Report prepared for Canterbury District Health Board

Comparison of New Zealand and Canterbury population level measures

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sapere research group

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This analysis considers the evidence for a different trend in hospital resources between Canterbury DHB and the rest of New Zealand in the five year period from 2006/07 to 2011/12. The overarching finding is that Canterbury exhibits a different pattern of change in discharges from the rest of New Zealand. That difference is demonstrated in a rebalancing of services away from acute medical hospital care, while maintaining comparability with the rest of New Zealand in elective surgical patterns of service.

While hospital discharge data represents a relatively narrow indicator of system wide change, these findings are consistent with the stated direction of CDHB which aims to direct resources to planned care to the maximum extent possible, and to manage acute demand in community settings.

Access to arranged surgery has increased in Canterbury in proportion to the rest of New Zealand, while the level of hospital based resource devoted to acute medical conditions has declined in Canterbury, compared to the trend in the rest of the country. Given the absolute amount of medical inpatient care which is accounted for by acute medical discharges, this represents a substantial medium term shift of resources from acute hospital care. That shift of resources is likely to have been in favour of community care and arranged and elective hospital services, representing a systematic rebalancing of health resources for the people of Canterbury. The challenge for Canterbury DHB will be to maintain this direction of rebalancing in the longer term. The graph below shows the raw number of discharges in CDHB and the rest of New Zealand according to admission type.

Specialty	DHB	Year	Acute	Arranged	Waiting List	Total
	Canterbury	2006/07	27077	9033	1856	37966
	Canterbury	2011/12	30511	8480	1992	40983
	other	2006/07	250869	77154	25259	353282
Medical	other	2011/12	343046	59329	35509	437884
	Canterbury	2006/07	15317	3931	14980	34228
	Canterbury	2011/12	17001	4376	21033	42410
	other	2006/07	119235	40998	128951	289184
Surgical	other	2011/12	129161	33454	169252	331867

This base data was used to conduct difference in difference regressions, which test explicitly for a difference in trend for Canterbury compared to the rest of New Zealand, taking into account differences in population demographics. Results are presented in the table below.

Difference in difference regressions find significant differences in trend between Canterbury DHB and the rest of New Zealand in terms of medical discharges. These findings are consistent with a shift of hospital discharges away from acute medical care, and a rebalancing of the health system away from acute hospital based medical services towards community based acute care. While that rebalancing has proceeded, Canterbury has maintained its trend of increase in provision of elective surgical services at the same level as the rest of New Zealand, and has somewhat increased its provision of arranged surgical discharges.

Model	Trend estimate	Statistical significance
Acute medical discharges	-0.185	Yes
Arranged medical discharges	0.209	Yes
Waiting list medical discharges	-0.265	Yes
Acute surgical discharges	0.038	No
Arranged surgical discharges	0.327	Yes
Waiting list surgical discharges	0.078	No
Acute medical bed days	-0.079	No
Arranged medical bed days	0.058	No
Waiting list medical bed days	0.190	No
Acute surgical bed days	-0.078	No
Arranged surgical bed days	-0.158	No
Waiting list surgical bed days	-0.034	No

This hospital based data cannot provide definitive evidence, but is consistent with the claim that over the past five years Canterbury DHB has achieved a different trend in the distribution of hospital resources from the rest of New Zealand, and that this different trend has been in a direction which has moved away from acute medical care in a hospital setting. This is consistent with goals of Canterbury DHB's overall health system transformation.

1. Introduction

This report has been commissioned by Canterbury District Health Board (CDHB) to support an evaluation being conducted by the King's Fund.

CDHB has implemented a wide ranging transformation programme across the whole of the Canterbury health system. This process was initiated in 2007/2008, and continues to generate change activity across Canterbury health services, ranging across public health, primary care and secondary elements of the system.

CDHB has been able to document a significant amount of transformation activity over this time period. But while, at a micro level, the consequences of change can be seen on individual patients and flows of service, the impact of wide ranging change is more difficult to demonstrate at a population level. This reflects some of the difficulty in collecting consistent national data for a range of health activities, and the complexity of interpreting specific measurable events as indicators of system level improvements.

The aim of this analysis is therefore to establish, as robustly as possible with readily available routine health care data, whether there is a difference between Canterbury and New Zealand wide trends on measures which are likely to reflect system wide transformation.

This analysis is based upon hospital inpatient data. In some respects this is a narrow basis upon which to measure system wide impacts, but this approach has been adopted because hospital inpatient data is among the most consistently collected sets of information in the New Zealand health system, across both time and geographic dimensions. There is a tension between breadth of analysis, and the reliability of the underlying data. The approach in this case is to prioritise reliability of data, while accepting that there are limitations to the interpretation of the results.

