

# Predicting patient use of general practice services in Australia

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## In Australia

- Population: 24 million;
- GPs: ~25,000 (full or part-time)
- We have increased demand on GP services from an ageing population and increasing prevalence of multimorbidity
- We have a fee- for service system, with partial or full payment of costs by Government

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### DIFFERENCES IN ANNUAL GP CONSULTATING TIME BY AGE AND SEX



85 year old  
Granddad



12 year old  
granddaughter

# Fee-for-service to capitation

In proposed trial of “Health Care Homes” GPs will move from fee-for-service to capitation

The capitation payments need to reflect the current level of GP income (+?) for each patient

An accurate measure of patient demand is required





## Early predictors of patient GP-visit rate

In 2000 we found patient GP visit rate was related to:

- their age
- holding a Commonwealth Health Care Card
- their number of diagnosed chronic conditions

Patient sex was **not** related

Depression, Anxiety, Chronic back pain independently increased patient GP-visit rate

Others suggest that the number of body systems affected by chronic conditions increases demand

## Aims of this study

To develop a parsimonious model that predicts patient visit rate to GPs, by examining:



the number of chronic conditions



the number of body systems



patient age and sex



other patient characteristics



the presence/absence of specific chronic conditions.



## Australia --BEACH Study Methods

(BEACH = Bettering the Evaluation And Care of Health)  
Continuous National study of GP clinical activity 1998-2016.

- National random samples of GPs  
(drawn by Department of Health)
- ~1,000 GPs per year- ever changing
- 20 per week x 50 weeks a year
- 100 consecutive encounters per GP
- Paper based data collection
- All types of encounters included

National data ~100,000 encounter records p.a.  
(1.8 million encounters records in total)



# BEACH study - classification

- ICPC-2 was used to secondarily classify:
  - Patientt reasons for encounter
  - Problems managed at encounter
  - Clinical and therapeutic treatments
  - Referrals made, pathology and imaging ordered
- Chronic conditions were defined according to O'halloran et al

[O'Halloran J, Miller GC, Britt H](#)

Defining chronic conditions for primary care with ICPC-2.

[Fam Pract.](#) 2004 Aug;21(4):381-6.



This study is a BEACH SAND Sub-Study

## **S**upplementary **A**nalysis of **N**ominated **D**ata

Sub-studies of health aspects which may not have been managed at the visit.

30 consecutive patients from 100 GPs over a 5 week 'block' = 3,000 patient sample

Fifteen 5 week blocks between Nov 2012 and March 2016:

1,449 GPs participating GPs recorded additional details for 43,501 patients



# BEACH (Bettering the Evaluation And Care of Health) - Morbidity and Treatment Survey - National

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DOC ID

Encounter Number

Date of encounter ____/____/____	Date of Birth ____/____/____	Sex M <input type="checkbox"/> F <input type="checkbox"/>	Patient Postcode _____	Yes / No	PATIENT SEEN BY GP ..... <input type="checkbox"/>
				New Patient ..... <input type="checkbox"/> <input type="checkbox"/>	PATIENT NOT SEEN BY GP ..... <input type="checkbox"/>
				Health Care/Benefits Card... <input type="checkbox"/> <input type="checkbox"/>	Medicare Item Nos: (if applicable)
				Veterans Affairs Card..... <input type="checkbox"/> <input type="checkbox"/>	Home visit (not RACF) .... <input type="checkbox"/>
				NESB..... <input type="checkbox"/> <input type="checkbox"/>	1. _____ Workers comp paid..... <input type="checkbox"/>
				Aboriginal..... <input type="checkbox"/> <input type="checkbox"/>	2. _____ Other paid ..... <input type="checkbox"/>
				Torres Strait Islander ..... <input type="checkbox"/> <input type="checkbox"/>	3. _____ No charge ..... <input type="checkbox"/>

Diagnosis/ Problem ①:								Problem Status New <input type="checkbox"/> Old <input type="checkbox"/> Work related <input type="checkbox"/>							
Drug Name AND Form for this problem	Strength of product	Dose	Frequency	No. of Rpts	OTC	GP Supply	Drug status New   Cont.	Drug Name AND Form for this problem	Strength of product	Dose	Frequency	No. of Rpts	OTC	GP Supply	Drug status New   Cont.
1.								1.							
2.								2.							
3.								3.							
4.								4.							

