



# End-of-life care – CMC pilot cost analysis

Final Report

June 2013

# Overview and objectives

## Overview of Coordinate My Care

- Coordinate My Care (CMC) is a new way of managing the treatment of patients who are nearing the end of their lives. As the name suggests, the approach focuses on the coordination of multiple providers. This improves the efficiency of delivery and ensures a more integrated experience for the patient.
- CMC promotes choice for patients. In particular, the location of place of death is important for patients. The majority of patients in the UK die in hospital, and yet this is the location least preferred by patients.<sup>1</sup> Treating patients in their homes, rather than in hospital, may also lead to a reduction in usage of costly NHS-funded services.
- CMC has been piloted in Sutton and Merton, and is being rolled out to the rest of London for one year. The CMC project team are keen to establish whether CMC patients are using fewer unnecessary services than non-CMC patients, and the size of any financial savings which may be created as a consequence.

## Objectives of this project

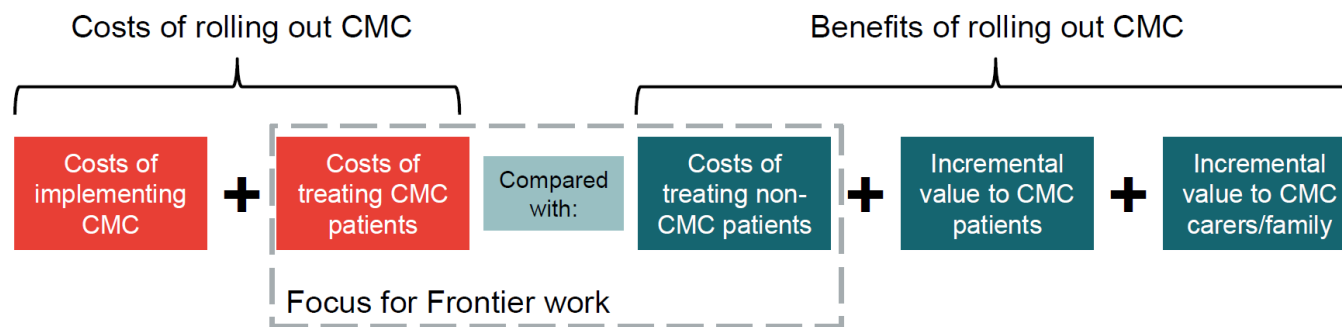
- This short piece of work by Frontier is intended to test whether CMC patients have used fewer unnecessary services than non-CMC patients, and to estimate the cost of these services.
- These results will be used to inform the CMC project team in discussions with local commissioners (including NHS London) and the Department of Health, and to inform journal articles reporting back on the success of CMC.

The **majority** of patients in the UK die in hospital, and yet this is the location **least preferred** by patients

# Project scope and approach

## Scope

- A full assessment of the impact of the CMC pilot would require consideration of all the costs and all the benefits associated with CMC. This includes non-financial benefits, such as the value to patients from experiencing greater choice and a more efficient, integrated service. This also includes the costs of the CMC pilot itself, for example implementation costs (e.g. purchase of IT systems or training staff to use these systems).
- This project considered only the costs of NHS services used by CMC and non-CMC patients.



## Approach

- The CMC project team collected data on usage of services – by a sample of CMC and non-CMC patients – in five main categories: A&E, hospital inpatient care, General Practice, community services and hospice care (including Hospice At Home).
- Frontier supplemented this data with additional information on the costs of providing different NHS services. This information was drawn primarily from public sources.
- Frontier combined the activity and cost data and modelled the total costs of treating CMC and non-CMC patients.

# Summary findings

## Activity

- As expected, CMC patients make **less use of hospital, emergency and unplanned care**. For example, The average number of hospital inpatient attendances is 1.7 for CMC patients and 2.3-2.6 for non-CMC patients.
- CMC patients also make **greater use of community services**. For example, CMC patients have approximately 15.5 GP surgery encounters compared with 10.0-10.4 for non-CMC patients.

## Cost

- The per-patient cost of hospital, emergency and unplanned care is £2,324-2,467 lower for CMC patients compared with non-CMC patients. The cost of community services is £365-974 higher.
- The net impact is that average treatment costs for CMC patients are £1,350-2,102 lower than for non-CMC patients.

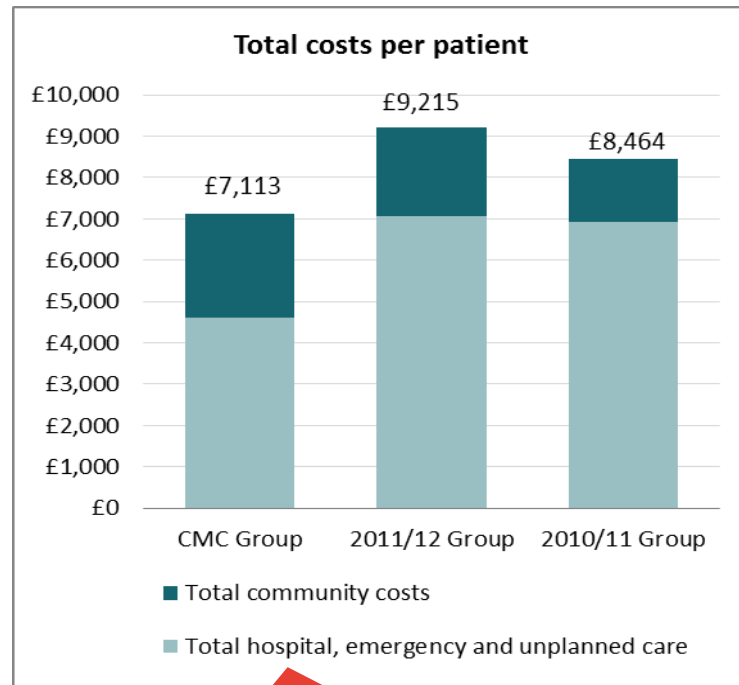
## Financial savings

- These figures do not necessarily represent the savings that would be realised by treating more patients using CMC.
- That depends on the extent to which costs are variable at a local level; for example, whether the local hospital is
  - able to reduce its cost base in response to a reduction in demand; and
  - whether it chooses to do so, rather than (say) choosing to use additional capacity to serve other patients.

Average cost of treating CMC patients is  
**£2,102** lower than non-CMC patients

# Total costs per patient are lower in the CMC group

- The chart below shows total costs per patient in the CMC group and in the two control groups, by activity type:
  - Hospital, emergency and unplanned care costs include the cost of A&E attendances, hospital admissions, GP out-of-hours, and ambulance services
  - Community costs include all other types of activity



As a consequence of increased community usage by CMC patients, community-level costs per patient were lower in the control groups...