There are a number of other measures which would be valuable in judging the impact of system change in CDHB. These potentially include primary care activity and diagnosis data, and other forms of hospital based activity such as outpatient events. But the datasets for these activities have limited consistency nationally, and have changed considerably in their completeness over time, making valid comparison and interpretation very problematic. Other measures, such as mortality and disease incidence, may be more nationally consistent but are likely to require a longer time period to show an effect.

The approach here is therefore to hypothesise that the system wide transformation undertaken at CDHB has had an impact on the effective use of hospital resources for the population. If this is found to be the case, then it would be consistent with an interpretation that health system resources have been rebalanced during the transformation, with improved use of health care resources for the population overall.

A high level analysis of routine data is unlikely ever to provide definitive proof of system transformation. But this approach is able to offer corroborative evidence, indicating whether trends in CDHB are consistent with or different from the rest of New Zealand, and whether the general direction of travel is consistent with improved services for the population of Canterbury.

2. Methods

This analysis explores different categories of hospital inpatient data. Inpatient events are categorised in national data as one of three admission types: acute, arranged, or waiting list events.[1] The definitions of these types of admission are:

- Acute: an unplanned inpatient event on the day of presentation;
- Arranged: a planned inpatient event within 7 days after a decision by a specialist that the admission is necessary;
- Waiting list/booking list: a planned inpatient event seven or more days after a specialist decided that an admission was necessary.

Broadly, it is assumed that an effective health system will manage demand for acute services from the population, reducing the need for reactive care in hospital, and providing as much resource as possible in a planned way through arranged or waiting list discharges. The specifics of coding acute, arranged and waiting list discharges are sometimes subject to incentives arising from the New Zealand elective services system, which usually allows DHBs to count only waiting list coded events against their targets for increasing elective activity. It may be in the narrow interest of a DHB to delay a procedure for more than seven days so the procedure can be counted against elective targets, rather than providing services in a more timely fashion to the patient.

The balance of hospital inpatient activity provided across acute, arranged and waiting list categories therefore indicates the ability of the DHB to direct resources towards planned services, and away from emergency treatment. More broadly, it reflects the ability of the health system to prevent or respond to acute care in the community, without the use of expensive hospital resources where effective alternatives exist.

The approach taken for this analysis is to use a difference in difference regression to compare CDHB and New Zealand data across two time periods, taking into account the demography of the population. This method estimates the difference between CDHB and the rest of New Zealand, while robustly taking into account patient demographic effects. It produces an estimated regression coefficient which represents the specific magnitude of the difference in trend across time periods between CDHB (the intervention group) and the rest of New Zealand (the control category). Essentially, this is a quantitative, testable estimate of how different the trend is in CDHB compared to the rest of New Zealand for a range of measures.

Data were sourced from the National Minimum Dataset (NMDS) for hospital inpatient events, accessed by CDHB analysts from the national datawarehouse. The data extraction covered information for the financial years 2006/07, and 2011/12, periods before and after the establishment of system wide transformation in Canterbury. Several extracts were completed, each covering different subsets of data. Fields extracted in each dataset included:

[1] Other admission types exist for privately funded and psychiatric patients returning from leave.

- Five year age band of patient
- Patient sex
- Patient ethnicity (coded to Maori, Pacific or Other)
- Admission type (acute, arranged or waiting list)
- Event end type (including whether patient deceased)
- Health speciality code (indicating the hospital department the patient was discharged from)
- Major diagnostic category
- Number of discharges
- Number of bed days

Extracts were performed for patients resident in CDHB, and for patients resident in other New Zealand DHBs. Patients not resident in New Zealand were excluded. Renal dialysis events were excluded, since practice in coding these has changed over time: regular, planned renal dialysis visits were historically coded as inpatient events, but are no longer recorded this way at CDHB.

Data were adjusted for population, broken into the same demographic categories of age sex and ethnicity as used in the NMDS extract. Population estimates for CDHB and the rest of New Zealand were based upon Statistics New Zealand projections of DHB populations, released in December 2012.

Data were manipulated in an Access database, in which dummy variables were coded for CDHB residence and time period. Population and activity records were matched and amalgamated into a single table for regression analysis, which took the form:

- Ethnicity
- Sex
- Age band
- Population
- Discharges (or bed days)
- DHB dummy variable (0 = rest of NZ, 1 = CDHB)
- Time dummy variable (0=2006/07 financial year, 1=2011/12)

This file was entered into the R Statistical software system, and applied to a regression of the form:

$$discharges = ethnicity + sex + ageband + DHBcode + Timecode + \left((DHBcode) \times (Timecode)\right)$$

The coefficient on the final interaction variable ((DHBcode)x(Timecode)) represents the difference in trend of CDHB versus the rest of New Zealand over the time period, when the impact of the other variables has been taken into account.

The regression was specified with an offset of population count, allowing for the count of measures to be proportional to the population in each demographic category. A generalised

linear model was used with a quasipoisson logarithmic link function, since the outcome variable is a count, and displayed characteristics of overdispersion.

