PSSRU

Evaluating Active Case Management in Greater Manchester

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EVALUATING ACTIVE CASE MANAGEMENT IN GREATER MANCHESTER

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GLOSSARY

ACM	Active Case Management
PCT	Primary Care Trust
GP	General Practitioner
PSSRU	Personal Social Services Research Unit
TIS	Tactical Information Service
SAP	Single Assessment Process
PARR	Patient at Risk of Re-hospitalisation
APN	Advanced Primary Nurses
COPD	Chronic Obstructive Pulmonary Disease
CHD	Coronary Heart Disease
ICD 10	International Classification of Diseases (10th Revision)
PSA	Public Service Agreement
EPIC	Eldercare Project in Cornwall
HES	Hospital Episode Statistic
A&E	Accident and Emergency
SCIE	Social Care Institute for Excellence
CDS	Commissioning Data Set
SPSS	Statistical Package for the Social Sciences
ANCOVA	Analysis of Covariance
VHIU	Very High Intensity Users
MDT	Multi-Disciplinary Team

PREFACE

This report relates to the findings of the evaluation of the developing Active Case Management (ACM) service in Greater Manchester and evidence of the impact upon service utilisation of patient characteristics and different approaches to the organisation of this service. It has several components:

- an executive summary;
- a literature review;
- information on the nature of service models;
- data on patterns of service utilisation; and
- information on the relationship between case management arrangements, patient needs and service outcomes.

The completion of this report has been a team effort. Jane Hughes and Jessica Abell were responsible for writing the literature review. They were also responsible for reporting questionnaire data from the 10 Primary Care Trusts (PCTs). Kathryn Berzins and Jessica Abell undertook interviews with managers of the ACM service in PCTs and wrote up this material. Together these comprise part one of the findings reported in chapter 3 of this report. Siobhan Reilly and Jessica Abell liaised with colleagues in the Tactical Information Service and PCTs on a day-to-day basis to oversee data collection on patient characteristics and service use and were responsible for the management of the data within the PSSRU at the University of Manchester. They were responsible for the analyses and reporting of the data in parts two and three of chapter 3. Christian Brand undertook the final analyses and also contributed to the reporting of this chapter. We are also grateful to Professor Graham Dunn for his advice in the analyses.

A key element of this study has been undertaken linking our collection of primary data from PCTs with routine data collected through the day to day operation of services. This would not have been possible without generous assistance of John McGovern and colleagues in the Tactical Information Service. We are also very grateful to staff within the PCTs for their participation in this study.

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EXECUTIVE SUMMARY

Recent policy guidance from the Department of Health in England recommends that patients with long term conditions are stratified into three broad groups according to the severity of their condition and the level of support which they require. It is expected that those patients whose health and social needs are most complex will require case management to deliver and coordinate their care from a range of agencies. NHS case management has the broad aim of identifying these patients and actively managing their care to enable them to remain at home longer and use less unplanned reactive care from specialist services. This approach, known in Greater Manchester as active case management (ACM), is expected to contribute significantly to delivering the Public Service Agreement target of reducing bed days by five per cent by 2008.

The Personal Social Services Research Unit was funded by the Department of Health to investigate whether service utilisation outcomes can be attributed to and are associated with different approaches to ACM for people with long term conditions. The evaluation was undertaken in conjunction with the Association of Primary Care Trusts in Greater Manchester and was designed to:

1. Map current provision of ACM services in primary care for people with long term conditions;
2. Classify programmes on observable features of case management implementation with particular focus upon the integration of care between primary and secondary care and between health and social care;
3. Explore the overall ACM intervention effect on service utilisation;
4. Examine whether different service outcomes are associated with different approaches, specific programme operations or processes of service delivery.

Method

There were three stages to the study. Stage one comprised a postal survey (Spring / Summer 2007) of managers with lead responsibility for ACM services in each PCT (n=10). Stage two comprised in-depth interviews (Summer 2007) with managers in PCTs (n=8) to further explore the particular local logics and rationales for the set of case management arrangements in place in each PCT. In the final stage of the study resource utilisation outcome data for patients with long term conditions in receipt of case management were tracked through data held by the Tactical Information Service (TIS). Individual patient level data were transferred to the PSSRU in a pseudonymised format. The main analysis was conducted using a sample of patients in receipt of ACM services for whom, at the time of the TIS data extraction, nine months or more had lapsed since they were added to the caseload (n=867). The dates these patients had been added to ACM caseloads ranged from 1st July 2005 to 1st October 2006.

Findings

Service description

- The ten PCTs in Greater Manchester compared favourably on a number of Health Care Commission national indicators relating to case management and improving the health of people with long term conditions.
- The date the first patient was accepted into each ACM service ranged from the first six months of 2005 to the first six months of 2006 for the ten PCTs.
- The majority of PCTs were based on a GP practice locality model and had worked to establish links with GPs. The most commonly established formal agreements were between ACM and community nursing. The majority of PCTs had formal arrangements for sharing assessment documents within the Single Assessment Process with local authorities. By comparison, formal links between secondary care and ACM were much slower to develop.
- Only four of the PCTs targeted their ACM service at a specific disease or condition. These included Chronic Obstructive Pulmonary Disease, Diabetes, Hypertension, Cancer, Coronary Heart Disease, Stroke and Transient Ischaemic Attack and Musculoskeletal Conditions.
- All PCTs used referrals from other professionals to identify patients for the ACM service and the majority also utilised the Castlefields tool and Patient at Risk of Re-hospitalisation II (PARR II). A locally approved Single Assessment Process (SAP) tool to assess ACM patients was used in all PCTs.
- Staff groups most likely to act as case managers were: community matrons, district nurses and other qualified community nurses such as disease specialist nurses. A broad range of tasks were usually carried out by case managers in all PCTs. However, some role conflict for certain staff groups was highlighted e.g., district nurses undertaking a disproportionate amount of 'hands on' or direct care.
- Case managers were managed by health services staff in all PCTs and the majority were based in a nurse team. Case managers did not usually undertake financial assessments or manage budgets for their patients in the ACM service of any of the PCTs.
- Size of caseload, an issue of contention, varied from 30 to 80 (mean 47). Some felt that the target caseload of 80 was unrealistic. Only half of the PCTs' ACM services had written policies to allocate cases of different levels of need or complexity to different levels of case management. The majority of respondents estimated that over 40 per cent of patients on caseloads were visited at least weekly. Several interviewees described cases being stepped down to a 'maintenance level' rather than discharged.

Overall effect of ACM on service utilization

- The proportion of patients from different PCTs in the nine month cohort sample (n=867) varied widely. The analysis is therefore based upon the combined PCT results.
- The majority of ACM patients included in the sample were white (88%), female (63%) and over 75 years of age (65%). Around half of the sample resided in the most deprived area of the locality (49%) (measured by the Index of Multiple Deprivation). The most prevalent primary diagnosis groups were (1) 'symptoms,

signs and abnormal clinical and laboratory findings, not elsewhere classified' (37%), (2) 'diseases of the circulatory system' (28%), (3) 'diseases of the respiratory system' (26%), (4) 'diseases of the digestive system' (19%) and (5) 'injury, poising and certain other consequences of external causes' (18%).

- Overall the average (mean) time for the ACM service to have been operating when a patient was added to a caseload was 10.7 months. Few (10%) ACM cases were recorded as formally closed (with a reason for closure described). Most of these patients had died.
- The use of hospital services in the nine months prior to the ACM intervention and nine months post ACM registration were compared. The mean number of hospital admissions and the mean length of stay for all admissions reduced significantly at the one per cent level. A similar pattern of results were detected in the number of emergency admissions and associated length of stay (mean reduction of 0.3 emergency hospital admissions and 2.9 days in length of stay for emergency admissions).
- The use of hospital services for this sample was also explored by the seven most prevalent primary diagnoses and the nine most prevalent specialties. The majority of the results showed a reduction but due to the small subgroups of the sample (when analysed by diagnosis or specialty) fewer of the findings were significant.

Relationship between service utilisation and service delivery

- Multivariate models were employed to explore the simultaneous effect of diagnosis and features of ACM service provision on admission patterns. Case complexity measured by the number of diagnostic categories present (ICD 10 chapter headings) was associated with a greater number of emergency admissions and greater length of stay.
- A very modest effect was shown with regard to ACM features, suggesting possibly the benefit of good communication between ACM and hospital services. A clustering of effects was observed whereby geographically adjacent PCTs appeared to have reductions or increases in the length of stay related to emergency admissions.
- For each day spent in hospital before ACM, patients are predicted to experience a reduction of nearly one day after ACM. The most powerful predictor of emergency hospital admissions within nine months from being added to an ACM caseload was prior admissions. This is consistent with the attempts to reduce readmissions in patients by focusing on those with prior recent admissions. However, it does not constitute definitive evidence that the reduction is attributable to ACM. This was the premise upon which much of the Long Term Conditions Policy has been founded.
- Conversely, a substantial share of the sample showed an increase in length of stay for emergency admissions. The number of primary and secondary diagnoses (ICD 10 chapter headings) is the main contributor towards explaining increases in length of stay for emergency admissions. Each added diagnostic group is associated with a 2.4 day increase in length of stay, everything else being equal.
- There are methodological limitations in our research design. Any measure of impact of this kind in a non randomised trial risks the effect of regression towards

the mean being the major cause of reduction in both hospital admissions and length of stay.

- Nonetheless, and related to this observation, the number of patients who had no recorded length of stay (as they were admitted and discharged on the same day of an admission), rose in the post nine months period. Thus it could be inferred that the process of preventing admissions was having some effect under case management.

Conclusions

- The commitment and support of all ten primary care trusts in Greater Manchester in undertaking this work has been paramount in completing this study.
- The study provides a benchmark by which progress can be judged and areas for future development can be signposted.
- The Long Term Conditions Policy has worked under a tight set of PSA targets until 2008. Following this target period there would seem to be a need to explore the sustainability of the active case management approach and examine the new roles and levels of staffing required.
- The present study has shed relatively little light on the impact of different approaches to case management upon outcomes, due in part to the relative homogeneity of the ways of working across Greater Manchester.
- The literature would indicate that there is a need for greater clarity about the impact of different case management models and approaches upon outcomes. Articulating these different models and identifying their relative effectiveness and cost is an area where further work is required.

CHAPTER 1: LITERATURE REVIEW

This is a selective review of the literature to inform our knowledge of the development of case management services in primary care in England for patients with complex long term conditions. The review considers the characteristics, related services and outcomes attributed to case management. It is important to note the nature and scope of the literature being reviewed. A variety of approaches have been included, for example systematic reviews and service evaluations and both empirical and narrative studies, to highlight relevant points and guide an understanding of the salient points of case management. The focus is predominantly on developments and arrangements in the United Kingdom (UK). However, international literature has been considered that is particularly relevant to the development or practice of case management in this country. The review is divided into five main sections: policy goals and objectives, service structures; screening and case finding; outcomes for secondary care and links with other services. These have been chosen to link with both aspects of the evaluation: a description of how case management has been implemented in Greater Manchester and its relationship to NHS resource utilisation data in the locality.

