Retrospective Practice Audit

Patterns of PSA testing by ethnicity and socioeconomic deprivation in a New Zealand general practice population: a retrospective equity audit

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Abstract

BACKGROUND: Prostate-specific antigen (PSA) testing is often used opportunistically in primary care to assist in the early detection of prostate cancer (PCa). In Aotearoa New Zealand, Māori men experience higher mortality from PCa compared with Pākehā, and differences in PSA testing between ethnicities may contribute to this disparity. This audit aimed to examine PSA testing rates among men aged 50–80 years within a large single-site general practice population and investigated whether testing differed by ethnicity and socioeconomic deprivation.

METHODS: Electronic health record data from men aged 50–80 years without a prior diagnosis of PCa were audited. The primary outcome was having at least one PSA test recorded within the preceding 36 months. Ethnicity, age and New Zealand Deprivation Index (NZDep) quintile were recorded. PSA testing rates were compared using chi-square tests, and logistic regression was used to estimate odds ratios for PSA testing adjusting for age and deprivation.

RESULTS: A total of 9,217 men were included in the analysis; 949 Māori and 8,289 Pākehā. PSA testing within 36 months occurred in 17.3% of Māori men and 21.0% of Pākehā men. In crude analysis, Pākehā men had higher odds of PSA

testing compared with Māori men (OR 1.27, 95% CI 1.07–1.52, p=0.006). After adjustment for age and deprivation, this difference was diminished (OR 1.17, 95% CI 0.98–1.41, p=0.09). Increasing age was associated with higher odds of PSA testing, while, independent of ethnicity, men living in more deprived areas had significantly lower odds of testing, particularly in NZDep quintiles 4 and 5.

CONCLUSION: PSA testing rates were lower among men living in more deprived areas. Differences in testing between Māori and Pākehā men did not reach statistical significance after adjustment for age and socioeconomic deprivation, suggesting that socioeconomic factors influenced patterns of PSA testing within this primary care population.

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1 Introduction

Prostate cancer (PCa) is a leading cause of cancer-related mortality in men [1]. Despite Prostate-specific antigen (PSA) testing being widely used opportunistically in primary care for early PCa detection, its use remains the subject of ongoing clinical debate regarding its risks and benefits for screening [2, 3]. In Aotearoa New Zealand, Māori men experience disproportionately higher PCa mortality compared with Pākehā men [4], and this disparity may in part reflect differential pattens in opportunistic PSA testing in primary care [5, 6].

The aim of this audit is to examine PSA testing rates between Māori and Pākehā within a large single-site general practice and determine whether any ethnic differences in PSA testing persisted after adjustment for age and socioeconomic deprivation.

2 Methods

A retrospective audit was conducted using electronic health record data from a large single-site general practice in Aotearoa New Zealand. Eligible participants were men aged 50–80 years enrolled in the practice at the time of data extraction. Patients with a prior diagnosis of prostate cancer were excluded. The study cohort consisted of Māori and Pākehā men identified through the practice management system (Medtech Evolution v8.0.0.113) using demographic codes.

The primary outcome was having at least one PSA test recorded within the preceding 36 months.

Variables collected included self-identified ethnicity, age at the time of audit and socioeconomic deprivation index. Ethnicity was catagorised nominally as Māori or Pākehā (re-catgorised from ethnicity codes: New Zealand European, European New Zealander) according to the practice electronic health record. Socioeconomic deprivation was measured using New Zealand Deprivation Index (NZDep) geocoded data [7], categorised into qualitative ordinal quintiles (Q1–Q5), where Q1 represents the least deprived areas and Q5 the most deprived.

Descriptive statistics were used to summarise crude PSA testing rates by eth-

nicity and deprivation quintile. Categorical ordinal variables were assessed using chi-square tests at $\alpha = 0.05$. Differences in mean age between ethnicities were assessed using independent samples t-testing. Logistic regression (LR) was used to estimate odds ratios (ORs) for PSA testing; a crude LR model examined the association between ethnicity and PSA testing, and an adjusted LR model examining the association between ethnicity and PSA testing while controlling for age and NZDep quintile. Results are reported as odds ratios with 95% confidence intervals (CI). Statistical significance was defined as $p < 0.05$.

This audit was conducted as a quality improvement activity within the practice. All data collected was de-idenified prior to analysis. Health and Disability Ethics Committee approval for this audit was sought (2026/OOS/25331) and was exempt. All statistical analyses were conducted using R version 4.5.2 (R Foundation for Statistical Computing, Vienna, Austria).

3 Results

A total of 9,238 Māori and Pākehā men aged 50–80 years without a history of prostate cancer were identified from a total practice population of 22,195. Of these, 949 (10.3%) were Māori and 8,289 (89.7%) were Pākehā. Within the preceding 36 months, 164 (17.3%) Māori men and 1,741 (21.0%) Pākehā men had at least one PSA measurement. In crude analysis, Pākehā men had a 27% higher odds of PSA testing compared with Māori men (OR 1.27, 95% CI 1.07–1.52, p=0.007) (see Table 1).

NZDep data showed that Māori men were more likely to reside in higher deprivation quintiles ($\chi^2 \approx 168.0$, $p < 0.001$) (see Table 2). Crude PSA testing rates demonstrated a significant deprivation gradient, with lower testing rates observed in more deprived quintiles ($\chi^2 \approx 21.6$, $p < 0.001$) (see Table 3).