Procedures, other treatments, counselling this consult for this problem		Procedures, other treatments, counselling this consult for this problem	
1. _____ Prac Nurse? <input type="checkbox"/>	2. _____ Prac Nurse? <input type="checkbox"/>	1. _____ Prac Nurse? <input type="checkbox"/>	2. _____ Prac Nurse? <input type="checkbox"/>

Diagnosis/ Problem ③:								Problem Status New <input type="checkbox"/> Old <input type="checkbox"/> Work related <input type="checkbox"/>							
Drug Name AND Form for this problem	Strength of product	Dose	Frequency	No. of Rpts	OTC	GP Supply	Drug status New   Cont.	Drug Name AND Form for this problem	Strength of product	Dose	Frequency	No. of Rpts	OTC	GP Supply	Drug status New   Cont.
1.								1.							
2.								2.							
3.								3.							
4.								4.							

Procedures, other treatments, counselling this consult for this problem		Procedures, other treatments, counselling this consult for this problem	
1. _____ Prac Nurse? <input type="checkbox"/>	2. _____ Prac Nurse? <input type="checkbox"/>	1. _____ Prac Nurse? <input type="checkbox"/>	2. _____ Prac Nurse? <input type="checkbox"/>

NEW REFERRALS, ADMISSIONS				IMAGING/Other tests				PATHOLOGY				PATHOLOGY (cont)			
Problem(s)				Body site				Problem(s)				Problem(s)			
1. _____	1	2	3	4	1. _____	-	1	2	3	4	1. _____	1	2	3	4
2. _____	1	2	3	4	2. _____	-	1	2	3	4	2. _____	1	2	3	4
					3. _____	-	1	2	3	4	3. _____	1	2	3	4

Approx. how many times has this patient seen any GP in the past 12 months (including today)? _____	Does the patient have any chronic conditions/problems? (Tick all that apply)				Other: <input type="checkbox"/> Asthma				Other chronic problems not listed: _____						
	<input type="checkbox"/> NO chronic problems → End questions				<input type="checkbox"/> COPD				(please specify) _____						
	<b>Musculoskeletal</b>				<b>Cardiovascular</b>										
	<input type="checkbox"/> Osteoarthritis				<input type="checkbox"/> Hypertension										
<input type="checkbox"/> Rheumatoid arthritis				<input type="checkbox"/> IHD				<input type="checkbox"/> Sleep apnoea							
<input type="checkbox"/> Other arthritis				<input type="checkbox"/> CHF				<input type="checkbox"/> GORD							
<input type="checkbox"/> Osteoporosis				<input type="checkbox"/> Periph Vasc. Dis				<input type="checkbox"/> Chronic renal failure							
<input type="checkbox"/> Chronic back pain				<input type="checkbox"/> CVA/stroke				<input type="checkbox"/> Glaucoma							
				<input type="checkbox"/> Atrial fibrillation				<input type="checkbox"/> Malignant neoplasm							
								Site: _____							

Mark the line with an X to indicate the patient's overall severity of illness in the past week:

LOWEST SEVERITY 0 1 2 3 4 5 6 7 8 9 10 HIGHEST SEVERITY



## Weighting method

High attending patients are over represented at GP encounters

To adjust estimates to match those who attended a GP at least once in a year, weightings were applied.

$$\text{Weight} = \frac{\text{Total average number of visits/}}{\text{Number of GP visits for patient}}$$