... while the cost of hospital, unplanned and emergency treatment per patient was higher for non-CMC patients

Net effect: lower total costs per patient with CMC

# Structure of the analysis

- Our analysis was developed in three stages, illustrated below:



- In the first stage, we analysed the activity data provided by the CMC project team:
  - 3 groups of patients
  - Group 1: 83 patients who have been on CMC for a time ranging from 1 to 456 days, who died in 2011-12
    - The mean number of days on CMC is 66; the median is 28;
    - The standard deviation is 97; the middle 50% of the patients by days on CMC were on it for a period between 7.5 and 76.5 days.
  - Two “control” groups:
    - 75 patients not on CMC who died in 2011/12 (Group 2)
    - 75 patients not on CMC who died in 2010/11 (Group 3)

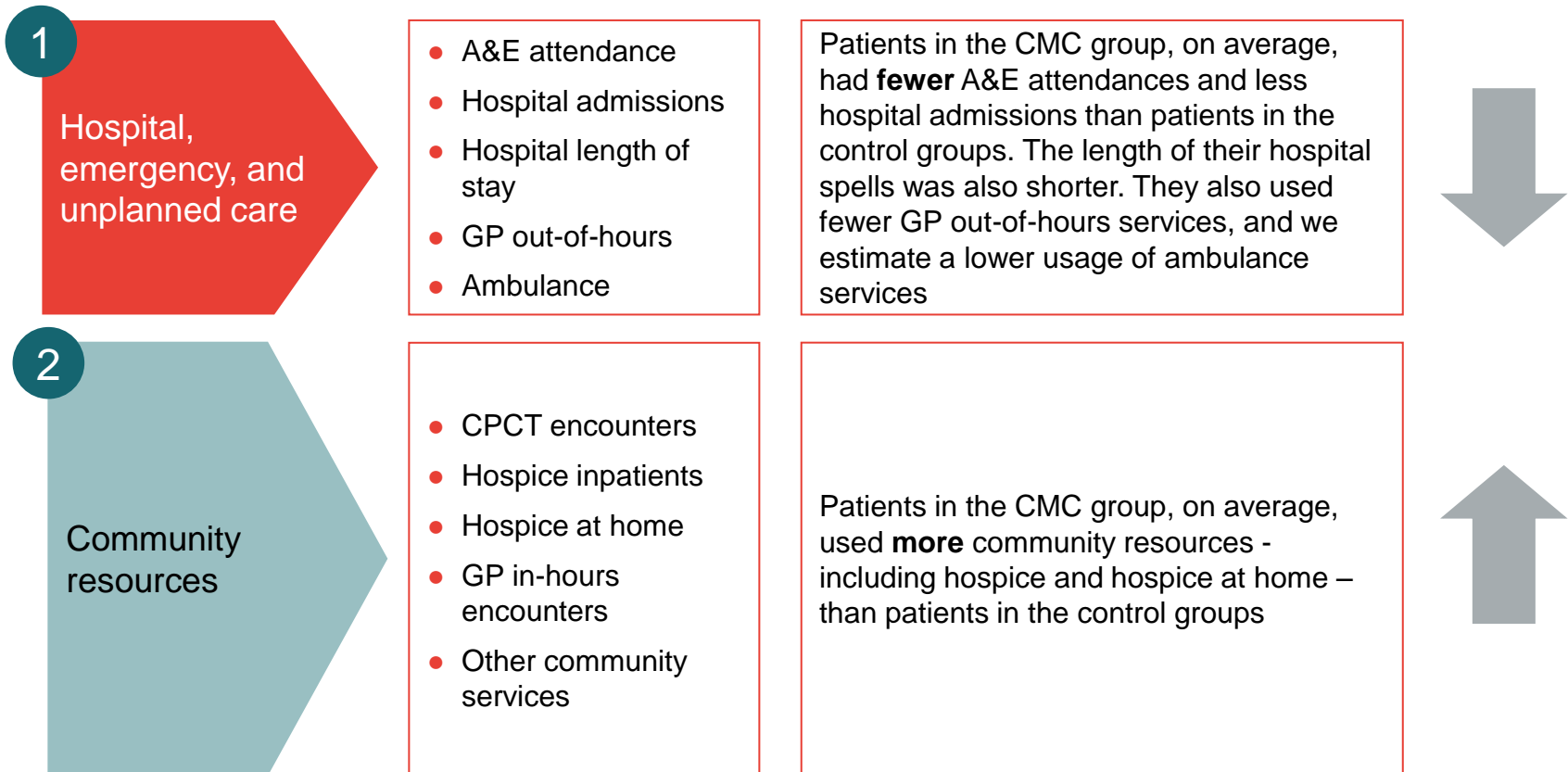
# Summary information on the three groups

- The CMC project team provided data on three groups, as described on the previous slide
- The table below shows the comparison between the groups on:
  - age of individuals;
  - gender of individuals; and
  - place of death
- CMC patients were marginally older on average
- The proportion of males was marginally lower in the CMC group

	Obs.	Age		Gen- der	Place of death					
		Mean	St Dev	% of males	Care home	Home	Hosp- ice	Hosp- ital	Other	Unkn- own
CMC patients	83	85.0	7.5	36%	31	17	14	18	1	2
2011/12 control group	75	81.7	8.7	43%	27	14	17	17	0	0
2010/11 control group	75	83.7	7.9	41%	28	14	13	20	0	0