The reference categories in the demographic variables were:

- Ethnicity: Maori
- Age band: 00-04
- Sex: Female

Models were fitted separately for number of discharges and number of bed days for combinations of the following variables:

1. Specialty area (all medical specialties, and all surgical specialties)
2. Admission type (acute, arranged, waiting list)

3. Results

The tables below set out the raw numbers and proportions of discharges and bed days in each of the analysis categories for patients resident in CDHB and elsewhere in New Zealand.

Table 1: Discharge volumes

Specialty	DHB	Year	Acute	Arranged	Waiting List	Total
	Canterbury	2006/07	27077	9033	1856	37966
	Canterbury	2011/12	30511	8480	1992	40983
	other	2006/07	250869	77154	25259	353282
Medical	other	2011/12	343046	59329	35509	437884
	Canterbury	2006/07	15317	3931	14980	34228
	Canterbury	2011/12	17001	4376	21033	42410
	other	2006/07	119235	40998	128951	289184
Surgical	other	2011/12	129161	33454	169252	331867

Table 2: Bed day volumes

Specialty	DHB	Year	Acute	Arranged	Waiting List	Total
	Canterbury	2006/07	87843	326464	2290	416597
	Canterbury	2011/12	89004	301135	3041	393180
	other	2006/07	723799	1946540	14000	2684339
Medical	other	2011/12	795685	1688922	15401	2500008
	Canterbury	2006/07	54879	9266	23949	88094
	Canterbury	2011/12	54921	6929	25488	87338
	other	2006/07	449457	74627	184758	708842
Surgical	other	2011/12	488844	66105	205123	760072

Table 3: Discharge proportions

Specialty	DHB	Year	Acute	Arranged	Waiting List	Total
	Canterbury	2006/07	71%	24%	5%	100%
	Canterbury	2011/12	74%	21%	5%	100%
	other	2006/07	71%	22%	7%	100%
Medical	other	2011/12	78%	14%	8%	100%
	Canterbury	2006/07	45%	11%	44%	100%
	Canterbury	2011/12	40%	10%	50%	100%
	other	2006/07	41%	14%	45%	100%
Surgical	other	2011/12	39%	10%	51%	100%

Table 4: Bed day proportions

Specialty	DHB	Year	Acute	Arranged	Waiting List	Total
	Canterbury	2006/07	21%	78%	1%	100%
	Canterbury	2011/12	23%	77%	1%	100%
	other	2006/07	27%	73%	1%	100%
Medical	other	2011/12	32%	68%	1%	100%
	Canterbury	2006/07	62%	11%	27%	100%
	Canterbury	2011/12	63%	8%	29%	100%
	other	2006/07	63%	11%	26%	100%
Surgical	other	2011/12	64%	9%	27%	100%

Detailed difference in difference regression results for each fitted model are provided in Appendix One. The table below summarises the interaction term for each regression, indicating whether there is a significant difference in trend between CDHB patients and

those resident elsewhere in New Zealand. This coefficient is interpreted as the amount by which CDHB has increased (or decreased) over time compared with the national trend. The estimate therefore does not say anything about the absolute level, or even about the overall trend, but indicates the extent to which CDHB has increased or decreased at a different rate from the remainder of New Zealand. The detailed regression results reported in Appendix One provide further information which can be used to recover the national trend and comparison between CDHB and New Zealand at different time periods. The principal focus of the results here is upon the question of whether CDHB is exhibiting a trend which is different from the rest of New Zealand.

Statistical significance is judged at the conventional 5% level. Detailed values for assessing significance are provided in the tables in Appendix One.

Table 5: Trend coefficients

Model	Trend estimate	Statistical significance
Acute medical discharges	-0.185	Yes
Arranged medical discharges	0.209	Yes
Waiting list medical discharges	-0.265	Yes
Acute surgical discharges	0.038	No
Arranged surgical discharges	0.327	Yes
Waiting list surgical discharges	0.078	No
Acute medical bed days	-0.079	No
Arranged medical bed days	0.058	No
Waiting list medical bed days	0.190	No
Acute surgical bed days	-0.078	No
Arranged surgical bed days	-0.158	No
Waiting list surgical bed days	-0.034	No

The implication of a trend coefficient is an estimate of how many more (or fewer) discharges and bed days CDHB would be performing in 2011/12 if it had changed with the same trend as the rest of New Zealand over the five year period 2006/07 to 2011/12. The table below

reduces the coefficient estimate to an estimated percentage difference from the rest of New Zealand and, on the basis of the volume of events in each category, estimates the absolute magnitude by which CDHB has reduced or increased its volumes compared to the New Zealand wide trend. Results which are statistically significant are reported in bold, those which are not are in italics.

