

# Care Plus Investigation

## Estimating case loads



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## BACKGROUND TO THE RESEARCH

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CBG Health Research Limited was contracted by the Ministry of Health to undertake an evaluation of Care Plus, a new initiative within general practice that is planned to replace the existing High Use Health Card (HUHC) system. Care Plus is currently in the process of being piloted in 6 primary health care organisations (PHOs) around the country.

As part of the evaluation, CBG carried out a quantitative investigation which involved collecting data from 28 primary care practice management systems (PMS), containing data on 180,000 registered patients. The practices also completed a questionnaire to help estimate the numbers of patients with various chronic conditions and the amount of clinical time typically required to manage these patients. The following report describes the findings of this quantitative component of our evaluation of the Care Plus pilots. An earlier piece of qualitative research described the set-up and establishment phases of the pilot in three Auckland primary care groups, and a further round of interviews will be conducted in the first half of 2004 to describe the scheme in operation.

The eligibility criteria for Care Plus funding at the time this research was undertaken were:

A **holder of a High Use Health Card** or fulfil any of the first five criteria and criterion number six:

***Any of the following:***

- has had six primary care visits in the past six months (including Emergency Department visits)
- has had two acute non-surgical admissions in the past twelve months
- has a terminal illness (defined as someone who has advanced, progressive disease which is no longer responsive to curative treatment and whose death is likely within twelve months)
- has two or more chronic conditions. These are defined as follows:
  - ♦ They have a significant burden of morbidity
  - ♦ They create a significant cost to the health system
  - ♦ There are agreed and objective diagnostic criteria
  - ♦ Continuity of care and a primary care team approach has an important role in management.
- is on active review for elective services

***and***

- is assessed by the General Practice team as being expected to need 'intensive clinical management' (at least two hours of clinical management) over the following 6 months.

These criteria may be interpreted in different ways by different providers. Primary Care Organisations may provide different guidelines to their member practices, and the practices themselves will interpret these guidelines in different ways.

# RESEARCH OBJECTIVES

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The primary goal of this research is to provide estimates of the number of patients that would be considered to be eligible for Care Plus.

# RESEARCH DESIGN

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The research used a series of PMS queries to measure:

- Any recorded diagnoses
- Prescription subsets for selected conditions (to get better data on diagnosis prevalence)
- Numbers of encounters in last 6 months

A questionnaire was distributed to all practices participating in the research. It was designed to gain practice estimates of the number of patients with chronic conditions that need “intensive clinical management” (defined as requiring at least two hours of clinical management by either a doctor or nurse in the next six months) and to estimate numbers of patients for Care Plus qualifying groups not covered in PMS data collection.

## SAMPLE

The research team consulted all of the PHOs involved or planning to be involved with the Care Plus pilot. All of them, with the exception of West Coast PHO, agreed to support the evaluation and 28 Med Tech 32 (MT32) practices were recruited from the participating PHOs.

The evaluation was limited to MT32 practices after the research team trialled the running of queries on Profile and observed that the software did not support the easy extraction of the necessary data. Such data extraction is of course possible, but would have required special programming by the software vendor, IntraHealth. ProCare, the PHO trialling Care Plus in the South Auckland region, requested that they be able to select 10 MT32 practices from their area in order to have a sample that accurately reflected their population. East Health PHO asked that they be involved in contacting the practices selected to take part in the quantitative study for their area.

The table below gives the participating PHOs and the number of practices recruited from each of them:

**Table 1 Participants**

<b>PHO</b>	<b>PRACTICES</b>
Health West	<b>10</b>
East Health	<b>5</b>
Procare	<b>10</b>
Canterbury Community	<b>2</b>
Tihewa Mauriora	<b>1</b>

## RECRUITMENT

Practices were contacted by fax and phone to invite them to participate in the research. A total of three faxes and follow up phone calls were completed with 28 out of 29 possible practices agreeing to take part.

## DATA COLLECTION

We wrote programmes (in SQL) that extracted data from the MT32 PMS. Data collection was restricted to registered patients of a practice. This will in general be larger than the numbers of capitated patients accepted for the purposes of HealthPAC claims.