# Main findings from activity data

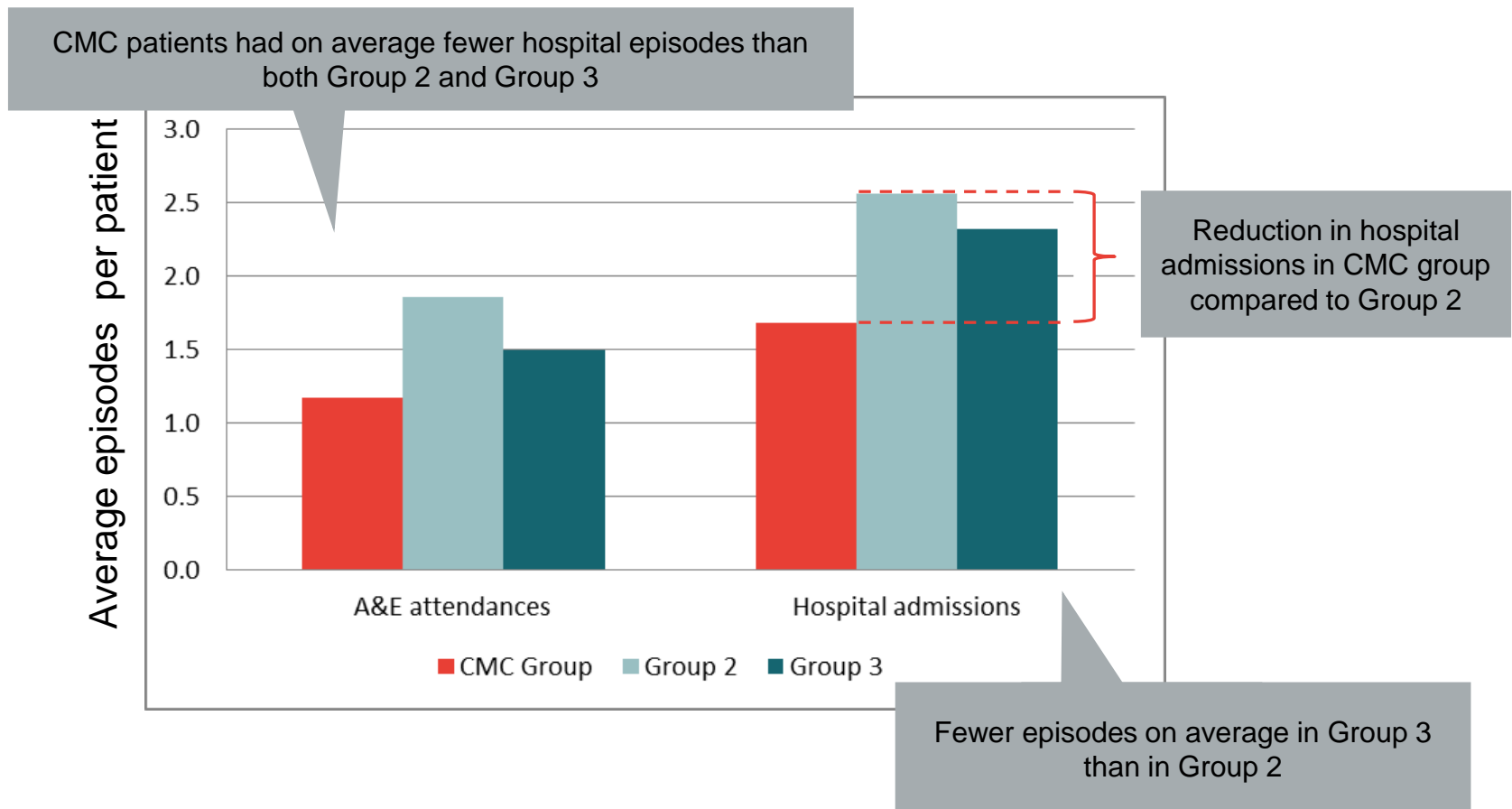
- We compared the usage of a range of services by CMC and control group patients





# 1 Lower usage of hospital resources by the CMC group

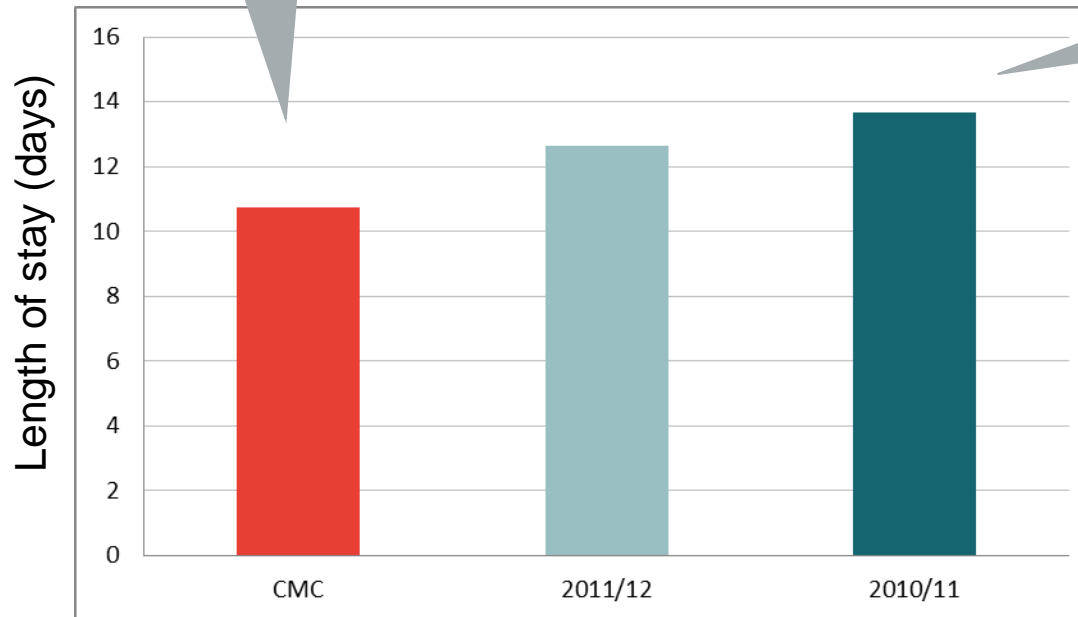
- This chart shows the average number of A&E and hospital episodes per patient in the three groups



# 1 Shorter average hospital length of stay in the CMC group

- This chart shows the average length of the hospital spells of patients in each of the three groups

Patients on CMC who had at least one hospital admissions stayed in hospital, on average, 10.7 days

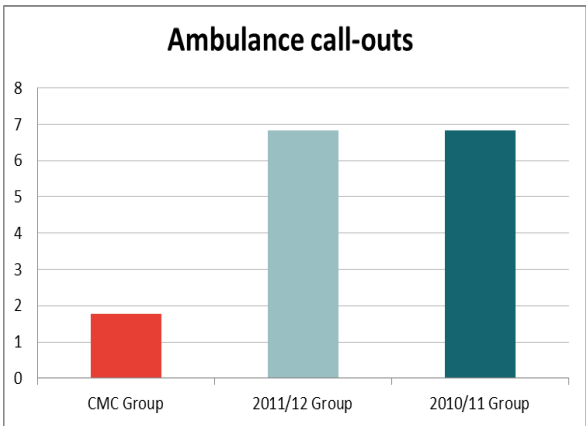
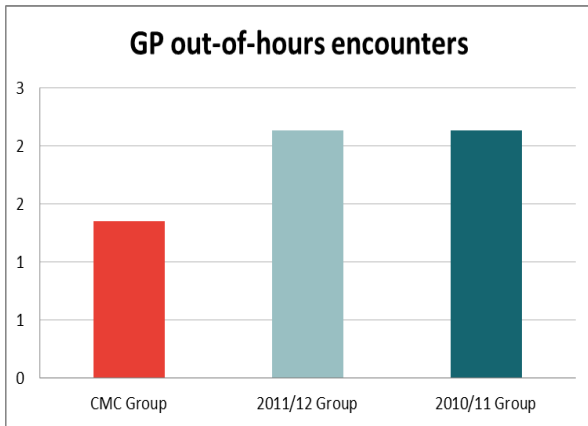
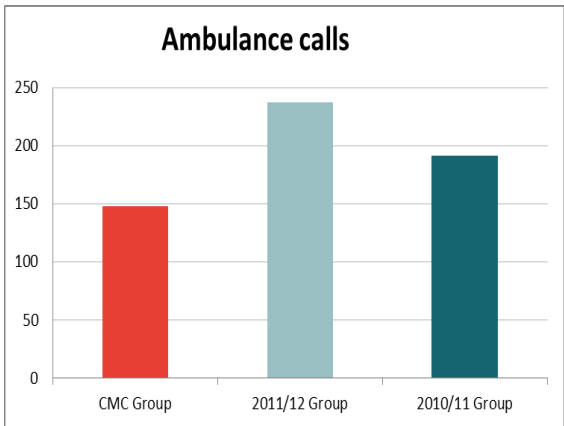