Table 6: CDHB 2011/12 volumes if at national trend

Model	Odds ratio CDHB/ Rest of NZ	Events avoided/increased	
Acute medical discharges	**0.83**	**6,200**	**Avoided**
Arranged medical discharges	**1.23**	**1,599**	**Additional**
Waiting list medical discharges	**0.77**	**604**	**Avoided**
Acute surgical discharges	*1.04*	*634*	*Additional*
Arranged surgical discharges	**1.39**	**1,221**	**Additional**
Waiting list surgical discharges	*1.08*	*1,578*	*Additional*
Acute medical bed days	*0.92*	*7,317*	*Avoided*
Arranged medical bed days	*1.06*	*16,969*	*Additional*
Waiting list medical bed days	*1.21*	*526*	*Additional*
Acute surgical bed days	*0.92*	*4,455*	*Avoided*
Arranged surgical bed days	*0.85*	*1,186*	*Avoided*
Waiting list surgical bed days	*0.97*	*881*	*Avoided*

4. Interpretation

The essential context for interpreting the regression results is the absolute volume of discharges and bed days provided in each category (Table 1 and Table 2) and the proportions of service provided in those categories (Table 3 and Table 4).

Across the rest of New Zealand, the shift in proportion of medical discharges to the acute category is much greater than has been the case in CDHB. Similarly, in acute bed days, the rest of New Zealand has increased the proportion of medical bed days much more than CDHB, and from a higher baseline. This appears to have been at the expense of arranged bed days which have remained proportionately very similar in CDHB over the 5 year period, but have dropped markedly across the rest of New Zealand. Waiting list events are a negligibly small proportion of the care provided in medical specialties, whether in terms of discharges or bed days. It is noteworthy that a very high proportion of medical bed days are in the arranged category, implying that arranged medical discharges have a significantly longer length of stay than either acute or waiting list discharges.[2]

Surgical discharges and bed days show a markedly different pattern. A much smaller proportion of events are in the arranged category. Canterbury has shown a rather greater fall in the proportion of acute surgical discharges than the rest of New Zealand, and a similar increase in the proportion of all discharges which are waiting list, compared to the rest of New Zealand. The difference lies in the proportion of surgical discharges which are arranged, with Canterbury showing only a slight drop of the proportion of discharges in this category, while the rest of New Zealand shows a larger proportional decrease. In absolute terms, Canterbury has increased the number of arranged surgical discharges over the time period, while arranged surgical discharges have dropped across the rest of New Zealand.

Surgical bed days show a markedly different pattern to discharges. While a minority of surgical discharges are acute, a significant majority of bed days fall into the acute category. The proportions of surgical bed days in acute, arranged and elective categories are remarkably stable, both for Canterbury and the rest of New Zealand, even while the distribution of discharges across these categories has changed over the five year period. In terms of proportions of discharges, Canterbury has seen a similar proportion to the rest of New Zealand in the proportion of waiting list surgical discharges, but has maintained the position in arranged surgical discharges while reducing the proportion of activity devoted to acute surgical discharges, compared to the rest of the country.

These absolute patterns and proportions provide the context for understanding the regression results, which indicate the difference in trend between Canterbury and the rest of New Zealand. The clearest effect is in medical discharges, which show a marked decrease in the number of acute discharges provided in Canterbury , compared to those expected on the basis of the trend in the rest of New Zealand. This is combined with an observation of proportionately smaller, non significant reduction in acute medical bed days compared with

[2] For clarity, it should be noted that AT&R discharges are not included with medical discharges, but fall under a separate category of disability related event.

the rest of New Zealand (Table 6). This result is consistent with CDHB performing fewer acute medical admissions and, for those which it does perform, having a higher level of average acuity. This represents a shifting of resource from acute care, and is consistent with lower acuity medical events being managed in a community setting, leaving a reduced number of higher average acuity medical events being managed in a hospital setting.

While CDHB has reduced the number of waiting list medical discharges it has performed, compared to the national trend, it has increased the number of arranged medical discharges by more than twice this amount. This result is within the context of a relatively small number of waiting list medical discharges, both nationally and in Canterbury, compared to other categories. Overall, the medical discharges show a pattern of moving resource from acute care to arranged care. This is consistent with the much lower crude rate of increase in acute medical discharges in Canterbury over the five year period (13%) compared to the rest of New Zealand (37%).

Canterbury shows increases, compared to the national trend, for all categories of surgical discharge, although only the increases for arranged discharges meet the conventional test of statistical significance. This result is consistent with CDHB maintaining its level of activity devoted to surgical waiting list discharges (a measure which is driven on a nationally consistent basis by increases in elective procedure targets). Given these results, it is reasonable to conclude that on surgical measures, Canterbury maintains approximately the same trend of increase in delivery as the rest of New Zealand.

Overall, hospital resources for patients resident in Canterbury DHB appear to have changed in the five years between 2006/07 and 2011/12. Access to arranged surgery has increased in Canterbury in proportion to the rest of New Zealand, while the level of hospital based resource devoted to acute medical conditions has declined in Canterbury, compared to the rest of the country. Given the amount of medical inpatient care which is accounted for by acute medical discharges, this represents a medium term shift of resources from acute hospital care. That shift of resources is likely to have been in favour of community care and arranged and elective hospital services, representing a systematic rebalancing of health resources for the people of Canterbury. The challenge for Canterbury DHB will be to maintain this direction of rebalancing in the longer term.