Data was collected on patient encounters in the last six months, prescriptions of beta agonists in the previous twelve months (used to indicate prevalence of asthma), prescriptions of frusemide and spironolactone (congestive heart failure) in the last six months, biguanides, insulin and sulfonylureas (diabetes) in the last six months, and nitrates (ischaemic heart disease) in the preceding twenty four months. Although there are obviously other medications that are used in the management of these conditions their specificity is low. For example, the use of ACE inhibitors in hypertension precludes their use as a marker for CHF. The author of this report has reported on these methods in published research, and they are increasingly employed in the US in prevalence estimation and resource prediction, as electronic prescribing records become the norm.

We also wrote a coding classification query (to run in “Query Builder”) that was designed to extract data providing an anonymous register of coded client encounters at each of the practices in the last twenty four months.

A general register query provided data on demographics, HUHC and CSC status.

The programmes were run by the MT32 PMS. The anonymous extracted data was then written with a practice-level patient identifier to text files that were emailed or posted back to CBG. Practices were supplied with a complete set of instructions with “screen shots”. At all times, a researcher was available to talk them through the process if required. When data was received by CBG it was checked by the researcher to make sure it was correct.

The survey questionnaire required the practices to make estimates of the number of patients that:

- had made six visits in the last six months (including ED visits)
- had two or more acute non-surgical admissions in the last twelve months
- were receiving terminal care
- were asthmatic
- were diabetic
- had IHD
- had CHF
- had COPD
- were hypertensive
- had chronic mental health issues

- had two or more chronic conditions
- were on “active review” for elective services

Practices were also asked to make estimates of the proportion of patients from each of the above mentioned patient groups that would require at least two hours of clinical management over the following six months. Practices were asked to estimate the proportion of HUHC patients that they felt would be eligible for Care Plus.

## **DATA ANALYSIS**

The data was provided as “\*.csv” files to CBG. It was imported into Access and labelled at row level with a clinic identifier. These tables were then aggregated to create single tables for each set of results. Basic frequency counts and cross tabulations were undertaken in Access. More sophisticated analyses, including predictive modelling was undertaken using Statistica.

## **CAVEATS**

The data was collected using standardised procedures for each provider. Nevertheless, data may be recorded in different formats and by different methods even within the same PMS. For example, there were 195 different codes for patient ethnicity, which were coded manually to Māori, Pacific and Other. All queries were restricted to patients with registration code “R”, for registered patients. Casual patients were therefore excluded from data collection. In all but one case, the estimated registers from practice questionnaires were 10%-15% less than the numbers recorded by our computerised queries. This was probably due to practitioners reporting the claimable registers, once enrolments at other practices had been deducted by HealthPAC. However in one practice the “R” register was twice the estimated register.

We used the same filter criteria (registered = “R”) for all practices and all six queries that we ran. The denominator and numerator in any rate calculation were thus produced by the same methodology.

# RESULTS

## REGISTERS SUMMARIES

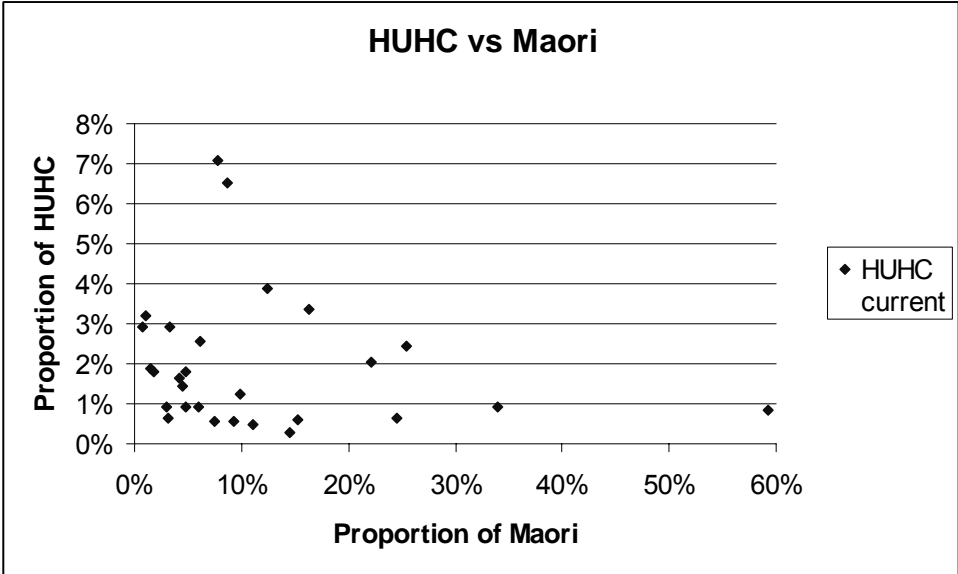
Table 2 describes each practice by ethnicity, age band, percentage of CSC holders (current or expired in last 2 years) and HUHC (current or expired in last 2 years). The two year window was used as the objective of this exercise is to predict Care Plus cases. Many people do not renew their HUHC before it expires; however their clinical status (which would make them eligible for CarePlus) has not necessarily changed, and usually will not have.