Hospital stays of patients in the 2011/12 control group were on average, approximately 2 days longer, at 12.6 days

Patients in the 2010/11 control group had the longest hospital spells, 13.7 days on average

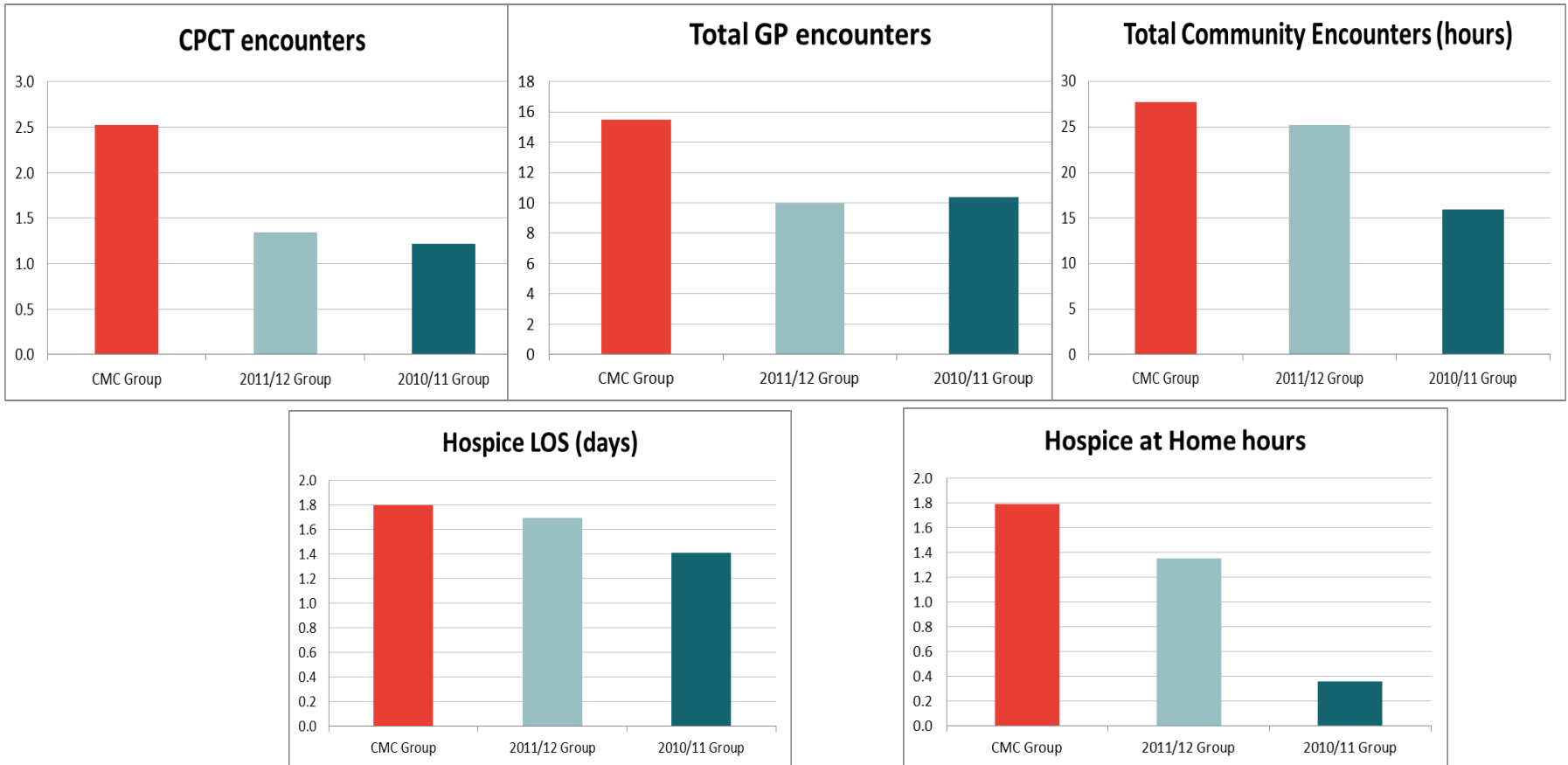
# 1 Lower usage of other unplanned and emergency care in CMC group

- For both ambulance and GP out-of-hours services, the average usage per patient is lower in the CMC group than in each of the two control groups
- Note that:
  - ambulance usage in the control groups was estimated using usage per A&E attendances in the CMC group and applying that proportion to A&E attendances in the control groups
  - GP out-of-hours usage in 2010/11 was assumed to be equal to usage in 2011/12



## 2 Higher usage of community resources by the CMC group

- For each of the types of non-hospital activity, the average usage per patient is higher in the CMC group than in each of the two control groups, with the exception of GP out-of-hours.



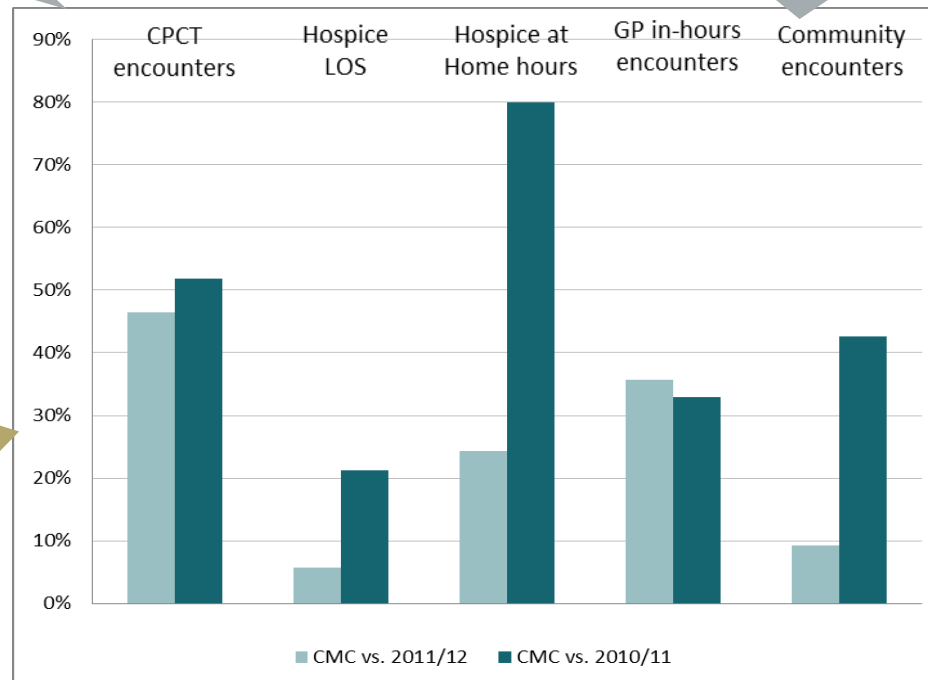
## 2 Variation in the usage of community resources

- The chart below shows, for different types of non-hospital activity, the percentage difference between usage per patient in the CMC group and in each of the two control groups (lower)

The size of the difference varies across types of activity and between the two control groups...