Appendix 1 Detailed regression results

Table 7: Acute medical discharges

Coefficient	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-1.974	0.027	-72.001	< 2e-16
ethOther	-0.436	0.021	-21.148	< 2e-16
ethPacific	0.211	0.030	6.933	1.54E-11
sexMale	0.079	0.014	5.505	6.39E-08
age05-09	-1.370	0.047	-28.938	< 2e-16
age10-14	-1.540	0.050	-30.566	< 2e-16
age15-19	-1.134	0.042	-26.830	< 2e-16
age20-24	-1.041	0.041	-25.170	< 2e-16
age25-29	-1.131	0.045	-25.225	< 2e-16
age30-34	-1.114	0.045	-24.828	< 2e-16
age35-39	-1.067	0.043	-24.751	< 2e-16
age40-44	-0.918	0.040	-22.876	< 2e-16
age45-49	-0.806	0.039	-20.741	< 2e-16
age50-54	-0.617	0.038	-16.352	< 2e-16
age55-59	-0.404	0.037	-10.964	< 2e-16
age60-64	-0.166	0.036	-4.602	5.55E-06
age65-69	0.132	0.035	3.734	0.000214
age70-74	0.445	0.035	12.836	< 2e-16
age75-79	0.812	0.034	24.014	< 2e-16
age80-84	1.144	0.034	33.942	< 2e-16
age85-89	1.409	0.037	37.950	< 2e-16
age90+	1.514	0.046	32.566	< 2e-16
DHBcode	-0.172	0.037	-4.631	4.85E-06
timecode	0.215	0.015	14.161	< 2e-16
DHBcode:timecode	-0.185	0.051	-3.657	0.000288

Table 8: Arranged medical discharges

Coefficient	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-3.632	0.061	-59.102	< 2e-16
ethOther	-0.146	0.045	-3.255	0.00123
ethPacific	-0.101	0.077	-1.309	0.19145
sexMale	0.133	0.028	4.672	4.10E-06
age05-09	-1.105	0.099	-11.154	< 2e-16
age10-14	-1.210	0.102	-11.889	< 2e-16
age15-19	-1.205	0.100	-12.069	< 2e-16
age20-24	-1.192	0.101	-11.831	< 2e-16
age25-29	-1.001	0.098	-10.229	< 2e-16
age30-34	-0.745	0.089	-8.369	1.01E-15
age35-39	-0.766	0.087	-8.764	< 2e-16
age40-44	-0.700	0.084	-8.313	1.51E-15
age45-49	-0.479	0.079	-6.064	3.11E-09
age50-54	-0.252	0.076	-3.309	0.00102
age55-59	0.018	0.073	0.239	0.81103
age60-64	0.283	0.072	3.947	9.38E-05
age65-69	0.578	0.070	8.235	2.64E-15
age70-74	0.837	0.070	11.912	< 2e-16
age75-79	1.072	0.070	15.209	< 2e-16
age80-84	1.275	0.072	17.587	< 2e-16
age85-89	1.530	0.079	19.260	< 2e-16
age90+	1.698	0.096	17.721	< 2e-16
DHBcode	-0.139	0.062	-2.249	0.02507
timecode	-0.359	0.030	-11.829	< 2e-16
DHBcode:timecode	0.209	0.089	2.344	0.01959

Table 9: Waiting list medical discharges

Coefficient	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-6.095	0.060	-101.907	< 2e-16
ethOther	0.029	0.030	0.963	0.336141
ethPacific	0.092	0.049	1.894	0.059052
sexMale	0.155	0.017	9.037	< 2e-16
age05-09	-0.642	0.093	-6.886	2.65E-11
age10-14	-0.713	0.095	-7.546	3.88E-13
age15-19	-0.710	0.093	-7.654	1.89E-13
age20-24	-0.431	0.085	-5.040	7.45E-07
age25-29	-0.140	0.081	-1.731	0.084327
age30-34	0.019	0.078	0.244	0.8076
age35-39	0.361	0.071	5.105	5.43E-07
age40-44	0.736	0.065	11.250	< 2e-16
age45-49	1.009	0.063	16.016	< 2e-16
age50-54	1.314	0.061	21.382	< 2e-16
age55-59	1.565	0.061	25.799	< 2e-16
age60-64	1.837	0.060	30.590	< 2e-16
age65-69	2.109	0.060	35.251	< 2e-16
age70-74	2.334	0.060	38.943	< 2e-16
age75-79	2.363	0.061	38.482	< 2e-16
age80-84	2.220	0.065	34.183	< 2e-16
age85-89	1.898	0.078	24.484	< 2e-16
age90+	1.206	0.125	9.628	< 2e-16
DHBcode	-0.608	0.052	-11.596	< 2e-16
timecode	0.239	0.018	13.335	< 2e-16
DHBcode:timecode	-0.265	0.073	-3.658	0.000293