Policy goals and objectives

With its origins in North America the development of case management has been the focus of many policy discussions both in the health and social care sectors internationally over a considerable period of time (Applebaum and White, 2000). A debate about its definition has also ensued. Both the terms *care* management and *case* management have been regularly used to describe this practice. However, the debate about the terminology of this care system is not as important as a discussion about the defining characteristics of this service and the 'clarity of meaning' (Challis et al., 1995) which is attached to it. Therefore the emphasis of this section will be how the process of NHS case management has been described and defined in the English policy context, what the key elements of this approach are and how they can be compared to the characteristics of care management as delivered in a social care context.

In England NHS case management, known locally in Greater Manchester as active case management (ACM), has been characterised as 'the active management of high-risk people with complex needs, with case managers (usually nurses) taking responsibility for caseloads working in an integrated care system' (DH, 2004a; b). Introducing a system of case management to manage the care of those with complex long term needs has been identified as the first step in the NHS and social care model for improving the care for people with long term conditions. The role of community matron (case managers with clinical nursing skills) has been specifically developed to undertake the case management function. It has been estimated that there are 250,000 high intensity users in England who require 3,000 community matrons to manage their care (DH, 2005b; 2004b). This approach is expected to contribute significantly to delivering the Public Service Agreement target of reducing bed days by five per cent by 2008 (DH, 2004b).

The NHS and social care model focuses on altering the 'delivery system' of care for a society where long term conditions are anticipated to be prevalent in the future

(DH, 2005a). It builds on an approach suggested in earlier NHS policies and recommends that patients are stratified into three broad groups according to the level of support which they require (DH,2004a; b). These are: supported self care for the majority of the chronic care population; disease/care management for patients who have multiple long term conditions; and case management for those patients who are very high intensity users of unplanned secondary care (DH, 2004a; b; 2005b). Underpinning this model is an emphasis on promoting better health in the population as a whole by providing advice and support about healthy choices. This broader focus on encouraging a healthy lifestyle is based on the premise of the importance of preventing the condition of patients deteriorating and consequently requiring a more intensive level of support (DH, 2004c; 2005a). It is expected that those patients whose health and social needs are most complex will require case management to deliver and coordinate their care from a range of agencies (DH, 2005a). As noted above these patients are believed to be responsible for a disproportionate number of unplanned admissions to hospital (DH, 2004b). NHS case management therefore has the broad aim of identifying very high intensity users of unplanned secondary care and actively managing their care to enable them to remain at home longer and require less unplanned reactive care from specialist services. The wider policy goal of providing people with increased choice about where they receive services and how is also apparent in the NHS and social care model (Cm 6737, 2006; DH, 2004b).

In some respects the introduction of the NHS and social care model in England mirrors that of the community care reforms in the 1990s. A key component of the latter was the introduction of care management arrangements. These had the underlying aim of achieving cost containment and promoting service user choice. This was to be achieved by shifting the delivery and accountability of social care away from institution based services towards care at home (Cm 849, 1989). More recently the introduction of NHS case management has been part of a wider emphasis within health care, to move away from a reliance on high cost acute services towards treating more patients with complex long term health problems in community settings (DH, 2004b). In both these approaches the emphasis is on providing a coordinated link between the range of agencies and organisations delivering care and those receiving it in order to minimise the fragmentation of service provision for those with multiple health and social needs (DH, 2005b; Challis et al., 2002). The core tasks of both are summarised in Box 1.1. There are clear similarities in both approaches; however a distinguishing feature of NHS case management is clinical intervention by a case manger. Both ways of providing coordinated care to vulnerable patients/users are discussed in terms of the monitoring and review of patient/user circumstances; the delivery of integrated health and social care; and differentiation within each to provide different levels of care appropriate to need.

Box 1.1: Care management and NHS case management: a comparison of core tasks (adapted from Challis et al., 1995)

Characteristics	*Care management*	*NHS case management*
Functions	Coordination and linkage of care services	Co-ordination of care and services across different services and agencies
Goals	• Providing continuity and integrated care • Increasing the opportunity for home – based care • Promoting client wellbeing • Making better use of resources	• Preventing unplanned hospital admissions • Increasing the provision of care in a primary, community or home environment • Increasing patient choice and personalised care
Core tasks	• Case finding and screening • Assessment • Care planning • Monitoring and review • Case closure	• Case finding • Comprehensive assessment • Care planning • Evaluate outcomes and identify changes to patient's needs and wishes
Characteristics of recipients	Long – term care needs; multiple service need	Multiple long - term conditions; complex health and social care needs.
Main features	Intensive involvement; wide breadth of services spanned; lengthy duration of involvement	Intensive, ongoing, personalised care
Multi – level response	Linking practice-level activities with broader resource and agency – level activities.	Liaising with local agencies, carers and relatives and other health care professionals to mobilise resources
Therapeutic intervention	Provided by other agencies, mobilised by the care manager.	Clinical care, medicine management and review provided by case manager.

Source: Challis et al., 1995; DH, 2004a; DH, 2005a; b

The tasks of monitoring; 'to support and control the delivery of the care plan on a continuing basis' (SSI/SWSG, 1991b, p. 77) and review; 'to reassess, at specific intervals, needs and service outcomes with a view to revising the care plan' (SSI/SWSG, 1991b, p. 83) have been acknowledged as key aspects of intensive care management. Reviewing patient care plans is also acknowledged as an important aspect of a case management service as it ensures that individual patient need is met and the quality of the overall service is maintained (Hughes et al., 2005; Challis et al., 1995). Recent policy relating to the role of NHS case management highlights the need for care plans to be regularly reviewed by case managers and outcomes to be evaluated. Box 1.1 also indicates that the tasks of monitoring and review of the care plan differ both in content and importance in NHS case management compared with care management within social care. In the former

there is an emphasis on the clinical aspects of these tasks, for example reviewing medication and clinical risk (DH, 2005a; b). As an adjunct to this it is also relevant to note that the NHS case management approach does not explicitly acknowledge the closure of cases as a core task as in care management arrangements.

Both approaches recognise a need for closer integration between health and social care and the creation of multi-professional teams to co-ordinate the different aspects of care required by patients in receipt of case or care management. The care management and assessment guidance issued at the beginning of the social care reforms, listed ten key potential benefits of care management, which included 'increasing continuity; and improving integration of services' (SSI/SWSG 1991a; b). It has been recognised that NHS case management policy has implications for social care within the context of delivering the care required to those with long term conditions, (DH, 2004a). For example, it has been stated that an integrated approach between health and social care for delivering NHS case management builds on the recommendations for joint assessments carried out between these two agencies as part of the Single Assessment Process for vulnerable older people (DH 2005a).

Policy guidance has also emphasised the stratification of services, with NHS case management part of a spectrum of services, and similarly social care systems have been required to provide a differentiated approach to care management with different levels of service available (DH, 2005b; SSI,1997). However, the extent to which this developed in the first few years after the implementation of the community care reforms was limited. Two reasons for this absence have been suggested, namely a lack of specific guidance from central government and an uneven implementation across the country (Weiner et al., 2002). The NHS model also offers some flexibility to individual Primary Care Trusts (PCTs) in how they deliver case management in their local area; for example, identifying suitable patients or recruiting community matrons (DH, 2005a; DH, 2005b). If the approach to the development of NHS case management mirrors that of care management it is likely that variations in the nature and scope of the service will become increasingly apparent. Some possible variations in these case management service structures appertaining to the NHS and social care model of case management are explored in the remainder of this review.

Service structures

In this section some of the defining characteristics of case management are considered. These features which influence the structure of a case management service are: staff mix and team structure; caseload size; case mix and targeting. Some of the examples are specific to the development of NHS case management and some are drawn from the wider literatures of care management.

Staff mix and team structure

Here we will consider the range of staff who have undertaken a case management role in primary care in the UK; the context of their role; and team structure. The development of NHS case management, although encompassing different models has broadly followed the principle of assigning one member of staff to carry out a 'case manager role' and undertake all or most of the 'core tasks' of case management (Singh and Ham, 2006; Ross and Tissier, 1997). Nursing staff have

most commonly been recruited into a case management role, either alongside their existing nursing role such as district nurse (Bergen, 1997; Audit Commission, 1999) or as a separate role coordinating both health and social care (Weiner et al., 2003). An example of nurses occupying a designated case manager role is the Cambridge PCT model (Boaden et al., 2006). Other health workers who have been recruited to the role of case manager in this way include occupational therapists and community psychiatric nurses (Weiner et al., 2003).

The Evercare model developed a specialist nurse role of Advanced Primary Nurses to deliver case management (Boaden et al., 2006). These nurses were managed centrally by the PCT but were based around one or two general practitioner (GP) practices. They undertook a general diagnostic and referral role rather than specific tasks, although they were trained to provide an autonomous clinical role (Boaden et al., 2006). Several other examples of case management have also developed a specialist nursing role. For example the Eldercare project in Cornwall (EPIC) which developed Advanced Primary Nurses based in GP practices (Tovey, 2004). Another example is specialist nurses for a particular long term condition, such as heart failure, managed by the appropriate hospital department for that condition (Blue et al., 2001). There are also examples of case management delivered by existing health care and social care staff groups, without the creation of a specific role. Several studies have described a more integrated approach, where both social care and health care agencies work together to develop a case management approach. This can be organised in a variety of ways, for example a GP practice based partnership between a district nurse and a social worker (Lyon et al., 2006; Ross and Tissier, 1997); an integrated health and social care team based at a GP practice (Brown et al., 2003); or a multidisciplinary team with the case management function coordinated by a social worker (Challis et al., 2002).

Caseload size

The level of involvement of a case manager in the care of a patient, often reflected by smaller caseloads is considered to be a defining feature of long term care case management (Applebaum and Austin, 1990). The optimum size for a caseload when delivering intensive long term case management has been suggested to be around 20-30 cases per case manager dependent upon the target population supported (Challis and Davies, 1986; Challis et al., 1995).

Studies which reported on the size of a caseload held by each case manager detailed variation from less than 20 cases (The Audit Commission, 1999) to 90 (Bergen, 1997). Some case management services reported a high caseload size, often of more than 50; this was sometimes due to the differing frequencies of contact for patients considered to be at greater risk (Boaden et. al, 2006; Bergen, 1997; Ross and Tissier, 1997). Therefore this variation may not reflect the active caseload size for a case manager. It may include both patients who are being visited frequently by a case manager as they need an intensive case management service and also those cases which are not considered ‘closed’ but are being monitored less intensively. Policy guidance (DH, 2005b) recommends a caseload size of between 50-80 patients per case manager within the NHS and social care model. This is higher than is considered optimal to deliver an intensive long term case management service (Challis et al., 1995).