... for example, the average community encounters per patient in the CMC group is only 9% higher than in Group 2, but ~43% higher than in Group 3

There is a large difference in Hospice at home usage between CMC and the 2010/11 control group because the service was only rolled out fully in 2011/12



# Statistical significance of variations in activity

- We tested the observed differences in service usage for statistical significance.
- We found that **most of the differences were significant** at the 5% level.
- Notable exceptions include the use of hospice and hospice-at-home services, and GP out-of-hours usage.
- In the case of GP out-of-hours, we found that a sample size of around 225 would provide statistically significant results – assuming the same differences in average usage were observed among this larger sample.

Activity type	CMC			Statistically significant difference at 5% level	
	Observations	Mean	Variance	vs 2011/12?	vs 2010/11?
A&E attendances	83	1.2	1.3	Yes	Yes
Hospital admissions	83	1.7	5.6	Yes	Yes
Hospital inpatient days	83	12.5	271.4	Yes	Yes
Hospital length of stay	61	10.7	142.2	No	No
Ambulance journeys	83	0.4	1.3		
CPCT encounters	83	2.5	35.2	Yes	Yes
Hospice length-of-stay	83	1.8	29.7	No	No
Hospice at home (hours)	83	1.8	23.2	No	Yes
GP in-hours (encounters)	45	15.5	82.8	Yes	Yes
GP out-of-hours (encounters)	83	1.3	3.2	No	No
Community services (minutes)	73	1,664	8,631,417	No	Yes

# Costing this activity requires two steps...



- Step 1: Collection of unit cost data:
  - From the CMC project team
  - The 2010/11 Unit Costs of Health and Social Care research (PSSRU)
  - NHS Reference costs
- Step 2: Matching of the cost data to the activity data:
  - Research on GP consultation length
  - Estimates of ambulance usage in the control groups

## A&E attendances and Hospital admissions

- Data from Secondary Use Services reported, for each patient, the total cost of the A&E attendances and Hospital admissions based on tariff price

## Community resources

- PSSRU includes unit cost data for each type of community-based staff

## GP (in-hours and out-of-hours) and CPCT episodes

- The activity data reported the number of encounters, while unit cost data is reported as costs per hour
- We have estimated the average length of each type of encounter

## Ambulance

- Cost per call-out: we have used the national average from the 2010/11 NHS Reference Costs
- Cost per call: no specific data available – we have used the cost of a call to a Healthcare assistant in a GP practice as a proxy
- Data on ambulance usage was available for CMC patients only. We have estimated usage of ambulance in the control groups.

## Hospice

- Due to the lack of national data, we have used the daily cost of specialist inpatient palliative care in hospital from PSSRU, which reports a lower, average, and upper estimate.

We have also analysed the sensitivity of the results to the estimation approaches on GP, ambulance, and hospice costs – presented later in this report



# Unit costs per type of resource

Activity  
analysis

Costing

Cost  
analysis

Type of care	Total cost per unit	“Staff” overheads (per year)	Non-staff overheads (per year)	Capital overheads (per year)	Source
A&E attendance	Average across all patients: £108 per attendance, ranging from £0 to £220	-	-	-	Secondary Use Services
Hospital admission	Average cost per day of stay across all patients: £537, ranging from £0 to £4,677	-	-	-	Secondary Use Services
Community Palliative Care Team	£70 per encounter	-	-	-	CMC team
Hospice	£258 to £592 per day	-	-	-	PSSRU
Hospice at home	£28 per hour	-	-	-	CMC team
General Practitioner	£118 per hour	£34,467	£21,020	£13,706	Personal Social Services Research Unit – Unit Costs of Health and Social Care 2011
Nurse (GP) – Band 5	£39 per hour	£ 0	£16,021	£5,414	
Admin-3	£30 per hour				
Band 5 staff: Admin, Dietitian, Occupational therapist, Physiotherapist, Speech and language therapist	£35 per hour				
Band 6 staff: Admin, Dietitian, Occupational therapist, Physiotherapist, Speech and language therapist, Podiatrist	£42 per hour	£5,330 to £5,358	£11,670 to £11,782	£3,598	
Band 7 staff: types included in Band 6 staff, plus specialist Physiotherapist and specialist Dietitian	£51 per hour				
ESP - Band 8a	£56 per hour				
Student - physiotherapist	£13 per hour				
HCA – nurse – Band 2	£22 per hour				
HCA – nurse – Band 3	£24 per hour				
HCA – podiatrist – Band 3	£25 per hour				
HCA – rehab – Band 3	£25 per hour				
HCA – rehab - Band 4	£27 per hour				
HCA – therapist – Band 3	£25 per hour				
Nurse - Band 5	£40 per hour	£7,756 per year	£16,892	£3,087	
Nurse - Band 6	£48 per hour				
Nurse - Band 7	£56 per hour				
Nurse – Band 8c	£66 per hour	£9,257 per year	£20,162	£4,745	

- The 2006/07 GP Workload Survey estimated at 11.7 the average length of a GP consultation – unlikely to be representative of an end-of-life visit
- We have used data from Deveugele et al. (2002)<sup>1</sup>: a surgery visit by a GP at the top end of the distribution of length is 18.8 minutes long
- We have used the proportions from PSSRU to obtain estimates of the length of a home visit, and of a phone call

Length per consultation type (minutes)

	Surgery	Telephone	Home visit
General Practitioner	18.8	11.4	18.8 (+12 travel time)
Nurse	15	6	25

	Cost per surgery consultation	Cost per telephone consultation	Cost per home visit
General Practitioner	£ 37	£ 22	£ 62
Nurse	£ 10	£ 4	£ 16

<sup>1</sup>Deveugele et al.(2002), *Consultation length in general practice: cross sectional study in six European countries*, BMJ, 2002 August 31