## Average number of visits

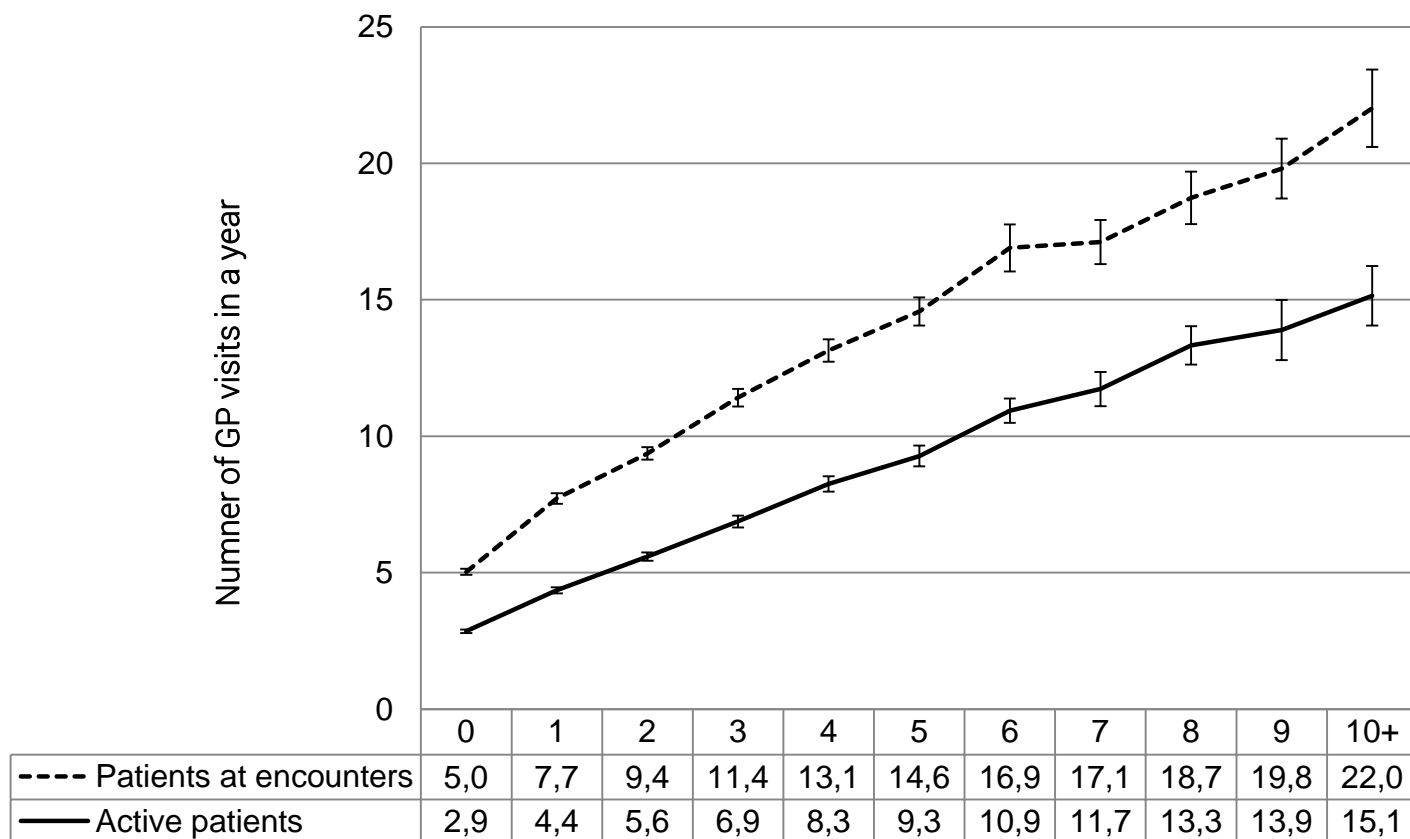
Patients in our sample had an average **9.66** GP visits over the previous 12 months



After weighting, we estimated that active patients had an average **4.54** GP visits over the previous 12 months.