Case mix

As well as the number of patients each case manager is responsible for, another gauge of the intensity of the case management service is the level of need of different patients on the same caseload. If all patients allocated to a case manager require the same high level of resources and have multiple needs which demand a very intensive form of case management, then this should be reflected in a smaller caseload size. One way that case management services have been organised to reflect this differentiated approach is that resources and time are allocated differently to patients on a caseload. Those with a lower dependency on the case management service will receive a different intensity of service as reflected in their care plan than those who require a high intensity service (Ross and Tissier, 1997; The Audit Commission, 1999; Boaden et. al., 2006).

Targeting

A key feature of effective case management is the successful targeting of the service to the needs of a specific patient population (Challis et al., 1995). To successfully achieve its service objectives a case management service must specify a target population and utilise a range of methods and resources to identify this particular population correctly. The Department of Health's target to reduce hospital bed days by introducing case management (DH, 2004b) has unsurprisingly influenced the emphasis of many NHS case management models and led many to define their target population accordingly. Therefore, patients at risk of admission to long term care or unplanned admission to hospital are the target population for many programmes of case management (Boaden et al., 2006; Challis et al., 2002; Lyon et al., 2006, Tovey, 2004). These patients are often not targeted specifically by their condition but by their utilisation of service resources. Sometimes a service will also be targeted towards patients according to their condition or age, for example specifically towards those with chronic heart failure (Blue et al., 2001) or older people with mental health problems (Weiner et al., 2003).

Screening, case finding and eligibility

A number of the core components of an effective case management approach are related to successfully identifying the target population for the service and creating a care plan which meets their needs. Various processes contribute to this although they are sometimes difficult to discern in practice. They are case finding and screening which assist in the identification of potential service recipients and mechanisms to determine eligibility for service which are applied both prior to assessment and within the process. The relationship between eligibility, screening and targeting is complicated and of intrinsic importance when considering and evaluating a case management service (Stewart et al., 2003). If the correct balance between the tasks is achieved, the right people are referred to the service and their needs can be met (Challis and Davies, 1986). However, if the balance is not correct then a service can be inappropriately targeted, as with a series of case management demonstration projects in the US and the service can fail in its aims (Kemper, 1998). Each of these four processes are discussed below.

Case finding

Case finding has often been understood as a method of detecting unmet need in a population before cases are presented to medical services (Bowns et al., 1991). It is sometimes necessary to identify patients who are suitable for case management and who constitute the target population (for example, those at risk of unplanned hospital admissions) even if these patients are at present largely unknown to health or social care services. The literature has identified that for a programme to be targeted to those who will benefit from it, it must have an initial method of identifying patients which is sensitive enough to capture appropriate cases (Challis et al., 1995).

One method of identifying a target population through case finding identified in the context of development of case management for people with long term conditions is by analysing datasets which document recent resource usage. Hospital discharge data has, for example, been used to identify patients at high risk of hospital admissions (Boaden et al., 2006). However, this method relies on the availability of adequate, up to date local information systems which may not always be available (Brown et al., 2003). A technique which does not require the existence of secondary data but still offers a wide-reaching approach is the use of a postal questionnaire distributed to patients with a high level of dependency and registered at GP practices (Bowns et al., 1991). Less wide-reaching methods which are often used include accepting referrals of patients who meet the eligibility criteria from other agencies such as hospitals, GP practices and local authority social care services (Brown et al., 2003; Ross and Tissier, 1997; Weiner et al., 2003).

The recognised importance of successfully targeting case management services to those patients for whom it will provide most benefit has led to the development of automated case finding tools. One such tool (the patients at risk for re-hospitalisation (PARR) algorithm) was developed using hospital episode data (HES) and uses routinely collected data to predict individual patients at the highest risk of readmission to hospital in the next 12 months (Billings et al., 2006).

Screening

As case finding methods are used to ensure that those who will benefit most from a case management service receive it, screening is a method of determining whether these patients identified from the case finding are the most appropriate to receive the service. (Applebaum and Austin, 1990). Although it is important to use a case finding method which will capture a high proportion of those who may need case management, a second stage which specifies which patients are the target population is also needed (Challis et al., 1995). This will enable those patients who met the initial criteria used in the case finding stage but are not appropriate for case management to be identified and referred elsewhere.

Methods for screening are usually more reliant on clinical and service judgement than those used to complete the initial case finding stage; for example discussions between health professionals providing the service will be often be used to select the final list of patients from a possible pool of cases (Boaden et al., 2006). In England a GP may play an important role at this screening stage of case management. He or she may act as a gatekeeper for the service by prioritising the patients whom they

believe will benefit from the service guided by a list generated initially by the case finding process (Lyon et al., 2006). Sometimes the screening process will adopt a more face-to-face approach with the patient. Follow up interviews may be conducted to validate a case finding technique, such as postal questionnaire, as well as identifying whether the patient will benefit from case management (Bowns et al., 1991).

Eligibility for assessment

The target population identified for a case management programme is usually closely linked to the objectives of the service. The characteristics of this group will usually result in a set of criteria being agreed which determine whether a patient is eligible for the service and if a patient will be referred to and accepted by the case management service (Drennan and Goodman, 2003). Case management programmes may have explicitly defined eligibility criteria and patients must meet some or all of these criteria to demonstrate their appropriateness for the service (Boaden et al., 2006). These include patient characteristics and details of service admissions as well as other social and health indicators of whether the patient is appropriate for the case management service. One example is the questionnaire developed by the Castlefields GP practice case management service, where patients must meet three of the criteria from a list of eleven and also be in the appropriate age band (Lyon et al., 2006).

Often, however, case management services do not have such clearly defined criteria for eligibility and instead focus mainly on one or two characteristics. For example, two studies identified age as the most significant measure of whether patients should be accepted onto a caseload (Audit Commission, 1999; Brown et al., 2003). The majority, especially those which were pilot studies of an intervention, considered patients to be eligible for the programme if geographically they were in the participating catchment area or GP practice (Boaden et al., 2006; Blue et al., 2001; Lyon et al., 2006).

Eligibility decisions within the assessment process

Assessing a patient's needs and formulating an appropriate care plan to meet these is a key stage in ensuring that the case management service assists the target population and meets its objectives. The assessment process has been described as fulfilling three functions; collection of information about patient's circumstances, evaluating these circumstances and defining their needs and constructing a care plan of formal and informal services to meet these needs (Hughes et al., 2005).

Within a case management service assessment is the means by which the appropriate level of service for each patient is identified and also contributes to the effective targeting of the service (Challis et al., 1995). A comprehensive assessment, including a patient's informal support networks and their living environment, will assist in this process (Hughes et al., 2005). Therefore case management services which emphasise the importance of undertaking a comprehensive assessment (Bergen, 1997; Challis et al., 2002); highlight the importance of home assessments (Blue et al., 2001); and share information about a patient's needs within and between

agencies (Brown et al., 2003; Lyon et., 2006) are more likely to target appropriate patients for the service.

Outcomes for secondary care

As outlined in the first section of this review, NHS case management has been developed within a policy context of service utilisation measures, especially those relating to acute inpatient care. It is anticipated that case management will contribute to a reduction in unplanned admissions and the aims and target population of many case management services have reflected this goal. This chapter reviews resource utilisation level rather than direct service user outcomes, which reflects the focus of both the policy framework for case management and stage three of this research study.

An outcome can be broadly considered as 'the impact, effect or consequence of a service or policy', however it is important to distinguish between those which will measure impact at the level of resource utilisation and those which consider the final impact on the service user (Qureshi, 1999). Two recent international reviews by Hutt et al. (2004) and Singh and Ham (2006) examine findings which contribute to the knowledge base regarding the impact of case management on the use of health services. The outcomes assessed in these reviews include hospital admissions, use of emergency departments and length of stay. Neither of these reviews demonstrates any consistent benefit from a particular case management approach, although the Hutt et al. (2004) reported some weak evidence that case management could contribute to a reduction in hospital admissions. However, there are two caveats which should be borne in mind when interpreting these findings. Firstly, it is not clear whether these findings are transferable to the UK from an international context to the U.K. Secondly, it is not known which aspect of a case management service has most impact on service outcomes.

This section will discuss four service use outcome measures: attendance at accident and emergency departments, unplanned admissions to acute care, length of stay in acute care and discharge arrangements from acute care. These are all considered to be aspects of resource use changes in which may be attributed to the implementation of case management. They have been selected for further exploration due to their relevance to the policy framework and the first three are measured in the longitudinal study in this report.

Attendance at accident and emergency departments

Although fewer studies reported outcomes that included attendance at an accident and emergency (A&E) department of NHS case managed patients, some did and are summarised below. However, these did not always distinguish between the outcome of attendance at accident and emergency and whether or not the patient was admitted or returned home. Case management services which used the number of accident and emergency attendances a patient had in the last 12 months as a criterion for entry to the service, for example the Kaiser Permente and Castlefields initiatives, were more likely to report on this outcome (Lyon et al., 2006; Matrix Research and Consultancy Limited; 2004). Very few of the U.K studies found a significant reduction in the number of accident and emergency attendances although

an international study reported a statistically significant decrease in emergency department visits (Bernabei et al., 1998).

Admissions to acute care

Preventing admissions to acute inpatient care is considered a policy priority for NHS case management, especially since it is estimated that three per cent of patients over 65 years old account for 35 per cent of admissions (Hutt et al., 2004). Therefore a key outcome for evaluating case management services will be to demonstrate that there has been a significant reduction in rates of emergency admission to acute inpatient care for those receiving the service. Thus whilst the objective of services which seek to address this outcome may be similar, the methods used to demonstrate this effect (data collection and analysis) may vary.

A case management service may measure a reduction in inpatient admissions by describing individual cases where this has been prevented by the case management service, for example the EPIC project (Tovey., 2004). Other studies have utilised routine admission data. The Castlefields model, based in general practice reported a statistically significant reduction in acute admissions (when measuring emergency medical admissions for people over 65 years) for the practice population when compared to neighbouring practices (Lyon et al., 2006). The evaluation of another pilot project, the Evercare approach conducted a before and after analysis of HES Data at a GP practice level to determine the pattern of admissions to acute care for older people. The study compared the change in outcomes for practices which had patients enrolled in the Evercare pilot with a control group (all other GP practices in England). No significant effect was found for either a high risk cohort of patients or all patients aged ≤65 (Gravelle et al., 2006). When the impact of Evercare services was assessed using a small case study with a control group admission rates for both groups reduced, although again no significant difference were found between the two groups (Patrick et al., 2006). The reduction was attributed to the tendency for rates of admission for this target population (frail older people) to fall without any intervention which was noted by a study which demonstrated that the admission rates for patients with recurrent admission diminish over time, irrespective of any intervention (Roland et al., 2005).