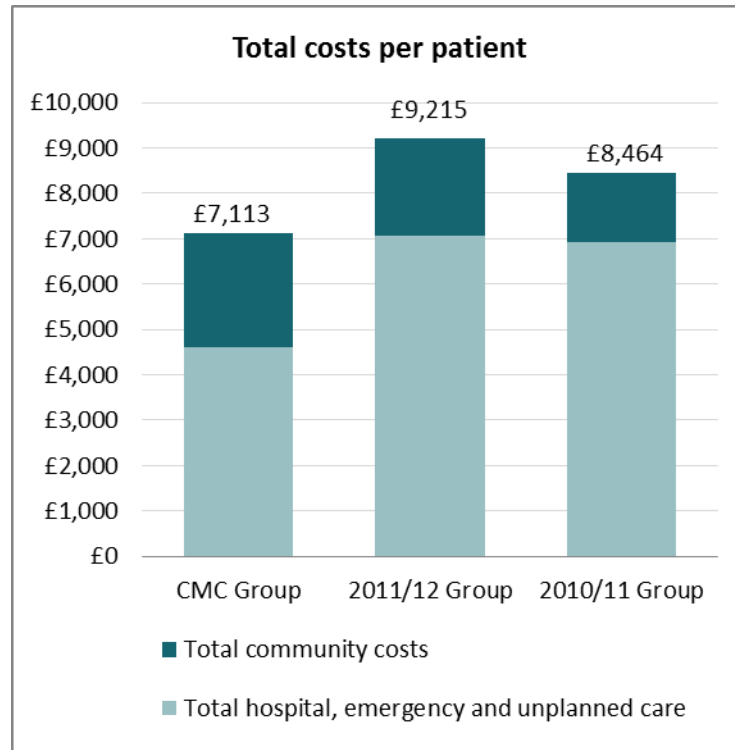
# Total cost estimates were obtained by combining the activity and unit cost data...



- Based upon the differences in activity identified, and the unit costs of service usage presented above, we estimated total costs of treating CMC and non-CMC patients

# Total costs in the CMC group are lower than in both control groups

- This chart shows, for each of the three groups, the total cost per patient across all of the activity types



**Lower costs in the CMC group:**

vs 2010/11 control

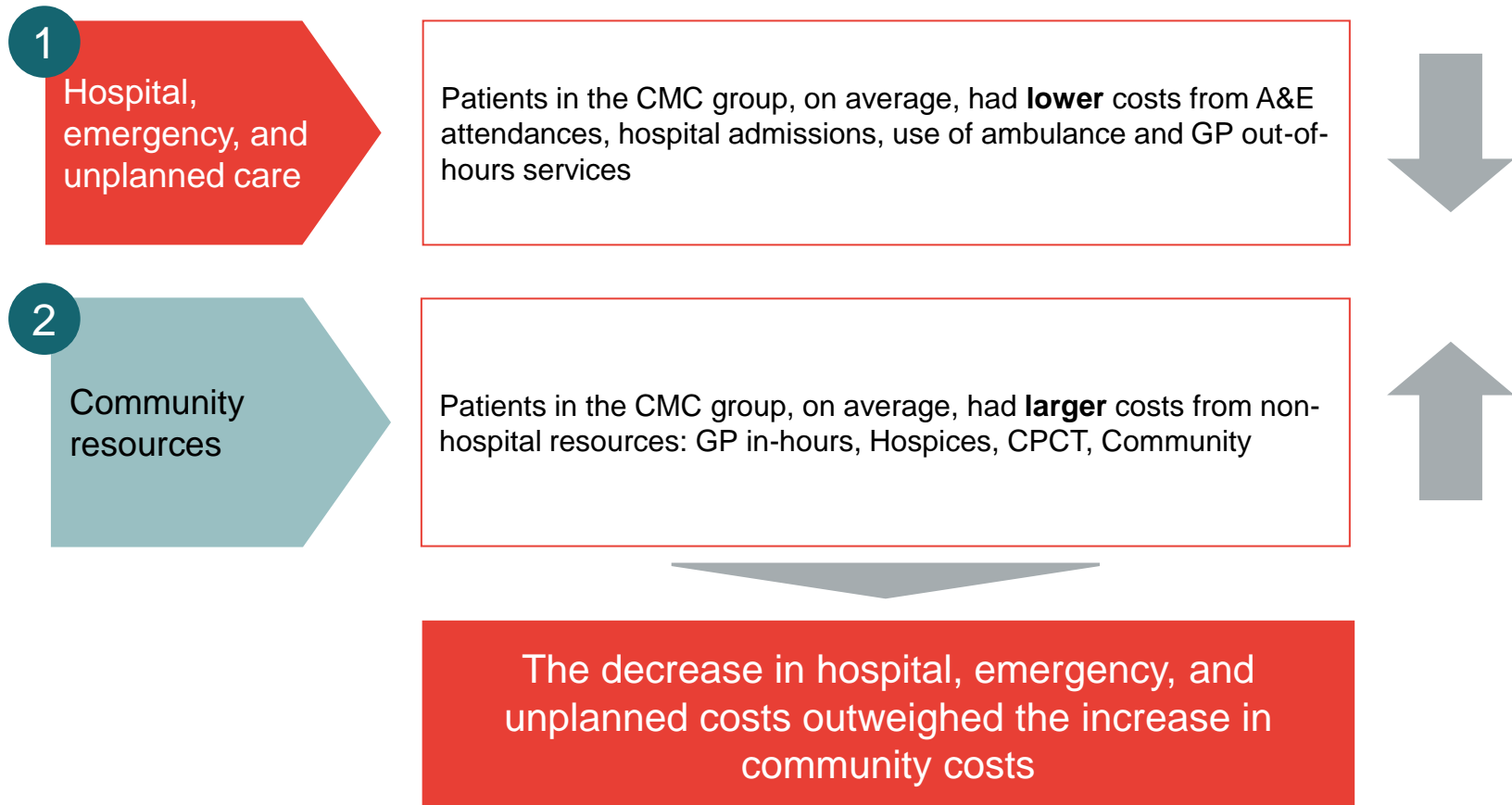
£ 1,350

vs 2011/12 control

£ 2,102

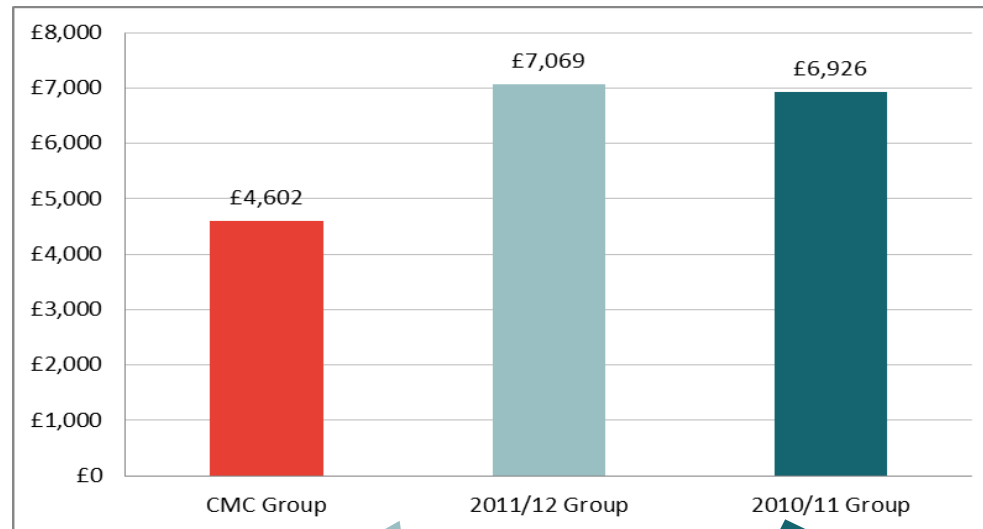
Note: financial savings arising in the CMC group compared to the control groups may differ from the total cost reduction. The amount of savings will in fact depend on the extent to which costs are fixed – see slide 26 for a detailed discussion