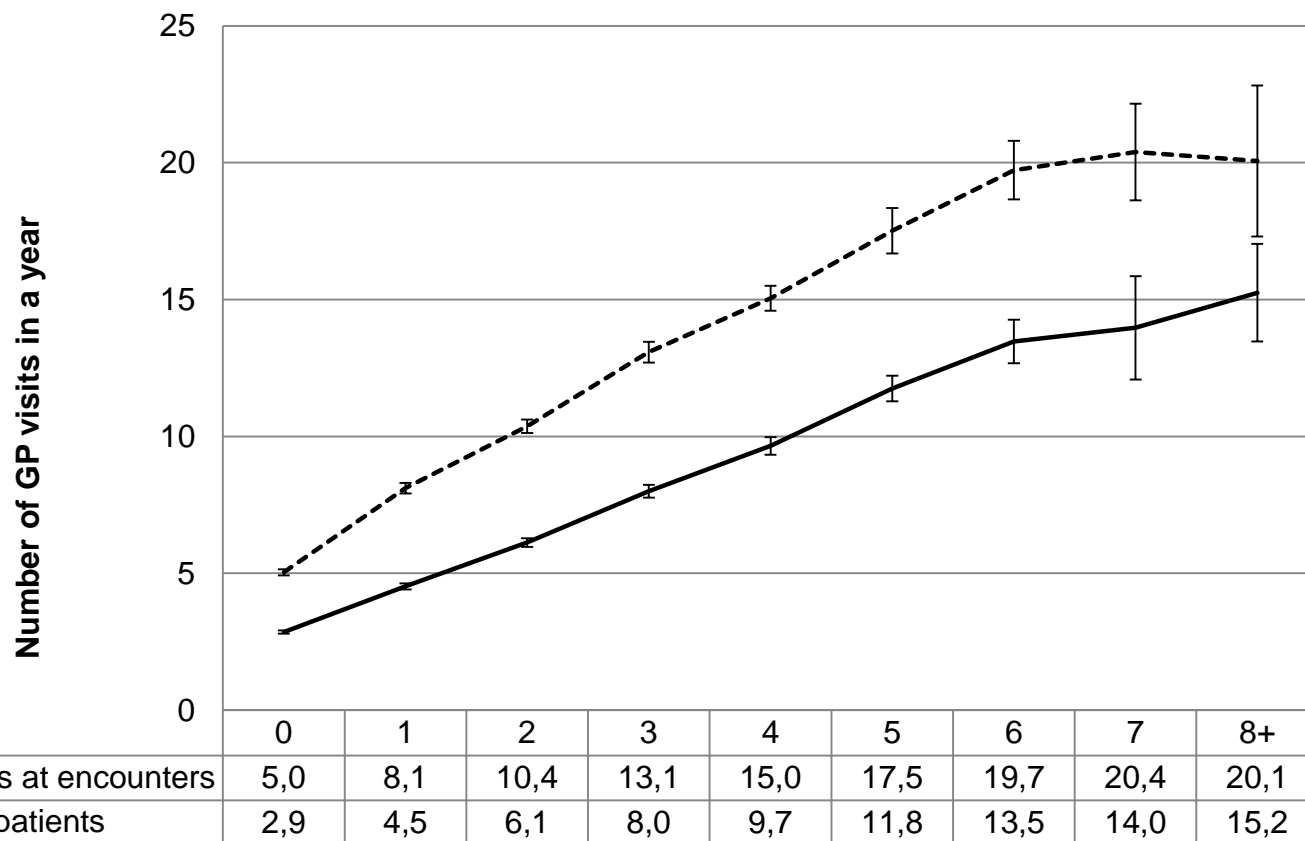
# GP visits by number of chronic conditions



R-Square encounter = 20.36%

R-Square active patients = 25.48%

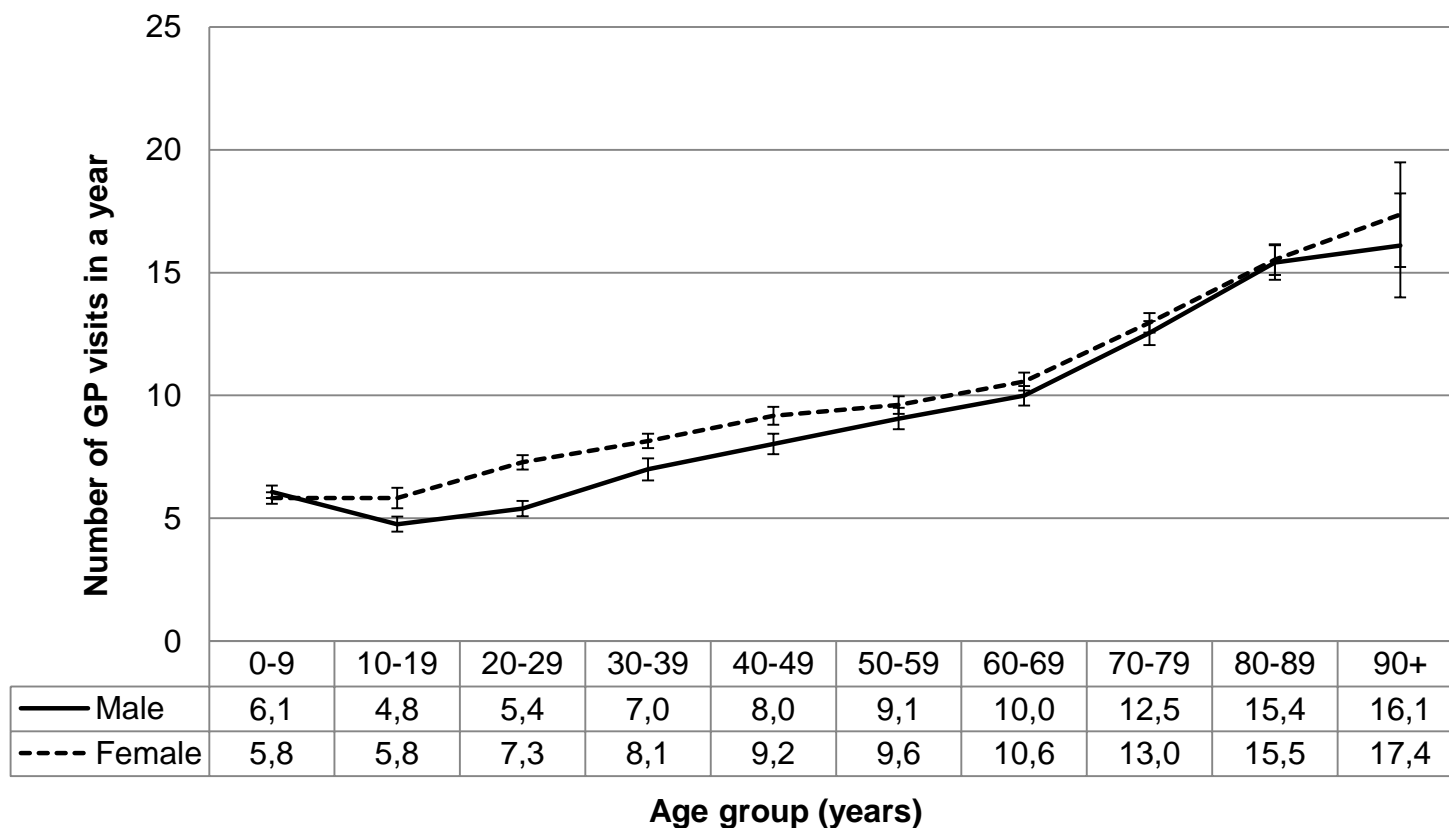
# GP visits by number of body systems affected (ICPC-2 chapters with at least 1 chronic)