Length of stay

Another policy goal associated with the introduction of NHS case management has been to reduce the time spent inappropriately in acute care beds by those patients admitted frequently to hospital. Therefore the length of time patients spend in acute care beds has also been measured alongside the rates of admission by evaluations considering the impact of case management. One study reported a reduction in the rates of admission and the number of bed days. Blue et al. (2001) described a disease specific service for patients with chronic heart failure and reported a statistically significant shorter length of hospital stay for those who received the nurse intervention. The before and after analysis of practice level data, however showed that the intervention had no significant effect on emergency bed days for either the high risk or general population (Gravelle et al., 2006). Similarly the case study evaluation of Evercare services (with a control group) (Patrick et al., 2006) did not find the Evercare intervention had a significant effect on length of stay (total

number of bed days). However, Roland et al. (2005) found a pattern for emergency bed days similar to emergency admissions; that they reduced over time, irrespective of any intervention. The number of days spent in hospital for older people with two or more unplanned admissions in the previous year decreased over the following four or five years without any intervention.

Discharge arrangements from acute care

The Community Care (Delayed Discharges etc.) Act was implemented in 2004 and placed new emphasis on the need for health and social care agencies to communicate more effectively about the discharge of patients from acute inpatient care and also to work together to encourage the provision of community care services for these patients (Henwood, 2004). Two studies have emphasised the possible impact of home care services on ensuring that discharge is timely and inappropriate hospital days are minimised (Hughes et al., 1997; Stott et al., 2006). The potential of NHS case management to reduce unplanned hospital admissions and length of stay has been noted above and suggests a relationship between timely discharge and the role of a case management service. This idea is reinforced by a systematic review conducted by Parker et al. (2002) which concluded that discharge arrangements for patients which spanned the hospital – community interface (as case management does) had the greatest impact on subsequent readmission rates.

The impact of a case management service on appropriate discharge from acute care has been considered; although in this context the need for clarity and a transparent measure of inappropriate bed use is recommended by McDonagh et al. (2000). An example of how case management services are reported as having a positive effect on discharge planning is the Castlefields model. Case management services engaged with hospital discharge teams to select appropriate cases for the service and the impact of the service on timely discharge was measured by the speed of assessment and discharge planning for patients alerted to the service by the hospital (Lyon et al., 2006). An additional perspective on the impact of case management on hospital discharge, which considers the outcome for the service user, is provided by the Social Care Institute for Excellence (SCIE) review (2006) which finds that discharge schemes which provide a continuity of care between hospital and home (which case management seeks to do) can allay patient concern and contribute to the success of this process.

Links with other services

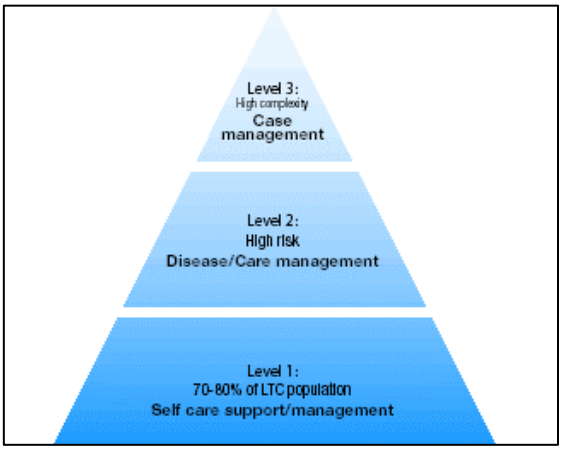
It is widely recognised that a key characteristic of a successful case management service is its position within an existing system of care. The recipients of the service often have multiple health and social needs which require a range of services to meet them and case management can provide the necessary coordinating role (Applebaum and Austin, 1990). Moreover it is important that a range of services is available in order for case management to draw on this system of care and to implement an appropriate care plan for patients (Hughes et al., 2005). Recent policy has emphasised how an NHS case manager should provide a fixed point in this environment, assuming clinical responsibility for care whilst coordinating other services from a range of agencies (DH, 2005b). However, there has been very little policy guidance about how these links should be established at a local level within

the context of available services (Hutt et al., 2004). This section considers how links between several agencies and case management have developed to date and has tried to demonstrate some of the constraints which can be encountered.

Self care

Case management can be considered to be at the pinnacle of a pyramid of need which is often illustrated by the Kaiser Permente triangle (see Box 1.2), where different interventions are matched to patients with different levels of need (DH, 2005b). A less intensive level of need is defined as 'supported self care' and encourages patients where possible, to manage their own condition (Cm 6737 2006; DH, 2005b). It is also anticipated that patients receiving a case management service will receive support and information to help them to manage their own care. Several case management services refer to the use of supported self care either generically as part of an ongoing care plan and delivered by the case manager (Boaden et al., 2006) or as a specialised service which targets the self management of a specific condition (Blue et al., 2001). However, there is a lack of studies which explore this interface between self care services and case management services at present.

Box 1.2: Kaiser Permanente Triangle



Source: DH, 2005b

Primary care

A key part of the care network for those with multiple health and social needs will be services provided by primary care health professionals. To date, much of the literature explores this from the perspective of a GP, who typically fulfils a key role, providing the first medical assessment and acting as 'gatekeeper' to other health and social care agencies (Ross and Tissier, 1997). Therefore established links (or lack thereof) between GP practices and case management services will be important. Often there is a geographical association, with the case management service based in or around a single practice; this has often been so for pilot phases of case management projects which have been organised around practices that were participating as project sites (Lyon et al., 2006; Boaden et al., 2006; Tovey, 2004; Challis et al., 2002). Linkages have been established between practices and case management services involving GPs and case managers discussing patients (Lyon

et al., 2006). Another example is found within the Evercare scheme in which APN's received formal mentoring from a GP (Boaden et al., 2006). Amongst those who provided an extended role to a case management service there was some concern that this could lead to an increased workload for their practice and lessen their ability to refer patients to hospital based care (Challis et al., 1995; Boaden et al., 2006). However, it has also been reported that GPs were positive about the single point of contact and feedback about referrals which their involvement with case management could offer (Ross and Tissier, 1997).

Intermediate care

Intermediate care does not refer to a specific type of service, so much as to a concept spanning services provided by the hospital care and community resources. Steiner (2001) categorised intermediate care as having two essential elements: crisis intervention to prevent unnecessary admissions for those at short term risk of admission to hospital for acute care and recuperation and rehabilitation for post acute patients. Intermediate care services, like many case management services are targeted at those, typically older patients, at risk of inappropriate admissions to acute care and long term residential care. Intermediate care policy seeks to promote the independence of older people and the appropriate use of acute inpatient beds (Cm 4818-1, 2000), similar objectives to the NHS and social care model (DH, 2004b).

Coordination between intermediate care and case management in localities may permit a case manager to access acute care alternatives to hospital admission or packages of rehabilitation services. It has been suggested that there is the potential for each of the two services to duplicate some aspect of the other's role and therefore establishing a clear role for both services will be necessary (Hutt et al., 2005). However, there is also evidence of case management services establishing links with intermediate care services which could complement the service; whether to secure additional resources to be accessed when implementing a care plan (Boaden et al., 2006) or for connecting the case management service to the target population (Ross and Tissier, 1997).

Local authorities

The integration of health and social care by bringing together the different agencies that often work separately to meet the needs of a similar cohort of people is afforded much emphasis by recent policy (Cm 6737, 2006; Cm 4818-1, 2000; DH, 2005b; DH, 2001). Thus to facilitate the provision of case management, effective links between health and social are important, both in terms of structure and process (Challis et al., 1995; Hughes et al., 2005). Integrating agencies at a structural level is necessary to ensure that there is clarity around the responsibilities and boundaries of each agency and that the resource implications of strategic decisions are fully considered (Ross and Tissier, 1997; Audit Commission, 1999). The integration of agencies at a process level can be demonstrated by the joint working practices of staff working across agency boundaries. This can be achieved through staff from both sectors contributing to joint assessments or care plans. Sharing the core tasks of case management can illustrate how the integration of social care and health care can be implemented at the level of the patient. This might be through staff from both health and social care carrying out joint assessments (Ross and Tissier, 1997) or by the

involvement of staff from a range of disciplines in the implementation of a care plan (Bergen, 1997)

Several positive aspects of joint working are discussed in descriptions of integrated case management services, for example health care staff being able to understand the constraints and working practices of another agency, and vice versa (Lyon et al., 2006). However, it is also emphasised that to be effective, the authority of other agencies must be accepted in the referral process, for example when a referral to social services specifying a resource allocation is made by a staff member from an outside agency, such as a district nurse (Ross and Tissier, 1997; Challis et al., 2002).

Summary

This chapter has described themes from the literature relating to case management services in primary care for patients with complex long term conditions and summarised the characteristics, services and outcomes attributed to case management arrangements. It has also sought to address the context of policy goals and objectives within which NHS case management has developed, and contrast this with the development of care management from the community care reforms of the 1990s. Several issues from the chapter are particularly important. Firstly, the target population for the case management service must reflect its objective. Secondly, mechanisms must be in place to correctly identify this population alongside appropriate outcome measures to evaluate it. Thirdly, there is a new and developing evidence base and policy guidance which allows for local discretion when implementing case management services in the UK. Therefore there is no simple model of proven effectiveness; there are strengths and weaknesses of each of them. Fourthly, whichever model is implemented, it does not stand alone, but it rests within the existing network of local health and social care providers and in part its 'success or failure' is related to this local environment. Finally, it is worth noting a conclusion from a recent review which suggests that discharge from hospital is itself often part of a larger process whereby people adjust to the impact of illness on their life and interventions, such as case management which enable older people to be cared for in a community setting, may enable them to preserve some control over this (SCIE, 2006).

CHAPTER 2: METHODOLOGY

The purpose of this longitudinal study is to investigate whether service utilisation outcomes can be attributed to and are associated with different approaches to active case management (ACM) for people with long term conditions. The study has been designed to:

- Map current provision of ACM services in primary care for people with long term conditions;
- Classify programmes on observable features of case management implementation with particular focus upon the integration of care between primary and secondary care and between health and social care;
- Explore the overall ACM intervention effect on service utilisation;
- Examine whether different service outcomes are associated with different approaches, specific programme operations or processes of service delivery.

The study was undertaken in three stages and aimed to employ multiple data sources from all 10 Greater Manchester Primary Care Trusts (PCTs). Ethics Committee (07/H1006/51) and Research & Development approval from ReGroup were obtained.

Methods of data collection

Stage 1: Postal questionnaire

A postal questionnaire, designed by the research team, to describe the current provision of ACM services in Greater Manchester (Appendix 1) was sent to managers with lead responsibility for ACM services in each PCT. Questions covered several broad domains including: background information relating to the PCT and ACM services; links with other services; the management, staffing and tasks of case managers; and the process of ACM (patient identification, assessment, care planning). The questionnaire was distributed in July 2007 and non-respondents were contacted up to ten weeks later to maximise the response rate. A 100 per cent response was achieved.