Table 10: Acute surgical discharges

Coefficient	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-3.910	0.047	-83.570	< 2e-16
ethOther	-0.339	0.023	-15.035	< 2e-16
ethPacific	0.110	0.035	3.175	0.001612
sexMale	-0.008	0.016	-0.509	0.611245
age05-09	0.063	0.060	1.048	0.295039
age10-14	0.214	0.058	3.712	0.000234
age15-19	0.735	0.052	14.221	< 2e-16
age20-24	0.860	0.051	16.877	< 2e-16
age25-29	0.814	0.052	15.570	< 2e-16
age30-34	0.815	0.052	15.547	< 2e-16
age35-39	0.722	0.053	13.719	< 2e-16
age40-44	0.595	0.053	11.145	< 2e-16
age45-49	0.545	0.054	10.058	< 2e-16
age50-54	0.538	0.055	9.715	< 2e-16
age55-59	0.618	0.056	11.048	< 2e-16
age60-64	0.773	0.056	13.769	< 2e-16
age65-69	0.934	0.057	16.407	< 2e-16
age70-74	1.181	0.057	20.738	< 2e-16
age75-79	1.449	0.057	25.469	< 2e-16
age80-84	1.704	0.058	29.633	< 2e-16
age85-89	1.929	0.062	30.887	< 2e-16
age90+	2.080	0.074	28.084	< 2e-16
DHBcode	0.007	0.037	0.198	0.843013
timecode	0.012	0.017	0.671	0.502338
DHBcode:timecode	0.038	0.051	0.742	0.458763

Table 11: Arranged surgical discharges

Coefficient	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-4.790	0.112	-42.926	< 2e-16
ethOther	-0.240	0.055	-4.355	1.71E-05
ethPacific	-0.279	0.098	-2.837	0.004799
sexMale	-0.293	0.041	-7.207	3.08E-12
age05-09	-0.268	0.157	-1.713	0.087567
age10-14	-0.565	0.170	-3.327	0.000961
age15-19	0.787	0.122	6.437	3.65E-10
age20-24	1.094	0.118	9.279	< 2e-16
age25-29	0.962	0.122	7.896	3.09E-14
age30-34	0.886	0.123	7.197	3.29E-12
age35-39	0.706	0.125	5.636	3.38E-08
age40-44	0.411	0.131	3.140	0.001823
age45-49	0.321	0.134	2.392	0.017239
age50-54	0.372	0.136	2.739	0.006451
age55-59	0.505	0.135	3.725	0.000225
age60-64	0.659	0.136	4.844	1.86E-06
age65-69	0.840	0.137	6.123	2.29E-09
age70-74	1.004	0.140	7.178	3.72E-12
age75-79	1.186	0.142	8.358	1.20E-15
age80-84	1.244	0.150	8.276	2.15E-15
age85-89	1.169	0.182	6.431	3.80E-10
age90+	0.949	0.259	3.670	0.000278
DHBcode	-0.302	0.096	-3.143	0.001804
timecode	-0.268	0.042	-6.329	6.90E-10
DHBcode:timecode	0.327	0.133	2.459	0.01436

Table 12: Waiting list surgical discharges

Coefficient	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-3.246	0.044	-73.306	< 2e-16
ethOther	-0.104	0.030	-3.507	0.000503
ethPacific	-0.059	0.050	-1.185	0.236821
sexMale	-0.050	0.019	-2.626	0.008956
age05-09	-0.169	0.054	-3.127	0.001888
age10-14	-0.933	0.068	-13.675	< 2e-16
age15-19	-0.967	0.068	-14.259	< 2e-16
age20-24	-0.902	0.067	-13.532	< 2e-16
age25-29	-0.811	0.067	-12.088	< 2e-16
age30-34	-0.614	0.063	-9.756	< 2e-16
age35-39	-0.412	0.058	-7.136	4.32E-12
age40-44	-0.293	0.055	-5.332	1.60E-07
age45-49	-0.132	0.053	-2.505	0.01261
age50-54	-0.004	0.052	-0.079	0.936696
age55-59	0.149	0.052	2.857	0.004495
age60-64	0.411	0.051	8.094	6.41E-15
age65-69	0.739	0.050	14.899	< 2e-16
age70-74	1.017	0.049	20.661	< 2e-16
age75-79	1.245	0.050	25.071	< 2e-16
age80-84	1.316	0.052	25.131	< 2e-16
age85-89	1.191	0.064	18.631	< 2e-16
age90+	0.770	0.099	7.768	6.31E-14
DHBcode	-0.143	0.048	-3.006	0.002804
timecode	0.188	0.020	9.233	< 2e-16
DHBcode:timecode	0.078	0.062	1.250	0.212119