R-Square encounter = 18.77%

R-Square active patients = 23.91%

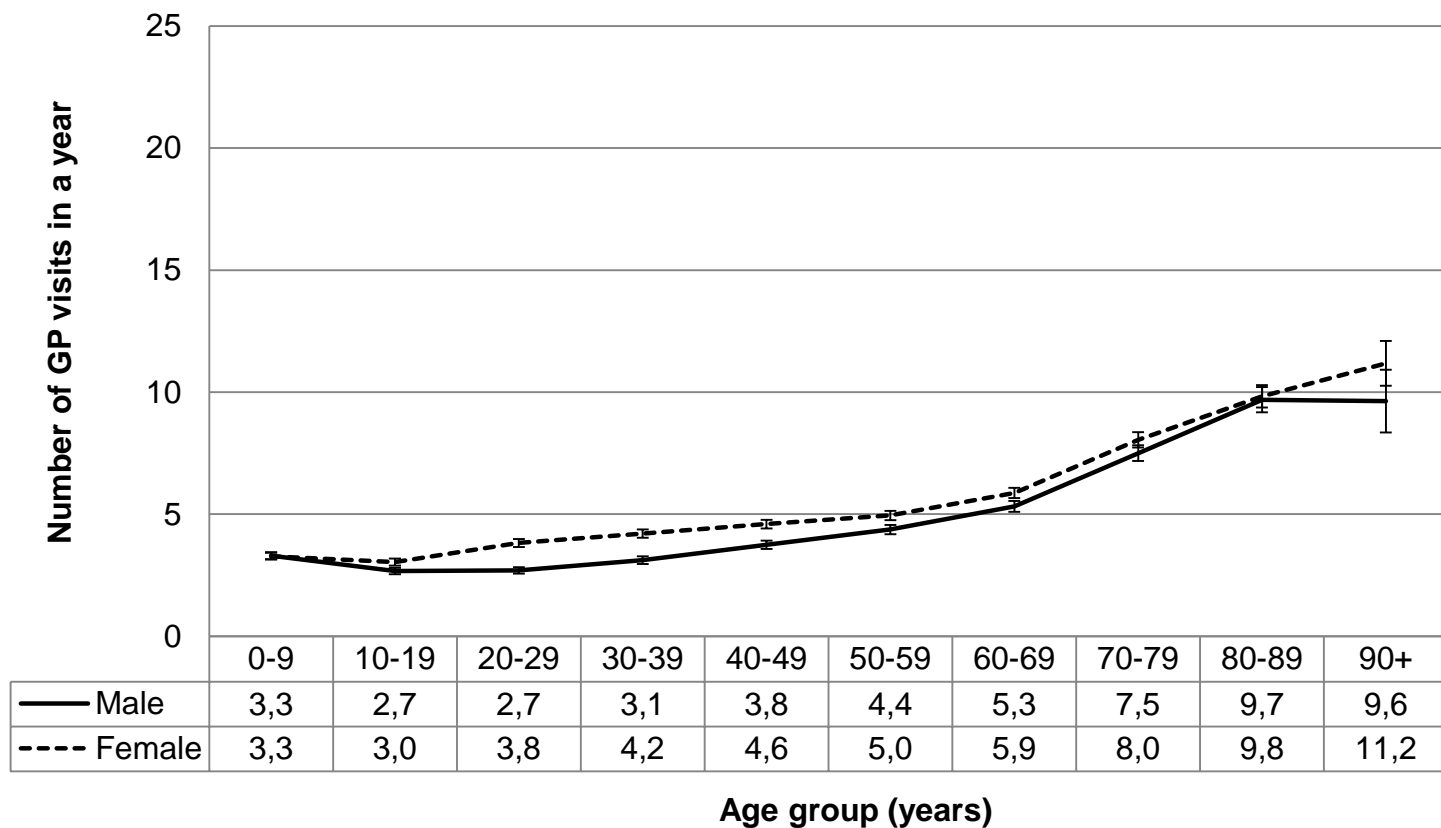
# GP visits by age and sex (patients at encounters)



