were similar for both groups.

The strength of our study was that we applied a standardised, audit-style review of medical records to a representative cross-section of admissions to New Zealand public hospitals. Furthermore, preventable adverse events have advantages as a measure of quality; they are less likely than other outcomes to be confounded by differences between groups in patterns of use and treatment, and they focus attention by identifying only the areas of poor-quality practice that harm patients and are potentially remediable.

However, these strengths were also weaknesses of the study. Because a cross-section was used, Māori were not represented in sufficient numbers to pursue the analysis of disparities more productively (quite aside from the probable undercounting of Māori in administrative statistics). Strategies are needed to address these difficulties.² Additionally, as an outcome-based measure, preventable adverse events fail to tap broader dimensions of quality that relate to the structure and process of care but do not necessarily result in adverse outcomes for the patients, although they might be indicative in this respect. To obtain a fuller picture, a wider range of measures would be needed.¹

Questions have also been raised about the reliability and validity of retrospective record review for gauging errors and events of clinical practice.¹⁹ The measurement properties of the method are moderate at best.²⁰ Nevertheless, these shortcomings afflict most techniques in this area,²¹ and our data represent the judgements of experienced hospital doctors on the basis of systematic interrogation of a representative sample of medical records.

Disparities in quality of care between different ethnic or racial groups have been shown in a wide range of studies, mostly in the USA. A subset of these findings relate to outcomes of care. The Harvard Medical Practice Study²²

showed that more black and poor patients had medical injuries due to negligence, although this result was not significant after controlling for other factors. Mortality findings are not consistent, with both higher²³ and lower²⁴ rates identified in black patients after suitable statistical controls have been applied. Few reviews of the quality of care received by indigenous people are available.²⁵

To address disparities, a range of remedies or reforms can be considered, and successes can be achieved.²⁶ If we accept that evidence of disparities in preventable inpatient harm might suggest broader quality issues, and if we are willing to apply the template of ethnic disparities to the case of indigenous peoples, then we can work with the framework proposed by the Institute of Medicine,¹ which suggests four broad categories of interest: legal, regulatory, and policy matters (avoiding fragmentation along socioeconomic lines, increasing recruitment of providers from affected groups); health-system issues (guidelines, payment systems, provider mix); empowerment of patients; and cross-cultural training.

New Zealand is reasonably well placed to address legal, regulatory, and policy issues, since the hospital system largely avoids the fragmentation along socioeconomic lines that has been identified as a potential source of disparities in quality of care,⁹ and there have been initiatives, albeit tentative, in recruitment and development of Māori health-care providers.² In the case of health-system issues, the picture is mixed. Obstacles to receiving necessary treatment have been identified for Māori in primary care, but not in the hospital sector.²⁷ However, more active and sensitive guideline development might be needed in cardiac care,^{28,29} which is an example of an area of great importance to Māori health.

Promising initiatives also exist for issues of empowerment of patients and cross-cultural training. The establishment of the Health and Disability Commissioner has advanced patients' rights substantially, including attention to the needs of Māori,³⁰ and evidence suggests that New Zealand's no-fault malpractice environment encourages the discussion of medical error.³¹ The matter of enhanced participation of Māori in the health system is also on the agenda.³² Finally, substantial advances have been made in New Zealand in the matter of cross-cultural training and cultural competence in the delivery of care.³³

The research results reported here are indicative rather than definitive. Aside from the initiatives in public policy, a number of avenues for further work are also feasible. First, data for quality should be collected routinely and more systematically, and when they are presented they should be stratified by indigeneity (or ethnicity).³⁴ Second, a range of data-collection techniques is available, aside from retrospective review, that may prove much more cost effective both for reporting on quality and for investigating further the results of this study.¹⁰

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Contributors

P Davis was the principal investigator, designed the study, and wrote the paper. R Lay-Yee undertook data checking and analysis. L Dyall and A Sporle were advisers and collaborators on Māori issues and were involved in the writing of the paper. R Briant organised and oversaw interrogation of records. D Brunt did an initial analysis of the data and was involved in development of the paper. A Scott advised on sample design, data quality, and analysis issues.

Conflict of interest statement

We declare that we have no conflict of interest.

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