Stage 2: Interviews with managers

Following completion of the postal questionnaire, an in-depth interview was undertaken with eight of the ten respondents over a eight week period between August and October 2007. The two remaining respondents felt they were unable to complete an interview the in given time period. The interviews were designed to further explore the particular local logics and rationales for the set of case management arrangements in place in each PCT. This method was also adopted to validate particular aspects of the data collected in the postal survey. The interviewers (KB & JA) were guided by a pre-determined interview schedule that covered the four themes: background, staff mix, process and networks of the ACM service (Appendix 2). Interviews were digitally recorded and detailed notes were taken.

Stage three: Service utilisation outcome data

Resource utilisation outcome data for patients with long term conditions in receipt of case management, were made available to PSSRU from the Greater Manchester Association of PCTs via the Tactical Information Service (TIS). In order to track ACM patient level data and explore the use of secondary care services, by ACM patient it was necessary to track ACM patients through resource utilisation data held by the TIS. As community PAS (IPM Lorenzo) was only available for three of the Greater Manchester PCTs community service receipt data could not be included. The aim was to include new patients added to ACM caseloads from the 1st April 2006 to 31st March 2007 and to extract retrospective utilisation data for one year prior to entry to ACM for all patients. Resource utilisation data would therefore range from 1st April 2005 to 30th June 2007. Data was extracted by the TIS on the 29th September 2007.

Initial exploratory work undertaken by the TIS suggested that the most effective way of extracting this data was to use the NHS numbers of patients being actively case managed and to identify eligible cases. However, as the TIS could not identify patients who had been or were in receipt of ACM services in the period covered by this evaluation a two stage process of data identification at the level of the patient was adopted. This required a preliminary transfer of data to occur from each of the 10 PCTs to the TIS. Box 2.1 illustrates the data which was initially requested from each PCT in respect of each ACM patient. This process was formally approved by the ACM programme board and followed TIS data sharing protocols. PSSRU coordinated the process to minimise burden on PCT staff and the TIS.

Resource utilisation data were then extracted by the TIS from relevant elements of the National CDS (Commissioning Data Set) which are generated by the patient administration systems within each hospital. Data were transferred to the PSSRU in a pseudonymised format but remained at the individual patient level. Data was received in CVS format and imported into SPSS files. The data files required extensive manipulation to enable data management and analysis in SPSS (version 14).

Box 2.1: The transfer of the resource utilisation data: a two stage process

Stage 1: Data transferred from each PCT to TIS[1]	Stage 2: Data transferred from TIS to PSSRU[4]
• NHS number (not disclosed to PSSRU); • date patient added to the ACM caseload [2] • date of case closure (if appropriate) • reason for closure (if appropriate) • date of birth (not disclosed to PSSRU) • gender • ethnicity • registered GP practice [3] • provider PCT (if different from registered) • full postcode (not disclosed to PSSRU). [3]	**Patient details** • age (on entry to case management) • gender • ethnicity • measure of deprivation[5] • registered PCT • provider PCT (if different) • registered local authority • date patient added to ACM caseload • date of case closure (if appropriate) • reason for closure (if appropriate) **Hospital spells** • admission date • discharge date • length of stay • primary diagnosis[6] • admission method • patient classification • primary procedure • speciality • secondary diagnosis[6] • tariff[7] **Accident and emergency attendances** • arrival date • A&E tariff **Outpatient visits[8]** (including non attendances) • appointment date • primary diagnosis • speciality • tariff

[1] Missing data was sourced from other data sources held by TIS.

[2] If only the month and year that a patient was added to (or removed from) a caseload was available then TIS recorded these dates as the 15th of the month (so not to differ from the true date by more than two weeks).

[3] If a patient had moved house whilst being case managed the postcode and registered GP practice recoded nearest to the date they were added to the service was used.

[4] TIS is mainly populated by taking record level extracts from routine data flows exchanged between healthcare providers and commissioners via the Connecting for Health (CfH) Secondary Uses Service (SUS). The data is refreshed at regular points throughout the financial year and TIS works closely with SUS to minimise inaccuracies and invalid data, although some errors may still occur.

[5] Based on the Index of Multiple Deprivation 2004.

[6] Diagnoses were described using the tenth revision of the International Classification of Diseases (ICD-10) (WHO). When analysed diagnoses were described using the chapter titles of ICD10.

[7] Calculated using the Payment by Results tariff for 07/08.

[8] Day case admissions were excluded so that patients attending hospital for treatments such as dialysis did not skew the results.

Data analysis

The data are presented in three sections in Chapter Three.

Part one – service description

The data reported from the questionnaires and interviews were chosen to describe the nature and organisation of case management arrangements and indicators of service integration and intensive case management were developed. Questionnaire data was analysed in SPSS (version 14). The data selected were guided by a number of criteria which aimed to ensure that the findings could:

- be applied across more than one site;
- capture variation in service organisation within a small data set (n= 10);
- explore the extent of integration between ACM services and social care;
- have the capacity to explain variation in service utilisation;
- link to the findings to wider case management literature.

Five interviews were fully transcribed and were used as a basis for coding using Atlas ti. These transcripts were initially coded according to the four pre-determined interview themes (service background, links with other services, staff mix and tasks and process of active case management), with additional themes identified during this process. The remaining interviews were partially transcribed to provide further information in relation to these themes.

The findings in Part One are presented and brought together under the domains covered by both the questionnaire and the interview themes.

Part two – service utilisation

This analysis (conducted using SPSS) explores whether the receipt of ACM services has an impact upon the use of secondary health services. Analysis has been conducted on three samples: patients with six month post intervention data (n=1418); patients with nine month post intervention data (n=867); and patients with 12 month post intervention data (n=345). However, in order to focus on a sub sample of patients which extends the follow up period whilst maximizing the sample size, we have presented the main findings around the data related to the nine month cohort sample (n=867). The results for the six month cohort sample and the 12 month cohort sample are presented in Appendix 3.

This section is structured around four main themes: the potential sample eligible for inclusion in the study; the sample selected for analysis; the patient characteristics and the resource utilisation associated with the nine month cohort sample. For the latter, ACM caseload indicators and hospital resource use data are aggregated from the nine month pre ACM intervention period and are compared with the nine months post addition to an ACM caseload. Hospital resource data is also explored by patient diagnosis and specialty function codes. The Wilcoxon matched-pairs signed-rank test is used for the statistical comparison between test conditions and for the analysis of variations over time. In the analysis, P values ≤ 0.05 is considered to be statistically significant and are highlighted within the text.

The data for the six month and 12 month sample are shown in Appendix 4 and reported in separate summary sections that highlight the differences between these cohort samples and the nine month cohort sample. The structure of the data analysis and the tests of significance used are the same for both of these samples.

Part three – the relationship between service utilisation and active case management

This analysis explores the overall contribution of ACM service arrangement upon service utilisation. The following research question will be addressed using the nine month cohort sample (n=867):

> "What factors (patient characteristics and active case management approaches) explain changes in patient level health service utilisation outcomes?"

The analysis focused upon two main health service utilisation outcome measures:

I. Change in emergency admissions;
II. Change in length of stay for emergency admissions.

In order to address the research question, regression analyses (Stata version 9.2) were carried out in a series of stages, initially to select the most appropriate variables to be entered into the model. Variables considered were those computed from the variables used in the analysis in sections one and two (see Box 2.2). As a rule, P values ≤ 0.05 were considered to be statistically significant (Altman 1991). Firstly, all relevant variables (demographic, diagnoses/hospitalisation related, PCTs, ACM characteristics etc.) were tested individually and short-listed for regression models if statistically significant effects were found. Secondly, groups of variables were entered and the least significant ones were removed in a stepwise elimination process until only significant ones remained. Finally, further adjustments were made after regression diagnostics, such as the removal of outliers, alternative analyses with transformed variables or robust standard errors, in order to arrive at final models which are both sufficiently robust and interpretable.

It was assumed, and there was reason to believe, that the available cases with pre and post nine month information represent a simple random sample of the broader target population. Calculating the so-called intra-class correlation[1] revealed no clustering effects within PCTs i.e. the most logical source of such effects, making the sample suitable for standard statistical analysis methods that assume independent observations.

Regression analyses in the context of aggregated longitudinal information and changes thereof come in two slightly different varieties. 'Direct analysis of change' (or change score analysis) regresses a change variable directly on a set of predictors whilst 'analysis of covariance (ANCOVA)' uses the same set of predictors plus the baseline variable from which the change variable was constructed (Wright 2006). These models can be written as the following linear regression equations:

[1] A measure of the dependency of individual observations within groups (or classes) as commonly used in multilevel modelling

Direct analysis of change:	$Post_i - Pre_i = \beta_1 x_1 + \beta_0 + e_i$
ANCOVA:	$Post_i = \beta_2 Pre_i + \beta_1 x_1 + \beta_0 + e_i$
Which can be reformulated as:	$Post_i - Pre_i = (\beta_2 - 1) Pre_i + \beta_1 x_1 + \beta_0 + e_i$

Notes: Post/Pre are the outcome measures at two time points (pre = 'baseline'); $\beta_1 x_1$ denotes a predictor (x) and its coefficient (β);β_0 designates the model's constant term; e_i denotes the model's generic error term, i.e. the unexplained variation in the data

It would be intuitive to assume that both analyses produce identical results. However, this is normally only the case with randomised controlled trials (RCTs), in which cases have been randomly assigned to intervention and control groups and thus do not differ significantly at the baseline with regard to any measured or unmeasured characteristic. In the absence of such randomisation (i.e. with observational data), the two types of analysis can produce strikingly different results, one famous example being 'Lord's Paradox' (Lord 1967). In particular, applying ANCOVA to observational data entails the risk of producing artefactual and entirely spurious results, for we cannot rule out the possibility that omitted (or unmeasured) variables and/or covariates are differently associated with our groups of interest (e.g. if an ACM intervention group of one kind or another also happened to be a particularly resilient group of patients, which then could give the incorrect impression of the intervention being particularly successful). A statistical phenomenon called 'regression towards the mean', e.g. automatic improvement of measured health conditions over time, can make matters worse in this context, if different groups tend to regress towards different group means. Biased coefficients are a likely result of this scenario. Only randomisation that eliminates baseline differences can overcome these well-known pitfalls of regression analysis.

Despite this risk, ANCOVA is often seen as the most suitable analysis if the effects of covariates clearly depend on the baseline (i.e. where a comparison starts). In other words, direct analysis of change merely asks how a predictor affects the change 'on average', while ANCOVA asks how a predictor affects the change 'conditional upon' a certain baseline value. More often than not, the latter is precisely the question we want to ask because we observe in our data that groups already differ at the baseline and intend to control for that. This is conceptually the more sophisticated question, but tends to suffer more from omitted variable bias and/or regression towards unequal means given the underlying observational data. While statisticians are continuing to debate the relationship between the two approaches (e.g. Senn 2006), it can be acknowledged that great care must be taken when making causal inferences from non-randomised ANCOVA models. Despite this limitation, which actually is a common feature of regression-type analyses, it has been argued that seemingly contradictory findings can be explained and thus that ANCOVA does have its place as a useful (maybe merely descriptive) technique in observational longitudinal data (Wright 2006). In this study, both types of analyses were conducted and the focus was firmly placed on substantively interpreting their conflicting results.