# The overall cost reduction is the result of two elements



# Total hospital, unplanned, and emergency care costs per patient

- This chart shows, for each of the three groups, the total cost per patient from A&E attendances, hospital admissions, GP out-of-hours and ambulance usage



**Decrease in Hospital, unplanned, and emergency costs In the CMC group**

vs 2011/12 control

**£ 2,467**

A&E: £71  
 Hospital admissions: £ 2,225  
 GP out-of-hours: £ 25  
 Ambulance calls: £ 89  
 Ambulance call-outs: £ 56

vs 2010/11 control

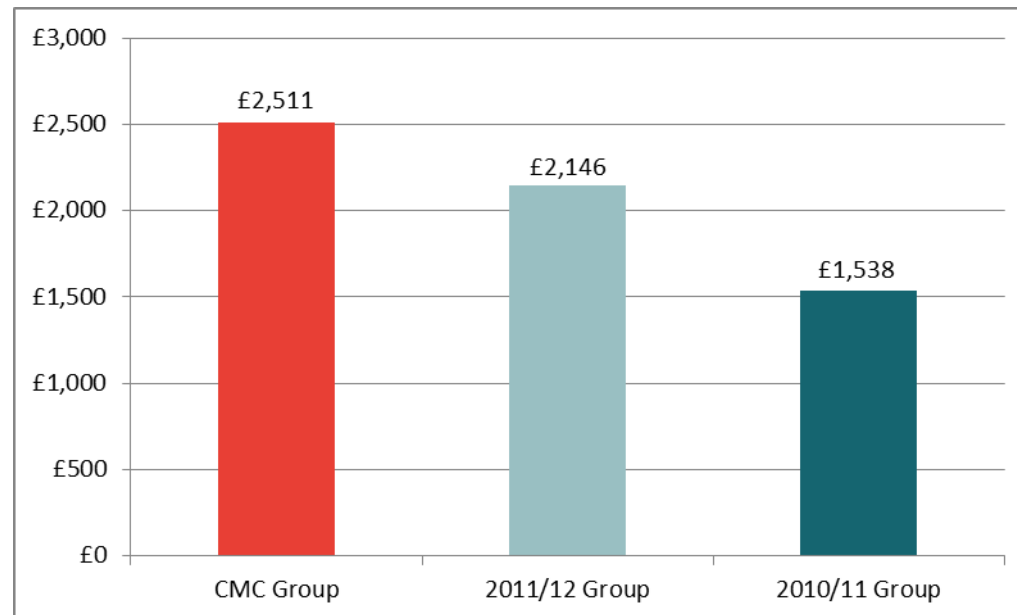
**£ 2,324**

A&E: - £25  
 Hospital admissions: £ 2,253  
 GP out-of-hours: £ 25  
 Ambulance calls: £ 43  
 Ambulance call-outs: £ 27

This negative number indicates that A&E costs were £25 higher in the CMC group compared to the 2010/11 control

# Total community costs per patient

- This chart shows, for each of the three groups, the total cost per patient of all treatment at the community level, including in hospices, hospice-at-home, CPCT, GP in-hours, and other Community encounters



**Increase in  
community costs in  
the CMC group**

vs 2011/12 control

**£ 365**

vs 2010/11 control

**£ 974**

Note: see next slide for a breakdown by different types of community care

# Community costs by type of activity

- The table below shows the difference in costs per-patient between CMC and each of the two control groups, for each of the types of community activity

	Difference between CMC and 2011/12 control	Difference between CMC and 2010/11 control
Hospice	£ 60	£ 226
Hospice at home	£12	£ 40
Other community	£ 138	£ 511
GP in-hours	£ 73	£ 105
CPCT	£ 82	£ 91

Community and Hospice are the two types of resource that have led to the greatest cost increase in the CMC group



# Financial savings depend on the proportion of fixed costs

- We have estimated lower costs for treating CMC patients. However this does not necessarily imply that switching patients to CMC would reduce financial costs, for three reasons:
  - First, some costs are “fixed” (e.g. overheads are charged independently of the number of patients)
  - Second, some costs are “stepped” only saved if the decline in activity is sufficient (e.g. patient numbers fall by enough that an entire ward could be closed)
  - Third, it is up to local providers and commissioners to decide whether any increase in spare capacity is used to reduce costs or to increase activity in other services

“Maximum impact” for CMC: If hospital, unplanned and emergency costs are entirely variable, and community costs entirely fixed, then the entire decrease in hospital, unplanned and emergency costs from CMC is realised as a financial saving, and none of the increase in community costs from CMC lead to an increase in expenditure

		Hospital, unplanned, and emergency costs		
		100% variable	75% variable	0% variable
Community costs	0% variable	£ 2,467	£ 1,850	£ 0
	75% variable	£ 2,193	£ 1,576	- £ 274
	100% variable	£ 2,102	£ 1,485	- £ 365

“Worst case scenario” for CMC: If hospital, unplanned and emergency costs are not variable, and community costs are entirely variable, no savings in hospital costs are realised, while the entire increase in community costs lead to an increase in expenditure

# Sensitivity analysis

- We varied a number of input assumptions, to illustrate the impact on the final results
- All results below show **the amount by which CMC costs are lower** than the 2011/12 group.
- **Using our baseline assumptions, total CMC costs are £2,093 lower.** Using the alternative input assumptions below, this difference in costs may be greater or smaller than this benchmark.
- The rightmost column in the table below show how the difference between CMC and the 2011/12 control group would change if we applied the alternative assumption rather than the one used in the base case