Table 13: Acute medical bed days

Coefficient	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-1.381	0.033	-41.564	< 2e-16
ethOther	-0.645	0.022	-28.886	< 2e-16
ethPacific	0.216	0.033	6.493	2.36E-10
sexMale	0.167	0.015	11.318	< 2e-16
age05-09	-1.533	0.068	-22.663	< 2e-16
age10-14	-1.439	0.065	-22.254	< 2e-16
age15-19	-1.369	0.062	-22.040	< 2e-16
age20-24	-1.370	0.063	-21.599	< 2e-16
age25-29	-1.373	0.067	-20.508	< 2e-16
age30-34	-1.231	0.064	-19.363	< 2e-16
age35-39	-1.050	0.058	-18.134	< 2e-16
age40-44	-0.773	0.052	-14.986	< 2e-16
age45-49	-0.512	0.048	-10.732	< 2e-16
age50-54	-0.166	0.044	-3.728	0.00022
age55-59	0.178	0.042	4.236	2.79E-05
age60-64	0.559	0.040	13.981	< 2e-16
age65-69	0.972	0.038	25.351	< 2e-16
age70-74	1.379	0.037	37.048	< 2e-16
age75-79	1.821	0.036	50.363	< 2e-16
age80-84	2.255	0.036	63.295	< 2e-16
age85-89	2.603	0.037	69.677	< 2e-16
age90+	2.766	0.043	64.556	< 2e-16
DHBcode	-0.078	0.034	-2.288	0.02262
timecode	-0.029	0.016	-1.894	0.05886
DHBcode:timecode	-0.079	0.048	-1.640	0.10169

Table 14: Arranged medical bed days

Coefficient	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-2.236	0.180	-12.426	< 2e-16
ethOther	0.298	0.108	2.761	0.006026
ethPacific	0.204	0.175	1.165	0.244787
sexMale	-0.364	0.040	-9.072	< 2e-16
age05-09	-2.241	0.511	-4.385	1.49E-05
age10-14	-1.967	0.444	-4.428	1.23E-05
age15-19	-2.150	0.470	-4.578	6.29E-06
age20-24	-2.222	0.488	-4.553	7.06E-06
age25-29	-2.108	0.485	-4.348	1.75E-05
age30-34	-1.713	0.405	-4.232	2.89E-05
age35-39	-1.040	0.300	-3.464	0.00059
age40-44	-1.172	0.309	-3.792	0.000173
age45-49	-1.022	0.294	-3.475	0.000568
age50-54	-0.218	0.235	-0.928	0.353825
age55-59	0.315	0.212	1.488	0.137484
age60-64	0.893	0.195	4.567	6.60E-06
age65-69	1.710	0.179	9.531	< 2e-16
age70-74	2.474	0.171	14.458	< 2e-16
age75-79	3.237	0.166	19.502	< 2e-16
age80-84	3.984	0.163	24.384	< 2e-16
age85-89	4.605	0.163	28.209	< 2e-16
age90+	5.058	0.165	30.707	< 2e-16
DHBcode	0.098	0.072	1.361	0.174396
timecode	-0.283	0.040	-7.033	8.93E-12
DHBcode:timecode	0.058	0.105	0.553	0.580865

Table 15: Waiting list medical bed days

Coefficient	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-5.015	0.088	-56.732	< 2e-16
ethOther	-0.334	0.067	-4.983	9.86E-07
ethPacific	-0.073	0.113	-0.648	0.51755
sexMale	0.283	0.045	6.248	1.20E-09
age05-09	-1.360	0.151	-8.999	< 2e-16
age10-14	-1.260	0.144	-8.776	< 2e-16
age15-19	-1.611	0.163	-9.914	< 2e-16
age20-24	-1.694	0.171	-9.886	< 2e-16
age25-29	-1.471	0.164	-8.993	< 2e-16
age30-34	-1.700	0.181	-9.376	< 2e-16
age35-39	-1.512	0.162	-9.339	< 2e-16
age40-44	-0.926	0.127	-7.310	1.81E-12
age45-49	-0.830	0.123	-6.739	6.54E-11
age50-54	-0.318	0.108	-2.949	0.00341
age55-59	-0.122	0.106	-1.150	0.25081
age60-64	0.199	0.102	1.952	0.05168
age65-69	0.562	0.098	5.723	2.25E-08
age70-74	0.703	0.101	6.944	1.85E-11
age75-79	0.897	0.103	8.687	< 2e-16
age80-84	0.845	0.115	7.348	1.42E-12
age85-89	0.778	0.144	5.393	1.27E-07
age90+	0.408	0.233	1.753	0.08039
DHBcode	0.252	0.095	2.657	0.00824
timecode	-0.006	0.049	-0.114	0.90941
DHBcode:timecode	0.190	0.126	1.512	0.13149