Box 2.2: Variables considered for selection into the regression models

Variable	Variable form
Dependent variable	
Change in number of emergency admissions (admissions in 9 months post ACM – admissions in 9 months pre ACM)	Continuous variable
Change in length of stay for emergency admissions (length of stay in 9 months post ACM – length of stay in 9 months pre ACM)	Continuous variable
Potential independent variables	
Patient characteristics	
Gender	Male, female (1, 0)
Age at entry to caseload	Continuous variable
Ethnicity	White, other (1, 0)
Index of multiple deprivation (2004) (A,B,C,D,E)	Dummy variables (n-1)
Hospital admission spell data	
Any admission coded with primary/ secondary diagnosis (ICD-10 chapters)	
- Symptoms, signs, and abnormal clinical and laboratory findings, not elsewhere classified	Present / absent (1,0)
- Diseases of the respiratory system	Present / absent (1,0)
- Diseases of the circulatory system	Present / absent (1,0)
- Diseases of the digestive system	Present / absent (1,0)
- Injury, poisoning, & certain other consequences of external causes	Present / absent (1,0)
- Diseases of the genitourinary system	Present / absent (1,0)
- Diseases of the musculoskeletal system and connective tissue	Present / absent (1,0)
- Factors influencing health status and contact with health services	Present / absent (1,0)
- Endocrine, nutritional, and metabolic disease	Present / absent (1,0)
- External causes of morbidity and mortality	Present / absent (1,0)
- Diseases of the eye and adnexa	Present / absent (1,0)
- Malignant neoplasms	Present / absent (1,0)
- Diseases of the nervous system	Present / absent (1,0)
- Diseases of skin and subcutaneous tissue	Present / absent (1,0)
- Diseases of blood, blood-forming organs, immune mechanism	Present / absent (1,0)
- Infectious and parasitic diseases	Present / absent (1,0)
- Mental and behavioural disorders	Present / absent (1,0)
- In situ neoplasms	Present / absent (1,0)
- Diseases of the ear and mastoid process	Present / absent (1,0)
- Congenital malformations, deformations, and chromosomal abnormalities	Present / absent (1,0)
- Number different primary/ secondary diagnosis (ICD-10 chapters) at all admissions	Continuous variable
Any admission coded as most prevalent specialty (top 8 not A&E):	
- General medicine	Present / absent (1,0)
- Geriatric medicine	Present / absent (1,0)
- General surgery	Present / absent (1,0)
- Trauma & Orphopaedics	Present / absent (1,0)
- Respiratory medicine	Present / absent (1,0)
- Opthalmology	Present / absent (1,0)
- Urology	Present / absent (1,0)
- Cardiology	Present / absent (1,0)

ACM / PCT related variables (only a selection are presented – see Appendix 1 for all variables)

Length of time on caseload at data extraction / when closed	Continuous variable
Length of time since set up of service	Continuous variable
PCT provider (1-10)	Dummy variables (n-1)
Integration with primary health care	
- ACM service delivered by a GP practice population model	Present / absent (1,0)
- Case managers based at GP practices	Present / absent (1,0)
- Formal agreements with community nursing	Present / absent (1,0)
- Formal agreements with community pharmacy	Present / absent (1,0)
- Formal agreements with community physiotherapy	Present / absent (1,0)
Or 5 item composite	Continuous variable
Integration with local authority social care	
- ACM service delivered by an integrated health and social care model	Present / absent (1,0)
- Social worker undertaking case management	Present / absent (1,0)
- Agreements with local authority social care	Present / absent (1,0)
- Case managers can authorise social care resources	Present / absent (1,0)
- Information shared at multidisciplinary locality meetings	Present / absent (1,0)
Or 5 item composite	Continuous variable
Integration with intermediate care services	
- Schemes in place to prevent hospital admission	Present / absent (1,0)
Integration with acute / foundation trusts	
- Access to hospital records	Present / absent (1,0)
Intensive case management	
- Policy for the allocation of cases	Present / absent (1,0)
- Caseload size is less than 30	Present / absent (1,0)
- <=3 target conditions for ACM service	Present / absent (1,0)
- Intensive visiting (over 41% cases visited weekly +)	Present / absent (1,0)
Or 4 item composite	Continuous variable

CHAPTER 3 FINDINGS: INTRODUCTION

As a precursor to the findings, we briefly report some contextual data on the sites included in this study and compare these with the national picture. Currently in Greater Manchester, ten PCTs (Ashton, Wigan and Leigh; Bolton; Bury; Heywood Middleton & Rochdale; Manchester; Oldham; Salford; Stockport; Tameside & Glossop and Trafford) serve a population of 2.4 million people. In the national merger of October 2006 the number was reduced from 14 PCTs to the present ten. The Association of Greater Manchester PCTs facilitates collective working across these ten PCTs and has a deliberate commitment to developing a common approach to case management, locally known as active case management (ACM) across this area.

A programme board was established in 2004 to coordinate the implementation of active case management (ACM) across Greater Manchester, with the intention of providing a consistent local approach to the national policy guidelines. The initial focus of the board was to develop a common strategy for service characteristics such as patient identification and establishing links with partner organisations. The principle underlying the implementation strategy was for the majority of ACM practice to be shared across the PCTs with some local flexibility in each area.

National Targets: Health Care Commission Data

The Healthcare Commission assesses NHS organisations against existing and new national targets as part of their annual health checks. The performance of Primary Care Trusts (PCTs) is assessed against certain targets, one of which relates to case management and improving the health of people with long term conditions:

"To improve health outcomes for people with long term conditions by offering a personalised care plan for vulnerable people most at risk; and to reduce emergency bed days by 5% by 2008 (from the expected 2003/2004 baseline) through improved care in primary care and community settings for people with long term conditions" *(http://www.healthcarecommission.org.uk, 2008).*

This target is measured using three indicators. These relate to the number of community matrons and additional case managers in post, the number of emergency bed days reduced and the very high intensity users (VHIUs) being case managed. The 2006/2007 results for all ten Greater Manchester PCTs are shown in Table 3.0 for these three target indicators and are also compared to the national results. The text below also describes the 2005/6 data on how the indicators were met nationally and in Manchester. It is worth noting that Manchester has improved over time on these indicators and compares favourably to the national picture particularly on two of the three indicators.

Table 3.0: Healthcare commission target indicators (2006/7)

	National (n=152)	Greater Manchester (n=10)
Community matrons & additional case managers[1]		
Achieved	64 (42%)	8 (80%)
Under - Achieved	24 (16%)	1 (10%)
Failed	61 (40%)	1 (10%)
	3 (2%)	-
Emergency bed days[2]		
Achieved	141 (93%)	9 (90%)
Under - Achieved	9 (6%)	1 (10%)
Failed	2 (1%)	-
Data not available	3 (2%)	-
Number of very high intensity users (VHIUs)[3]		
Achieved	48 (32%)	5 (50%)
Under - Achieved	100 (66%)	5 (50%)
Failed	4 (3%)	-
Data not available	-	-

[1] Actual number of whole time equivalent staff (WTE) in the community matron and additional case manager role/planned number of WTE in the community matron and additional case manager role.
[2] (Actual number of emergency bed days minus the planned number of emergency bed days)/planned number of emergency bed days.
[3] Actual number of VHIUs being case managed/ planned number of VHIUs being case managed.

In 2005/6 only 5 of the then 14 PCTs (36%) in Greater Manchester had achieved the planned number of staff working as community matrons or case managers for people with long term conditions (not shown). This was less than the proportion that achieved it nationally; 206 of 303 PCTs (68%). As Table 3.0 shows, in 2006/7 the number of PCTs that achieved this target in Greater Manchester rose to 8 of the 10 PCTs (80%) which was higher than the proportion of PCTs achieving the target nationally; 64 out of 152 PCTs (42%).

Nationally 275 of the 303 PCTs (91%) met the emergency bed days target in 2005/6, whilst 12 of the 14 Greater Manchester PCTs (86%) also achieved this (not shown). In 2006/7 141 of the 152 PCTs (93%) achieved this target, as did 9 of the 10 Greater Manchester PCTs (90%) (Table 3.0).

In 2005/6 115 of the then 303 PCTs (32%) achieved the planned number of VHIUs being case managed whilst 3 of the 14 (21%) of the Greater Manchester PCTs had achieved this target (not shown). By 2006/7 (Table 3.0), the percentage of PCTs which achieved this target had dropped slightly nationally (32%) whilst it had risen for Greater Manchester, where half of the ten PCTs (50%) were now meeting this target.

FINDINGS PART ONE: SERVICE DESCRIPTION

This section will describe the nature and organisation of case management arrangements. The selection of data from the questionnaires and interviews were guided by a number of criteria. These aimed to:

- Apply across more than one site
- Capture variation in service organisation within a data set of 10
- Explore the extent of integration with social care
- Meet an a priori expectation of their legitimacy and capacity to explain variation in service utilisation
- Link to the findings to wider case management literature.

The questionnaire was distributed to all ten of the Primary Care Trusts (PCTs) in Greater Manchester and all returned completed questionnaires, representing a response rate of 100 per cent. Interviews were undertaken with (eight) of the ten PCTs, their respondents are identified by number and this classification is also used in describing data from the questionnaires.

Background

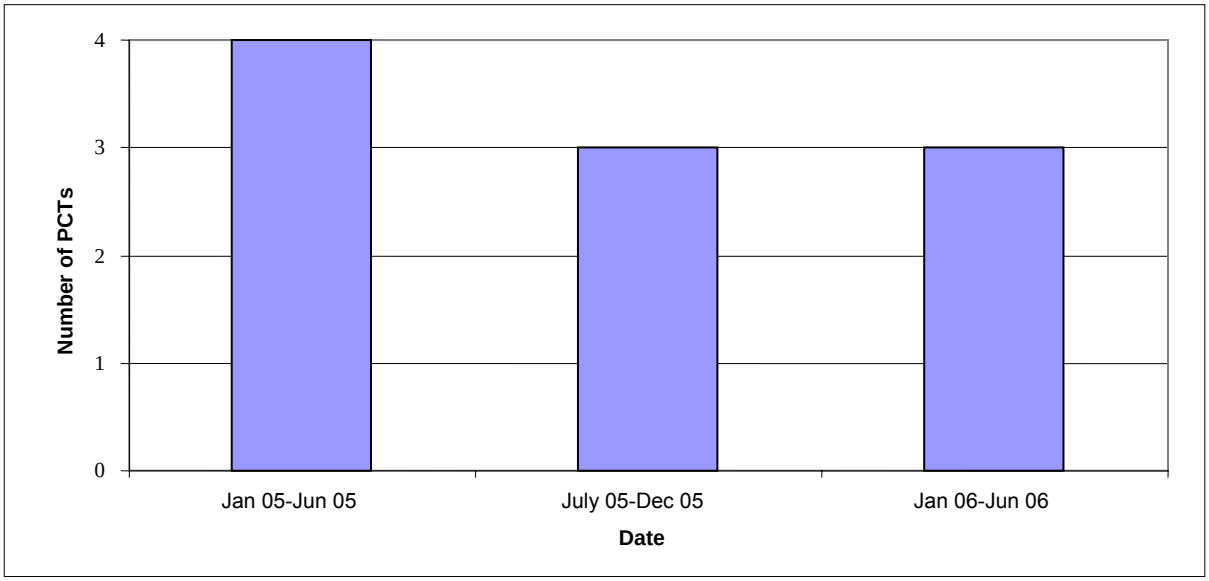
Table 3.1: Number of GP practices within each PCT?