	Base case assumption	Alternative assumption	Estimate for CMC costs vs. 2011/12 control (baseline = £2,102)	Impact of assumption
Hospice costs	£592 (Upper quartile of national distribution)	£448 (national average)	CMC £2,117 lower	£15 increase
		£258 (lower quartile of national distribution)	CMC £2,136 lower	£34 increase
GP consultation length (in surgery)	18.8 mins (Deveugele et al. 2002 average plus two standard deviations)	14.1 mins (Deveugele et al. 2002 average plus 1s.d.)	CMC £2,109 lower	£7 increase
		11.7 mins (GP 2006/07 workload survey)	CMC £2,113 lower	£11 increase
Ambulance trips per non-CMC patient	1.99 trips (proportional to A&E attendances)	1.94 trips (proportional to hospital admissions)	CMC £2,092 lower	£10 decrease

- Annex:  
Assumptions

# Note: our approach takes into account both variable and fixed costs of providing care

- “Fully allocated” cost:
  - PSSRU cost figures include overheads, capital and non-capital
- Hospital data is from SUS – based on PbR cost, which is comprehensive of the entire economic cost borne by the provider
- Caveats:
  - The most recent PRSSU data available is from 2010/11, whereas hospital costs for CMC and one of the control groups are from 2011/12
  - Limited information on the length of GP consultations – reviewed with the contribution of the CMC team
  - Limited information on overheads for AHPs of bands higher than 5 – this affects our estimates if overheads are different for AHPs with different pay
  - Lack of data on ambulance usage
    - We have combined the information on ambulance and hospital usage in the CMC group with information on hospital usage in the control groups to estimate how many ambulance calls and trips occurred in the control groups
    - For example, if in the CMC group there were 80 ambulance trips per 100 A&E admissions, and in the control group there were 200 A&E admissions, we estimate 160 ambulance trips in the control group

# Assumptions – Overarching issues

1

Type of staff/resource	Why is a decision needed?	Solution
<p>All community and GP resources (that is, all resources but for hospital, A&amp;E, CPCT, hospice, hospice at home, and ambulance</p>	<p>PSSRU estimates national average costs, whereas the activity on which data was collected by the CMC team was within London</p>	<p>We have adjusted the London multipliers included in the PSSRU research to reflect the fact that costs in Sutton and Merton are at an intermediate level between London and non-London costs. To do this, we have looked at the Market Forces Factor indexes for 2010/11 (for consistency with PSSRU). In that year, the index for the Sutton and Merton PCT was 1.08; the average index across London PCTs was 1.105.</p>

# Assumptions – Community resources

Type of staff/resource	Why is a decision needed?	Solution
2 Dietitian – bands 5, 6, and 7	PSSRU only includes data on hospital-based dietitians	We have obtained the cost of a community-based dietitian as the sum of salary and oncosts of the relevant pay band and the overheads estimated by PSSRU for a physiotherapist
3 Specialist physiotherapist, specialist dietitian	PSSRU does not distinguish “specialist” and “non-specialist” AHPs	The costs of a band 7 specialist physiotherapist and a band 7 specialist dietitian are equal to the “generic” band 7 physiotherapist and dietitian costs
4 Extendend Scope Practitioner – Band 8a	No specific data on Extended Scope Practitioners in PSSRU	The costs is obtained adding salary and oncosts of a band 8a professional to the overheads of a physiotherapist.

# Assumptions – Community resources

Type of staff/resource	Why is a decision needed?	Solution
<p>5</p> <p>Physiotherapist, Occupational therapist, Speech and language therapist, Podiatrist – Bands 6 and 7</p>	<p>PSSRU provides cost data for these types only for Band 5 staff</p>	<p>We have estimated the cost of Bands 6 and 7 staff by adding the PSSRU estimates of fixed costs for Band 5 staff to the salaries and salary oncosts of Band 6 and Band 7 staff. We recognise that this would lead to underestimating community costs if overheads are higher for staff on higher pay bands.</p>
<p>6</p> <p>Student physiotherapist</p>	<p>No specific data on student physiotherapist in PSSRU</p>	<p>We have used the fixed costs attached to a Band 5 physiotherapist, and no salary (and salary oncosts)</p>
<p>7</p> <p>CPCT encounters</p>	<p>Length of encounter needed to match cost per hour to consultation-level activity data</p>	<p>We have used PSSRU data to obtain the time spent each day on patient-related tasks by community nurses. Using an average number of 4 visits per day, estimated locally in Sutton and Merton, we have obtained the average length of a CPCT encounter.</p>

# Assumptions – GP resources

Type of staff/resource	Why is a decision needed?	Solution
<p>8</p> <p>GP staff – “other”</p>	<p>PSSRU only considers explicitly Nurses and General Practitioners in the “GP” data section</p>	<p>We have used salary and oncosts relevant for a Band 3 professional, and the overheads and working times estimated by PSSRU for a nurse in a GP practice</p>
<p>9</p> <p>GPs</p>	<p>Length of each type of consultation (visit in surgery, visit at home, telephone call) needed to match cost per hour to consultation-level activity data</p>	<p>We have combined information from the <i>2006/07 UK General Practice Workload Survey</i> and Deveugele et al. (2002) – we estimate the length of an end-of-life surgery visit at 18.8 minutes, of a home visit at 30.8 minutes, of a phone call at 11.4 minutes. On slide 36, we have analysed how results would have changed if we had used different consultation lengths.</p>
<p>10</p> <p>Nurses in GP practices</p>	<p>Length of each type of consultation (visit in surgery, visit at home, telephone call) needed to match cost per hour to consultation-level activity data</p>	<p>Using data from a 2007 survey of nurses working in primary care, according to which average times are: 15 minutes for a visit in the surgery, 6 for a phone call, 25 (including travel time) for a home visit</p>



# Assumptions – GP resources

Type of staff/resource	Why is a decision needed?	Solution
11 GPs	PSSRU includes an estimate of the yearly cost of providing out-of-hours to the total cost of a GP	We have excluded this (which amounts to ~5% of the total cost) from the costing of in-hours GP services
12 Out of hours GP	PSSRU does not distinguish explicitly in-hours and out-of-hours GP costs	We have used the same hourly costs as non-out-of-hours.
13 Out of hours GP	The activity data records the type of “consultation”, but not the type of staff (i.e. GP versus Nurse versus other)	We have always used the hourly cost of a General Practitioner
14 Out of hours GP	At the moment, we do not have data on usage by patients in the 2010/11 control group	We have assumed that out-of-hours usage in 2010/11 was identical to usage in 2011/12

# Assumptions – Ambulance services

Type of staff/resource	Why is a decision needed?	Solution
15 Ambulance	We have no data on ambulance usage by patients in the control groups	<p>We have computed the ratio of ambulance calls and ambulance trips per A&amp;E episode in the CMC group, and multiplied this by the number of A&amp;E episodes in the control groups to estimate the number of ambulance calls and trips in those two groups.</p> <p>An alternative solution is using the number of hospital attendances as a proxy for the number of ambulance trips. In slide 36, we have provided an analysis of the impact on the results of adopting this alternative method.</p>
16 Ambulance	At the moment, no specific data on the cost of a call	Using the cost of a call to HCA/reception staff in a GP surgery



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