Table 16: Acute surgical bed days

Coefficient	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-3.103	0.047	-65.888	< 2e-16
ethOther	-0.464	0.019	-24.516	< 2e-16
ethPacific	0.075	0.030	2.509	0.0125
sexMale	0.123	0.013	9.495	< 2e-16
age05-09	-0.065	0.065	-1.009	0.3134
age10-14	0.291	0.059	4.925	1.22E-06
age15-19	0.802	0.053	15.040	< 2e-16
age20-24	0.883	0.053	16.646	< 2e-16
age25-29	0.840	0.054	15.434	< 2e-16
age30-34	0.889	0.054	16.420	< 2e-16
age35-39	0.924	0.053	17.337	< 2e-16
age40-44	0.969	0.053	18.416	< 2e-16
age45-49	1.111	0.052	21.444	< 2e-16
age50-54	1.179	0.052	22.628	< 2e-16
age55-59	1.404	0.052	27.258	< 2e-16
age60-64	1.679	0.051	32.986	< 2e-16
age65-69	1.915	0.051	37.644	< 2e-16
age70-74	2.241	0.050	44.376	< 2e-16
age75-79	2.581	0.050	51.473	< 2e-16
age80-84	2.867	0.050	56.951	< 2e-16
age85-89	3.169	0.052	60.898	< 2e-16
age90+	3.372	0.057	59.557	< 2e-16
DHBcode	-0.066	0.030	-2.203	0.0281
timecode	-0.011	0.014	-0.775	0.4387
DHBcode:timecode	-0.078	0.042	-1.861	0.0634

Table 17: Arranged surgical bed days

Coefficient	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-4.77936	0.14177	-33.712	< 2e-16
ethOther	-0.42333	0.06144	-6.89	2.31E-11
ethPacific	-0.31846	0.11248	-2.831	0.004883
sexMale	0.20302	0.04135	4.909	1.36E-06
age05-09	-0.89029	0.24966	-3.566	0.000409
age10-14	-0.39233	0.20991	-1.869	0.062381
age15-19	0.40092	0.17065	2.349	0.019314
age20-24	0.68985	0.16329	4.225	3.00E-05
age25-29	0.60932	0.1692	3.601	0.000358
age30-34	0.75949	0.16478	4.609	5.52E-06
age35-39	0.62654	0.16671	3.758	0.000198
age40-44	0.66363	0.16434	4.038	6.51E-05
age45-49	0.83274	0.16045	5.19	3.42E-07
age50-54	1.12282	0.15632	7.183	3.60E-12
age55-59	1.36075	0.1542	8.825	< 2e-16
age60-64	1.67016	0.15192	10.994	< 2e-16
age65-69	1.95821	0.15086	12.981	< 2e-16
age70-74	2.23559	0.15062	14.843	< 2e-16
age75-79	2.5591	0.1497	17.095	< 2e-16
age80-84	2.62437	0.15405	17.035	< 2e-16
age85-89	2.90628	0.16079	18.075	< 2e-16
age90+	2.90365	0.18572	15.634	< 2e-16
DHBcode	-0.0667	0.08997	-0.741	0.458946
timecode	-0.22138	0.04355	-5.083	5.82E-07
DHBcode:timecode	-0.15802	0.1365	-1.158	0.247736

Table 18: Waiting list surgical bed days

Coefficient	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-4.09167	0.075144	-54.451	< 2e-16
ethOther	-0.21375	0.032397	-6.598	1.27E-10
ethPacific	-0.12049	0.056711	-2.125	0.03421
sexMale	-0.02267	0.019698	-1.151	0.25046
age05-09	-0.47358	0.114819	-4.125	4.49E-05
age10-14	-0.29998	0.10806	-2.776	0.00575
age15-19	-0.13148	0.101853	-1.291	0.19747
age20-24	-0.21295	0.104827	-2.031	0.04284
age25-29	-0.09781	0.104729	-0.934	0.35089
age30-34	0.230217	0.096501	2.386	0.0175
age35-39	0.548435	0.088961	6.165	1.67E-09
age40-44	0.831741	0.084123	9.887	< 2e-16
age45-49	1.154849	0.08076	14.3	< 2e-16
age50-54	1.326051	0.080121	16.551	< 2e-16
age55-59	1.621117	0.078764	20.582	< 2e-16
age60-64	2.029328	0.077126	26.312	< 2e-16
age65-69	2.44874	0.076036	32.205	< 2e-16
age70-74	2.76975	0.075708	36.584	< 2e-16
age75-79	2.899281	0.076414	37.942	< 2e-16
age80-84	2.819022	0.078915	35.722	< 2e-16
age85-89	2.575836	0.08789	29.308	< 2e-16
age90+	1.983961	0.122565	16.187	< 2e-16
DHBcode	-0.05125	0.044712	-1.146	0.25237
timecode	-0.00097	0.020862	-0.046	0.96309
DHBcode:timecode	-0.03418	0.062082	-0.551	0.5822