	No.	%
30-40	2	20
41-50	2	20
50-60	3	30
61-70	1	10
71+	1	10
No. of PCTS	9	

Source: Question 1 - How many GP practices are there within your PCT?

The majority (7) of PCTs had between 30 and 60 GP practices within their jurisdiction (see Table 3.1) and within this range, three had between 50 and 60 practices. Respondents were asked to indicate the date on which their first patient was accepted into the PCT's active case management (ACM) service. Four began to accept patients in the first six months of 2005, three services accepted patients six months later, whilst another three achieved this one year later in the first six months of 2006 (Figure 3.1).

Figure 3.1: Date first patient accepted into the ACM service



Source: Question 6 - On what date was the first patient accepted into the ACM service?

PCTs were also asked to indicate how their service for people with long term conditions was delivered by selecting from a number of suggested methods and the results are shown in Table 3.2. The most (6) frequently selected descriptions were 'GP practice population model' and 'geographical locality based-model'. None of the PCTs delivered their services using a disease group based model.

Table 3.2: Method for describing how services for people with long term conditions are delivered

	No.	%
GP Practice population model	6	60
Geographical locality based model	6	60
Integrated health social care	2	20
Disease group based	-	-
Other	-	-
No. of PCTS	10	

Source: Question 9 – Which of the following best describes how ACM for people with long term conditions is primarily being delivered in your PCT? Tick all that apply

Links with other services

Links with general practice

As half the ACM services were based on a GP practice population model and two ACM services were based within practices, links with GP practices were discussed by all interviewees. Most of the interviewees described their relationships with GP practices and GPs as on the whole good, although this had taken time to develop.

Two interviewees described the change in attitude of GPs as they saw benefits for their patients:

'There has been a real shift, because when we first went out promoting case management, you know you always get your early adopters and things like that and there was the early adopters and then there were those who were: 'No way! This is nonsense.' Yes, and now the 'No way' people are now phoning us up and saying: 'When am I getting a case manager? So it has been a real shift and you know, because the practices that had it, really appreciated it, and could see the benefits of it.' **PCT 2**

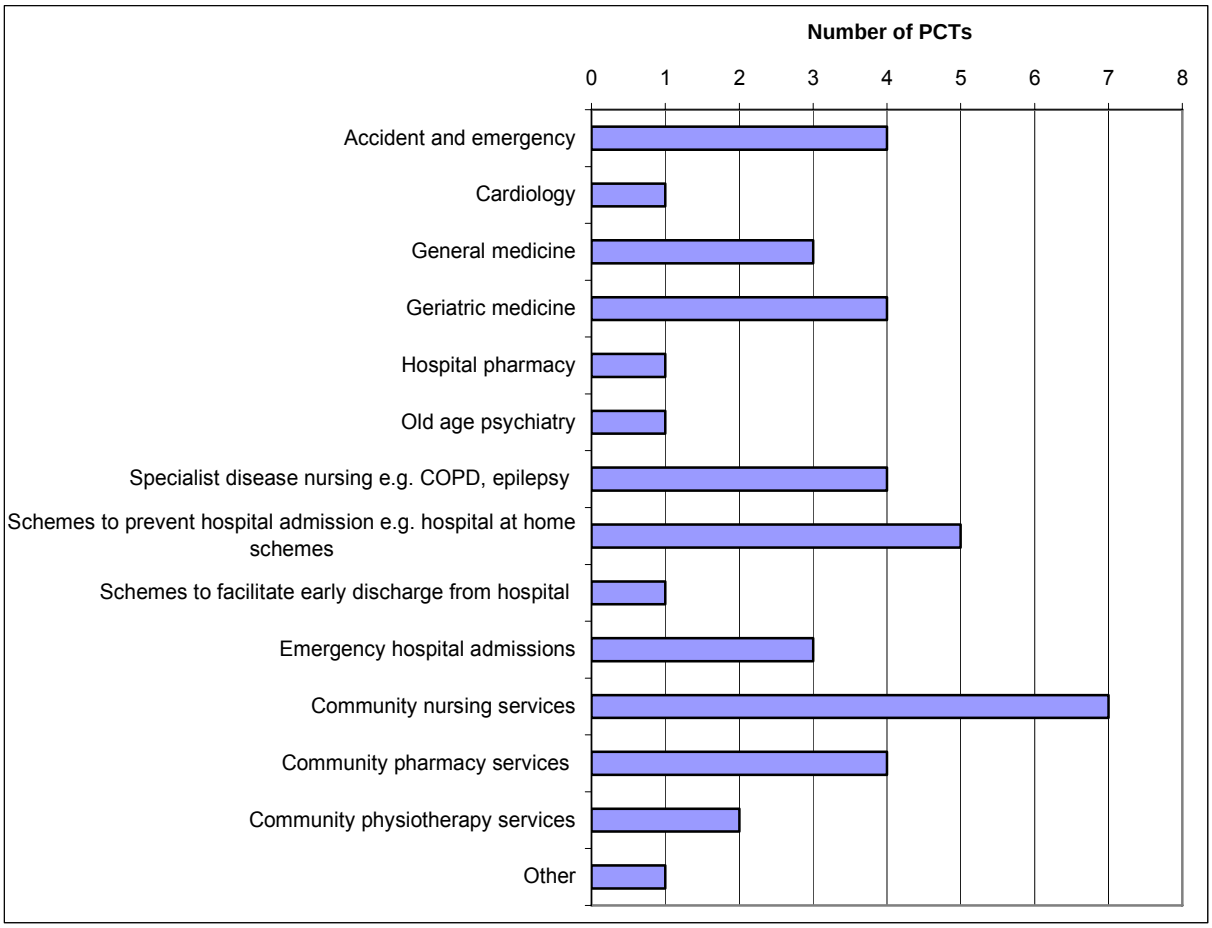
'I have got e-mails that have come to that case manager who then forwarded them on to me, notes from the GPs saying this is really working. Now, there are so many variables, you don't know what it is, it could be the personality of the person or many others.' **PCT 9**

As with other new service developments, awareness raising was key to developing positive relationships, as well as case managers being attached to practices:

'…it was always set up to be GP attached. We did a lot of preliminary work with GPs before we set it going: 'This is what active case management is, how would you like to see it running? We would like to set it up in this unit, what do you think?' And they all said: 'As long as we keep a named person for our practice', that is what they wanted, because then they could build up those relationships.' **PCT 2**

Links with other health services

Figure 3.2: Formal agreements between ACM service and other services



Source: Question 11 - Please indicate with which of the following services your ACM service has developed a formal agreement. Tick all that apply

It was reported that the majority of PCTs (7) had developed formal agreements between their ACM service and community nursing services (see Figure 3.2). This was the most commonly established formal agreement between services. Additionally half of the respondents (5) indicated that their PCT had similar agreements with schemes to prevent hospital admission. Formal agreements between accident and emergency services, geriatric medicine, community pharmacy services and specialist disease nursing were in place for four PCTs.

An example of this was an arrangement between an ACM service and a local hospital when ACM patients were admitted:

'…it is written into the policy now that the active case managers will be invited to the multi-disciplinary team meetings (MDT) on the wards for all actively case managed patients, so that has given that official clarification…' **PCT 7**

The links with secondary care services were viewed in a positive light by several interviewees, although they had taken time to establish. Two interviewees described difficulties in developing these relationships due to a lack of understanding by secondary care staff about the role of the ACM service:

'We did have difficulty initially being able to gain access to the multi-disciplinary team (MDT) meetings, because there was an issue regarding, where does the consultant's clinical responsibility end and the practices start, so there were interesting discussions around the perception that that would change if the case managers came into the MDT meeting, which was easily extinguished, because really It was about explaining that it was a liaison role that had to be fostered over time, and the case managers were coming onto the board to give information about how this patient lives at home.
And was that accepted, was that okay - ?
Yes.' **PCT 8**

Another interviewee mentioned the slow development of any formal agreements between the ACM service and acute care, although referral pathways were being cultivated:

'The relationships of the matrons and secondary care are fairly basic in that all the referral pathways are there so that they can refer all to the specialities and they refer to medical admissions. We've got them links so they can access the investigations…they can order x-rays all that that type of thing. We have tried to engage acute care services particularly the wards with contacting matron when a patient comes in, but that has been a bit slow from the acute side.' **PCT 1**

This initial lack of clarity had been similarly resolved in several PCTs by deliberate raising of awareness with other sectors of the NHS.

Table 3.3: Dedicated specialist physician sessions to support ACM?

	No.	%
Yes	1	10
No	9	90
No. of PCTS	10	

Source: Question 12 - Do you have any dedicated specialist physician sessions to support ACM? If yes, please describe in terms of speciality and number of programmed activities per week

In only one of the ten PCTs was it reported that they had dedicated specialist physician sessions to support ACM (see Table 3.3), although another PCT noted that these sessions were available during the training of case managers, where specialist physicians provided a mentoring role. The PCT which did have specialist physician sessions to support case managers had one session per month and noted that its purpose was to support continuing professional development.