**Table 2 Register summaries**

	Māori	Pacific	45-64	65-74	75-79	80-84	85+	CSC 2yr	HUHC 2yr	HUHC current
1	5%	11%	24%	5%	3%	2%	1%	27%	2%	1%
2	6%	19%	25%	4%	2%	1%	1%	42%	3%	3%
3	1%	1%	21%	4%	2%	1%	1%	18%	4%	3%
4	15%	8%	17%	3%	1%	1%	1%	17%	0%	0%
5	8%	3%	21%	4%	2%	1%	2%	15%	1%	1%
6	16%	4%	19%	6%	3%	1%	1%	36%	4%	3%
7	5%	1%	26%	5%	1%	1%	0%	21%	2%	2%
8	25%	20%	16%	2%	1%	0%	0%	31%	1%	1%
9	5%	7%	22%	7%	2%	1%	1%	34%	1%	1%
10	6%	9%	20%	6%	2%	2%	2%	28%	1%	1%
11	9%	5%	16%	4%	1%	1%	1%	21%	1%	1%
12	22%	17%	17%	5%	2%	1%	1%	38%	3%	2%
13	12%	13%	19%	6%	2%	2%	1%	35%	7%	4%
14	59%	1%	19%	5%	2%	1%	1%	64%	1%	1%
15	2%	8%	19%	5%	1%	1%	1%	13%	2%	2%
16	8%	1%	24%	9%	5%	3%	2%	23%	9%	7%
17	3%	2%	28%	7%	3%	2%	2%	20%	1%	1%
18	15%	21%	17%	3%	1%	1%	1%	26%	1%	1%
19	2%	1%	24%	5%	2%	1%	1%	19%	2%	2%
20	11%	3%	16%	3%	1%	1%	0%	25%	1%	0%
21	1%	1%	28%	7%	3%	2%	2%	18%	3%	3%
22	25%	24%	16%	3%	1%	0%	0%	42%	3%	2%
23	34%	16%	21%	4%	0%	0%	0%	51%	2%	1%
24	4%	6%	19%	7%	3%	1%	1%	27%	2%	2%
25	3%	2%	18%	3%	1%	1%	1%	19%	1%	1%
26	10%	15%	23%	5%	1%	1%	0%	57%	2%	1%
27	3%	2%	20%	3%	1%	1%	1%	17%	3%	3%
28	9%	2%	24%	6%	3%	3%	2%	30%	7%	7%

The main value of this table is to illustrate the range of practice profiles in this survey. The proportion of current HUHC holders ranged from 0.3% to 7.1%. A quick examination of the proportion of Māori in a practice seems to suggest an inverse association plotted below:

**Figure 1 Māori vs HUHC**



Associations like these must be examined for confounders – if chronic illness develops in old age then the low life expectancy of Māori could explain the association. This doesn't seem to be supported by looking at Table 2 where we see that a long tail on the age distribution doesn't appear to be associated with high HUHC proportions.

These analyses should be (and probably have been) conducted with much larger datasets using registers submitted to HealthPAC. A more powerful analysis (which could also be performed nationally) would be to look at a full logistic regression model in which the dependent variable is the presence of the HUHC.

The effect of an individual clinic has to be considered also as funding models, practice culture, and enthusiasm of reception staff are all major determinants of HUHC levels.