R-Square = 9.24%

R-Square (age<sup>2</sup> included) = 10.15%

# GP visits by age and sex (active patients)



R-Square = 11.23%

R-Square (age<sup>2</sup> included) = 14.28%

# Multivariate model 1

<b>Parameter (R-square = 27.59%)</b>	<b>Estimate (Visits)</b>	<b>t-Value</b>	<b>p-Value</b>
Intercept	2.789	40.63	<0.0001
Female (over male)	0.516	11.56	<0.0001
Age (years)	-0.032	-8.02	<0.0001
Age <sup>2</sup> (years)	0.00052	9.13	<0.0001
Health Care Card	1.056	14.43	<0.0001
Number of chronic conditions	1.061	38.82	<0.0001

Patient Indigenous status, patient relative advantage/ disadvantage, number of body systems, and patient rurality were removed through backwards elimination



## Multivariate model 2

<b>Parameter (R-Square = 28.40%)</b>	<b>Estimate (Visits)</b>	<b>t-Value</b>	<b>p-Value</b>
Intercept	2.735	40.14	<0.0001
Female (over male)	0.495	11.04	<0.0001
Age (years)	-0.030	-7.52	<0.0001
Age <sup>2</sup> (years)	0.0005	8.59	<0.0001
Health Care Card	1.031	14.06	<0.0001
Number of body systems	0.355	4.75	<0.0001
Number of chronic conditions	0.980	14.75	<0.0001
Atrial fibrillation	0.014	4.79	<0.0001
Peripheral vascular disease	0.009	2.65	0.0082
Hyperlipidaemia	-0.012	-9.59	<0.0001
Hypertension	-0.005	-5.56	<0.0001
Glaucoma	-0.008	-3.07	0.0022
Obesity	-0.006	-4.04	<0.0001
Asthma	-0.003	-2.85	0.0044

## Discussion

Number of individual chronic conditions was the best predictor of GP visit rate

The model that explained the most variance included:

- Patient age

- Patient age<sup>2</sup>

- Sex

- Health care card status

- Number of diagnosed chronic conditions

- Presence/absence of specific chronic conditions

- Number of body systems with chronic conditions

## Discussion

The most parsimonious model included:

Patient age

Patient age<sup>2</sup>

Patient sex

Health care card status

Number of diagnosed chronic conditions

Accounted for 97.1% of the variance explained in the larger model

# Conclusion

The final parsimonious model will assist with GP workforce planning and the proposed trial of capitation payments for patients enrolled in 'Health Care Homes'.





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***BEACH 2015-16***



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THE ROYAL AUSTRALIAN  
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GENERAL PRACTITIONERS



*Thanks to all the  
GPs who  
participated!*

# General practice activity in Australia

2015–16

Family Medicine Research Centre



**Free PDF versions of the BEACH reports  
can be downloaded from**

**[Sydney.edu.au/medicine/fmrc](http://Sydney.edu.au/medicine/fmrc)**

*(go to 'Publications' and select 'Books – General Practice  
series')*

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interrogation**

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# Questions?



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## Limitations

The number of patient visits in our study is largely based on patient recall. There is some evidence that this number has been under-reported in our study.

This would mean that our models will underestimate how often patients attend general practice.

This limitation could be avoided in future studies if we included Medicare claims data linked to participating patients