In the adjusted logistic regression model examining PSA testing by ethnicity after adjusting for age and deprivation quintile, the difference between ethnic groups was not statistically significant (OR 1.17, 95% CI 0.98–1.41, $p = 0.09$). Increasing age was associated with higher odds of PSA testing, with approximately 2% higher

odds of testing per additional year of age (OR 1.02, 95% CI 1.01–1.02, $p < 0.001$).

Higher deprivation was associated with lower PSA testing rates, with testing significantly lower in NZDep quintiles 4 and 5 compared with quintile 1, independent of ethnicity (see Table 4). Men living in the most deprived quintile (Q5) had 30% lower odds of PSA testing compared with those in the least deprived quintile (OR 0.70, 95% CI 0.58–0.85, $p < 0.001$). Overall, PSA testing rates appeared to be more strongly associated with socioeconomic deprivation than ethnicity alone.

4 Discussion

This audit looked at PSA testing rates between Māori and Pākehā men aged 50–80 years and examined whether testing differed by ethnicity and socioeconomic deprivation. Uncontrolled crude PSA testing rates were lower among Māori men compared with Pākehā men but after adjusting for age and deprivation this difference was reduced and was no longer statistically significant. This suggests that differences in crude PSA testing rates between Māori and Pākehā within this practice may be partly explained by differences in age distribution and socioeconomic deprivation.

A clear association between deprivation and PSA testing was seen, independent of ethnicity. Men living in more deprived areas had significantly lower odds of PSA testing compared with those in the least deprived quintile. This finding adds further support to evidence that socioeconomic deprivation strongly influence patterns of healthcare access and testing within primary care [8]. Given Māori men in this population were more likely to reside in higher deprivation quintiles, this may partly explain the crude differences observed in uncontrolled testing rates.

This finding should not be interpreted as meaning ethnicity is unimportant; rather it emphisises how structural socioeconomic disadvantage disproportionally affects Māori and drives health inequalities.

Increasing age was associated with higher PSA testing rates, which is expected given the increasing risk of prostate cancer with age and the greater likelihood of testing in older men. The finding that Māori men were tested at a younger mean age (63.0 vs 66.2 years in those tested, $p < 0.001$) may warrant further investigation.

This audit has several limitations. It was conducted within a single-site general practice so may not be applicable to other populations. The analysis was based on routinely collected retrospective electronic health record data, and information on factors that may influence PSA testing, such as clinical indications, family history or patient preference, was not audited. Finally, a small proportion of patients had missing deprivation quintile data, although this was unlikely to significantly influence the findings.

Overall, these audit findings suggest that socioeconomic deprivation plays an important role in PSA testing patterns in this primary care practice, and highlights the importance of addressing socioeconomic barriers to preventive healthcare as a key strategy for reducing prostate cancer inequities in Aotearoa New Zealand. Given that Māori men in this study cohort were over-represented in higher-deprivation quintiles, addressing these socioeconomic and structural determinants is a health system obligation from a Te Tiriti o Waitangi perspective.

5 Tables

Table 1: Crude patient characteristics by Ethnicity

	Māori	**Pākehā**	***p*-value**
Study population, n,(%)	949 (10.3%)	8,289 (89.7%)	–
Mean age, years, (SD)	61.9 (8.0)	65.3 (8.4)	<0.001
Crude PSA testing rate, n (%)	164 (17.3%)	1,741 (21.0%)	0.007 [a]
Mean age at testing, years (SD)	63.0 (7.8)	66.2 (8.1)	<0.001
Crude OR for PSA testing (Pākehā vs Māori)	Reference	1.27 (95% CI 1.07–1.52)	0.007

Total study population $N = 9,238$ of 22,195 enrolled (41.6%).
SD = standard deviation; OR = odds ratio; CI = confidence interval.
[a] $\chi^2 \approx 7.2$. (Critical $\chi^2_{\alpha=0.05,df=1} = 3.84$)

Table 2: Crude Distribution of Ethnicity by NZDep quintile

NZDep Quintile	**Māori**	**Pākehā**
Q1 (least Deprived)	106	1884
Q2	134	1643
Q3	214	1781
Q4	245	1737
Q5 (most Deprived)	221	959
Missing	29	285

Table 3: Crude PSA testing by NZDep quintile and Ethnicity

NZDep quintile	**Māori n/N (%)**	**Pākehā n/N (%)**
Q1 (least Deprived)	22/106 (20.8%)	432/1884 (22.9%)
Q2	27/134 (20.1%)	361/1643 (22%)
Q3	36/214 (16.8%)	381/1781 (21.4%)
Q4	43/245 (17.6%)	338/1737 (19.5%)
Q5 (most Deprived)	29/221 (13.1%)	173/959 (18%)
Missing NZDep	7/29 (24.1%)	56/285 (19.6%)

n = number tested; N = total in group. $\chi^2 \approx 21.6$, $p < 0.001$ for testing across quintiles. (Critical $\chi^2_{\alpha=0.05,df=4} \approx 9.5$)

Table 4: Adjusted logistic regression model for PSA testing

	Adjusted OR (95% CI)	***p*-value**
Pakeha vs Maori	1.17 (0.98–1.41)	0.096
Age	1.02 (1.01–1.02)	<0.001*
Q2 v Q1	0.96 (0.82–1.11)	0.562
Q3 v Q1	0.91 (0.79–1.06)	0.242
Q4 v Q1	0.82 (0.70–0.95)	0.009*
Q5 v Q1	0.70 (0.58–0.85)	<0.001*

OR = odds ratio; CI = confidence interval.
Reference category for ethnicity = Māori;
Reference NZDep quintile = Q1 (least deprived).
* Statistically significant

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