**HUHC AND NUMBER OF ENCOUNTERS.**

The register downloads allowed us to see how often people in various categories visited the practice. Table 3 shows these results.

**Table 3 Average visits in six months by HUHC and CSC vs chronic conditions\***

Current HUHC	Current CSC	Number of chronic conditions						
		0	1	2	3	4	5	6
N	N	1.0	3.5	5.2	6.8	7.8	4.2	5.0
N	Y	2.2	5.1	7.1	9.2	8.8	10.3	18.0
Y	N	7.7	10.2	11.0	13.8	16.9	11.3	
Y	Y	7.8	10.8	14.1	16.0	16.6	17.4	30.3

\* see Table 5 for list of possible conditions

Table 4 shows the distribution of visits for HUHC holds and others. 67.7% of HUHC holders had 6 or more visits in the last six month.

**Table 4 Distribution of visits for HUHC holders**

Encounters in last 6 mths	HUHC		
	N	Y	
0	101575	157	
1	21991	90	
2	16405	126	
3	11035	160	
4	7662	218	
5	5536	193	
6	3803	209	67.7%
7	2755	217	
8	1932	199	
9	1384	147	
10	1111	165	
11	810	136	
12	628	131	
13+	2348	776	

These data will be used later to adjust for double counting in Care Plus eligibility categories.

## CHRONIC ILLNESSES

We analysed each practices disease coding, collecting every Read term that had been entered in the patient disease coding tables. All practices used Read. For the 181899 patients in our sample there were 260285 Read codings. There were 8013 unique Read codes used. We classified 3025 of these manually in to one of 7 chronic conditions (see below). This represented coding for 97% of all codes.

We then constructed tables that eliminated Read terms in the same code group for a given individual. For example a person with a Read term “NIDDM” and “diabetic neuropathy” was only counted once in the Diabetes diagnosis group.

We also collected data from prescription records as described earlier to estimate the number of people under active management for a given condition. Table 5 compares the estimates of chronic condition prevalence from these two methods

**Table 5 Chronic disease estimates**

n=181899	Rx	%	Read	%	Both	%
Asthma	9615	5.29%	7463	4.10%	12591	6.92%
Diabetes	2231	1.23%	2586	1.42%	3231	1.78%
CHF	1731	0.95%	596	0.33%	1877	1.03%
IHD	1978	1.09%	1921	1.06%	2834	1.56%
Hypertension	-	-	6228	3.42%	6228	3.42%
Mental Health	-	-	2090	1.15%	2090	1.15%
CORD	-	-	856	0.47%	856	0.47%

The 3 larger participating primary care providers have all been actively encouraging disease coding in various ways. The differences in the proportions even follow the pattern one might expect, although this could easily be a chance result; some people may use beta agonists without having a formal diagnosis of asthma (eg bronchitis) and some people with diabetes will be on dietary control. Prescribing based indicators were not able to be constructed for hypertension, and COPD, and we did not collect data for mental health, because we did not have enough data on the correlation between diagnosis and medication.

## MULTIPLE CHRONIC ILLNESSES

One of the criteria for qualifying for Care Plus funding was the presence of two or more chronic illnesses. Because we have data at the individual patient level we can just count the number of chronic conditions for every patient in the combined patient registers. We considered a patient to have a particular chronic condition if either disease coding or prescription history indicated a patient had a condition.

The next question that arises is which chronic conditions should be included in an analysis? The definition in the proposed Care Plus agreement is that a chronic condition:

- Has a significant burden of morbidity
- Creates a significant cost to the health system
- Has agreed and objective diagnostic criteria
- Is such that continuity of care and a primary care team approach has an important role in management.

We asked PHOs to indicate which conditions they were suggesting to member practices should be considered as chronic conditions for the purposes of Care Plus. Table 6 shows the wide variation. It should be noted that these were only guidelines – a person that qualified for funding by virtue of meeting the criteria would still be a possible Care Plus patient.

**Table 6 Suggested chronic conditions**

Common fields	Health West	Canterbury	Northland	EastHealth	West Coast	Manukau
Asthma	X	X	X	X	X	X
CHF	X		X	X		X
IHD	X		X	X	X	X
Hypertension	X	X	X			
Hyperlipidemia	X					
COPD	X			X	X	X
Diabetes	X	X	X	X	X	
Malignancy		X			X	
Chronic MH		X			X	
Hepatitis		X				
Rheumatoid		X				
Osteo		X	X			
Bronchiolitis			X			
Gout			X			
PVD			X			
Frail Elderly					X	
AF / Arrhythmia			X			
Methadone		X				
Chronic RF			X			

We have estimates for seven of the top nine conditions from our PMS queries. The analysis of counts of chronic conditions for which we do have data is shown in Table 7:

**Table 7 Counts of chronic conditions**

Number of Chronic Diseases	Number of patients
0	158304
1	19076
2	3360
3	886
4	218
5	49
6	6
Total	181899
2 or more	2.48%

## ESTIMATES OF CARE REQUIRED

To construct an estimate of the total possible Care Plus patient load we needed to obtain data on other possible qualifying conditions and the amount of clinical care they would require. These were not available from PMS systems and a questionnaire was sent to each practice to obtain estimates of various conditions. We originally understood that PHOs might have some

of these data, for example, the number of patients on active review, but these data were not able to be provided.

The relevant sections of the questionnaire that was distributed to practices is shown in Table 8, with summaries of the returned data (range and number of responses received) in each cell that was filled in. It is easier for people to estimate the number of people in small categories than percentages, and for the larger categories many GPs gave exact numbers from their disease registers.

**Table 8 questionnaire responses**

<b>CATEGORY</b>	number of patients	% that will need at least 2 hrs clinical management over next six months
Six visits in last six months (including ED visits)	284 (5-2021, n=16)	52% (10%-100%, n=15)
2 or more acute non-surgical admissions last 12 months	43 (2-300, n=15)	54% (5%-100%, n=10)
Terminal Care	7 (0-20, n=22)	88% (50%-100%, n=13)
Chronic Conditions		
<i>Asthma</i>	289 (10-1000, n=21)	31% (5%-100%, n=16)
<i>Diabetes</i>	163 (10-452, n=22)	59% (5%-100%, n=16)
<i>IHD</i>	132 (25-436, n=21)	50% (5%-100%, n=16)
<i>CHF</i>	68 (3-200, n=20)	61% (5%-100%, n=16)
<i>COPD</i>	127 (2-687, n=20)	53% (5%-100%, n=16)
<i>Hypertension</i>	342 (30-1248, n=20)	30% (2%-90%, n=16)
<i>Chronic mental health</i>	65 (10-205, n=19)	65% (5%-100%, n=14)
<i>Two or more chronic conditions</i>	189 (30-500, n=16)	61% (5%-90%, n=14)
On "active review" for elective services	75 (10-200, n=9)	48% (20%-66%, n=6)

Practices estimated that an average of 56% of HUHC patients (10%-100%, n =20) would be eligible for Care Plus.

Using these data and the stated practice populations a table which compares practice estimates with data from the PMS (diagnosis coding and prescribing analysis) can be constructed:

**Table 9 Practice vs PMS estimates**

	GP estimate	PMS (max of Read code estimates and Rx analysis)
<i>Asthma</i>	6.7%	6.9%
<i>Diabetes</i>	3.8%	1.8%
<i>IHD</i>	3.1%	1.0%
<i>CHF</i>	1.6%	1.6%
<i>COPD</i>	2.9%	1.1%
<i>Hypertension</i>	7.9%	3.4%
<i>Chronic mental health</i>	1.5%	1.1%
<i>Two or more chronic conditions</i>	4.4%	2.5%

# CARE PLUS CASELOAD

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## OUTSTANDING ISSUES

The data above can be used to build an estimate of the number of people that meet the current Care Plus criteria. There are a few loose ends that need to be tied up.

First – what proportion of HUHC holders will be covered by the Chronic Conditions definitions? Table 10 shows that nearly half of current HUHC holders do not have chronic conditions as defined here:

**Table 10 Chronic conditions by HUHC and CSC**

current HUHC	current CSC	Chronic conditions			Totals
		0	1	2 or more	
N	N	130589	11762	1658	144009
N	Y	26385	6356	2225	34966
Y	N	811	485	222	1518
Y	Y	519	473	414	1406
ALL HUHC		45%	33%	22%	100%
Y=1.6%	Y=20%	158304	19076	4519	181899

To get a HUHC a person must have had 12 visits in the last 12 months for an ongoing health condition or conditions. Two obvious reasons why not all the HUHC holders in our sample have a recorded chronic condition are (a) they have a condition we haven’t looked for, the most common of which would probably be arthritis and (b) the condition hasn’t been coded.

Second, and a related, issue is - what would the impact of other chronic conditions not on the list of seven? US data from HMOs (eg Kaiser Permanente) report that, in the US, the seven conditions listed here account for 85% of the chronic disease burden in primary care. The situation is probably similar in NZ, although, as far as we know, there are no good data on this question. As will be seen, to be conservative, we will use the GP estimate (4.4%) and not our PMS derived estimate for the number of people with 2 or more chronic conditions.

We will also need to know what proportion of HUHC that do not meet the six or more visits in six months have 2 or more chronic illnesses. This proportion is only 3.5%, and will be used to adjust for double counting in our model.

It was originally planned to apply the estimates of the proportion of cases requiring “intensive clinical management” to individual chronic disease categories to derive a Care Plus population for each group. As was shown in Table 8, there was a wide distribution of estimates, with an average of close to 50% for most conditions. Was this a function of random responses or can we place some value on these estimates?

The most important estimate we requested was the proportion of people with two or more chronic conditions that would require intensive clinical management. We have reported the average (mean) value in the questionnaire in the previous page; the median (the middle value) is 50% for most categories also. In the case of the proportion of people with two or more

chronic conditions that would require intensive clinical management the average is 56% because of a single persons estimate of 5% - the median value is 75%. We will use this median value in our modelling.

## CASELOAD ESTIMATE

The following table lays out a sensible approach to case load estimation given the poor quality (i.e. low number of GP estimates) of the source data. It is estimated that 8.5% of the population may be eligible for Care Plus. This estimate is based upon assuming a population of 100,000 and applying the data from PMS downloads whenever possible and filling in the gaps with GP estimates. The estimate is insensitive to the choice of estimate for the two or more chronic conditions rate (4.4% vs 3% - Scenario 1) but very sensitive to the proportion of cases in each category that need intensive clinical management (Scenario 2) .

**Table 11 Care Plus eligibility estimate**

	pop = 100000	N	intensive clinical management	Total CP	notes
1	Six or more visits	9209			from PMS
	inflation for ED (+5%)	9669	50%	4835	ED guess; GP estimate
2	2+ acute ns admits 12 mths	996	50%	498	GP estimate
3	Terminal Care	162	100%	162	GP estimate
4	2 or more chronic conditions	4379			max(GP estimate, PMS)
	less already in 1	2324			
	leaving	2055	75%	1541	
5	On "active review"	1738	50%	869	GP estimate
6	HUHC	1607			All in 1, as per GP records
	HUHC in 1	1089			from PMS
	HUHC not in 1, in 4	56			from PMS
	leaving	463	50%	544	
<b>Total</b>				<b>8449</b>	<b>(or 8.5%)</b>
<b>Scenario1</b>	<b>Use 3% 2+ CC (4)</b>			<b>7264</b>	<b>(or 7.3%)</b>
<b>Scenario2</b>	<b>Use 100% need ICM for all</b>			<b>14780</b>	<b>(or 14.8%)</b>

This calculation assumes that acute non-surgical admission patients, Terminal Care and patients on active review are not already included in other categories. This will not be the case, and to that extent the estimates of N, the numbers of patients in these groups, are conservative (high) estimates.

The largest category – number of patients with six or more visits is calculated from PMS data and is highly reliable. The inflation figure of 5% for ED attendance has been based on our experience in CM DHB where 10% of the population sees ED in a given year. This too will in general be conservative. We have assumed that 5% of the population that had 5 visits, had 6 when their ED visit were included (adds 150).

The two or more chronic conditions estimate is based upon the GP estimate of 4.4% (only 14 of 28 practices returned an estimate), compared with the PMS based calculation of 2.5% (this might be scaled to 3% to take account of other less common chronic conditions, still less than the 4.4% we utilise). The final HUHC category shows that 25% of current HUHC holders are not covered in any other Care Plus groups.