Table 3.4: Arrangements for ACM patients with an emergency outside of normal working hours

	No.	%
Yes	3	30
No	7	70
No. of PCTS	10	

Source: Question 14 **-** Are there specific arrangements for ACM patients with an emergency outside of normal working hours? If yes, please describe

Respondents were also asked whether their PCT had specific arrangements for ACM patients with an emergency outside of normal working hours. The majority of PCTs (7) did not have a specific service for ACM patients different to standard primary care arrangements for an emergency, (Table 3.4). The three PCTs with specific arrangements detailed an 'out of hours service' for ACM patients, handover alerts and a method for 'flagging up' ACM patients on the electronic system of the North West Ambulance Service:

'We have now got a system for flagging patients on admission to A & E and contact the case manager… we are beginning to develop relationships around discharge and ensure that we are facilitating discharge quickly, that is something that is new and they picked up with our first referrals out of hospitals recently…' **PCT 7**

One ACM service system additionally alerted case managers to unscheduled GP contacts:

'The new ones (arrangements) that we have had to set up are working very well with the ambulance service and the case managers are getting alerts from the out of hours medical services, from the out of hours GP manager who is telephoning and contacting them about any patient they're seeing in the night, so the case manager can follow it up the following day.' **PCT 9**

The same interviewee whose service also provided a contact number for the out of hours services felt that the use of such services by case managed patients had been reduced:

'…the numbers will be left on the patient's own record or by the case manager… so for example if there is a patient which a case manager needs actively monitoring over the weekend, the patient will have a named district nurse to ring, which is left by the case manager or that named nurse will go in routinely to check and do an observation visit at the weekend
So they rarely need to make the normal 999 call?
Exactly, absolutely… And looking at the data, we don't get that many, out of hours (calls), it has gone down something like 94% from a random sample of patients, it's a radical reducer of out of hours.' **PCT 9**

Links with local authority social care services

Respondents were also asked if their PCT had agreements with local authority social care services for people with long term conditions. Six PCTs had agreements in place and the majority of these addressed how ACMs accessed social care service resources (Table A.3.1, Appendix 3). However links with social care services were felt to be the least developed and only one interviewee described plans for a fully integrated service currently operating one integrated pilot site:

'They share a base, they are co-located, they work together and they all have their work and they all seem to relate. The agenda for the full integration is happening now it will be between now and the end of next year.' **PCT 7**

Other interviewees saw this as an area requiring further development:

'I think that it is an area that we would all slag off and say was difficult and it would help things enormously if we could move that along. I know X is planning to, with working more closely with social services to improve that, but they are in the beginning, but they could be better and wider.' **PCT 5**

Particular problems were poor communication and conflict over budgets:

'So if the hospital has admissions prevented that has implications for the social service providers budget which means the government doesn't have to incentivise them in the same way, so you have got an immediate conflict.
Obviously that affects your day to day working… would the answer, the solution be, sharing the budgets?
Yes, it has caused conflict but it is purely on a monetary, financial basis and it is something that the PCT is looking at now, it is very encouraging to see that has been taken forward.' **PCT 8**

Table 3.5: Formal arrangements for sharing information about individual patients with partner organisations

	Acute/ foundation trust		Local authority		Intermediate care services	
	No.	%	No.	%	No.	%
Joint access to computerised client record systems	2	20	-	-	3	30
Case managers have access to hospital patient records	6	60	-	-	1	10
Multidisciplinary locality meetings	1	10	1	10	1	10
Via a designated person	1	10	1	10	1	10
Shared assessment documents within the SAP	6	60	8	80	6	60
Shared assessment documents outside the SAP	1	10	2	20	2	20
Shared review documents	1	10	2	20	2	20
Single case file	-	-	2	20	2	20
Exchange of written information	3	30	1	10	2	20
Patient-held records	3	30	4	40	3	30
Disease registers	1	10	-	-	-	-
No. of PCTS	10		10		10	

Source: Question 15 - Does your ACM service have formal arrangements for sharing information about individual patients with partner organisations? Tick all that apply

PCTs were asked to indicate whether their service had formal arrangements for sharing information about individual patients with partner organisations (Table 3.5). The majority of PCTs (8) had formal arrangements for sharing assessment documents within the Single Assessment Process with local authorities. Six PCTs had similar arrangements for sharing this information with acute/foundation trusts and six with intermediate care services. Only one PCT had formal arrangements to share information about their ACM patients with acute/foundation trusts through disease registers. Arrangements for case managers to have access to hospital patient records were formalised with acute/foundation trusts by six PCTs.

Information sharing between the ACM service and secondary and intermediate care was better developed than with local authority social care services. Although shared assessments were frequently used there was less sharing of other information. Information technology systems were cited as the reason by three interviewees:

You both use the shared assessment process; I noticed that was how active case management patients are assessed. Is there a sharing of that information across…?

No, because we don't have shared computer systems, so at the moment it is being duplicated. We are working on it, but it is very difficult when its, a strategic, a national level really, it could be better.' **PCT 8**

As a result of the inability to share information effectively with the local authority, one interviewee described patients being managed by both the PCT and social care:

'…quite recently, in the last six months, what we have done is shared a list of all the patients who are being actively case managed and cross referenced them with social services database and although I can't quote actual figures, or accurate figures, but I think a number or patients were known to both services and were being care managed by both services.' **PCT 2**

In one PCT there were plans to develop a joint record in the future:

'We have agreement to run a health and social care record, that was July last year (2006) when we got the approval, but it has been slow because of government issues and getting agreement, but we are moving more and more into single records.' **PCT 9**

Staff mix and tasks

Table 3.6: Primary location of case managers/case manager assistants or their equivalents

	No.	%
GP practices	2	20
Health and social care integrated team	1	10
Nurse team in primary health care	7	70
Health and social care integrated old age team	-	-
Health and social care integrated old age mental health team	-	-
Hospital	-	-
Local authority social care services team	2	20
No. of PCTS	10	

Source: Question 17 - Where are case managers/case manager assistants for people with long term conditions, or those undertaking the equivalent role, based? Tick all that apply (For staff working at more than one site, please tick their **primary** location.)

As Table 3.6 shows, in the majority of PCTs, (7) case managers (or their equivalents) were based in a nurse team. Two PCTs based their case managers in GP practices and one PCT had case managers located in an integrated team (health and social care). Two PCTs reported that the primary location of their case managers was in a local authority social care services team. As described above, those ACM services with case managers linked to GP practices reported more positive relationships with those practices.

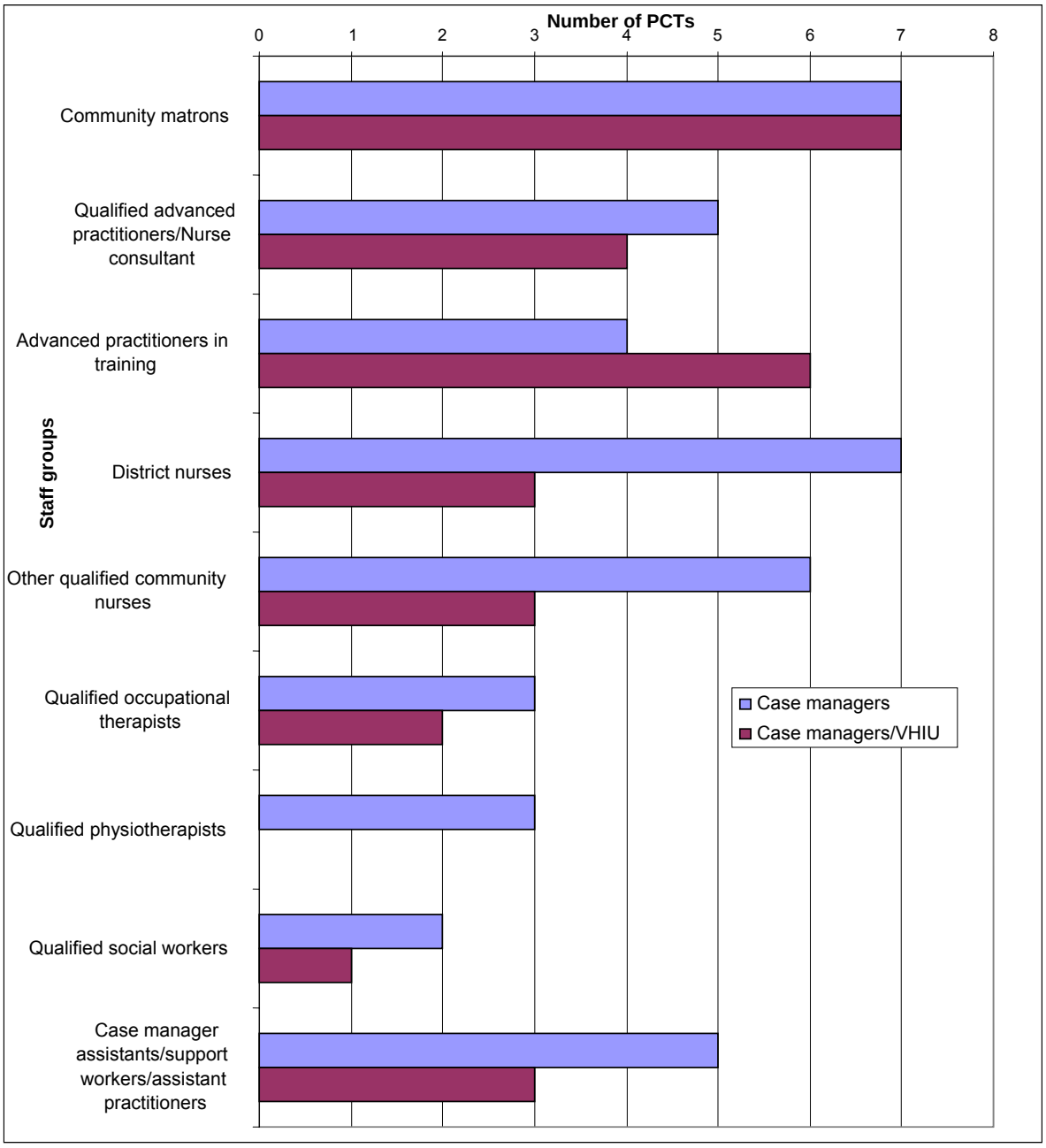
Table 3.7: Organisation providing the manager for case managers

	No.	%
Health services only	10	100
Jointly managed, (health services holds major responsibility)	-	-
Jointly managed (social care services holds major responsibility)	-	-
Local authority social care only	-	-
Other	-	-
No. of PCTS	10	

Source: Question 18 - Which organisation provides the manager for case managers? Tick all that apply

In all the PCTS (10) case managers were managed solely by health services staff. No other organisation such as a local authority social care team provided any managerial responsibility for case managers in any of the PCTs (Table 3.7).

Figure 3.3: Staff groups acting as case managers within the ACM service and working with Very High Intensity Users



Source: Question 16 - Which staff groups work with people with long term conditions and act as case managers within the ACM service? Which staff groups work with Very High Intensity Users? Tick all that apply

PCTs were asked to indicate which staff groups acted as case managers within their ACM service and also to indicate which staff groups worked with *Very High Intensity Users*. The three staff groups most likely to fulfil the case manager role in 7 PCTs were: community matrons and district nurses. In six PCTs other qualified community nurses such as disease specialist nurses acted as case managers. As Figure 3.3

illustrates the staff groups working as case managers were not always the same groups who worked with *Very High Intensity Users.* The majority of respondents specified that community matrons (7) and advanced practitioners in training (6) were most likely to work with these patients.

One ACM service described how patients were assigned to different staff according to intensity of need:

'There was a pathway for those patients who would be of high intensity to be seen by the community matrons, those people who fluctuate between steady state and high intensity would be [case managed by] the active case managers and then the dormant patients are seen by the assistant practitioner and/or district nursing.' **PCT 8**

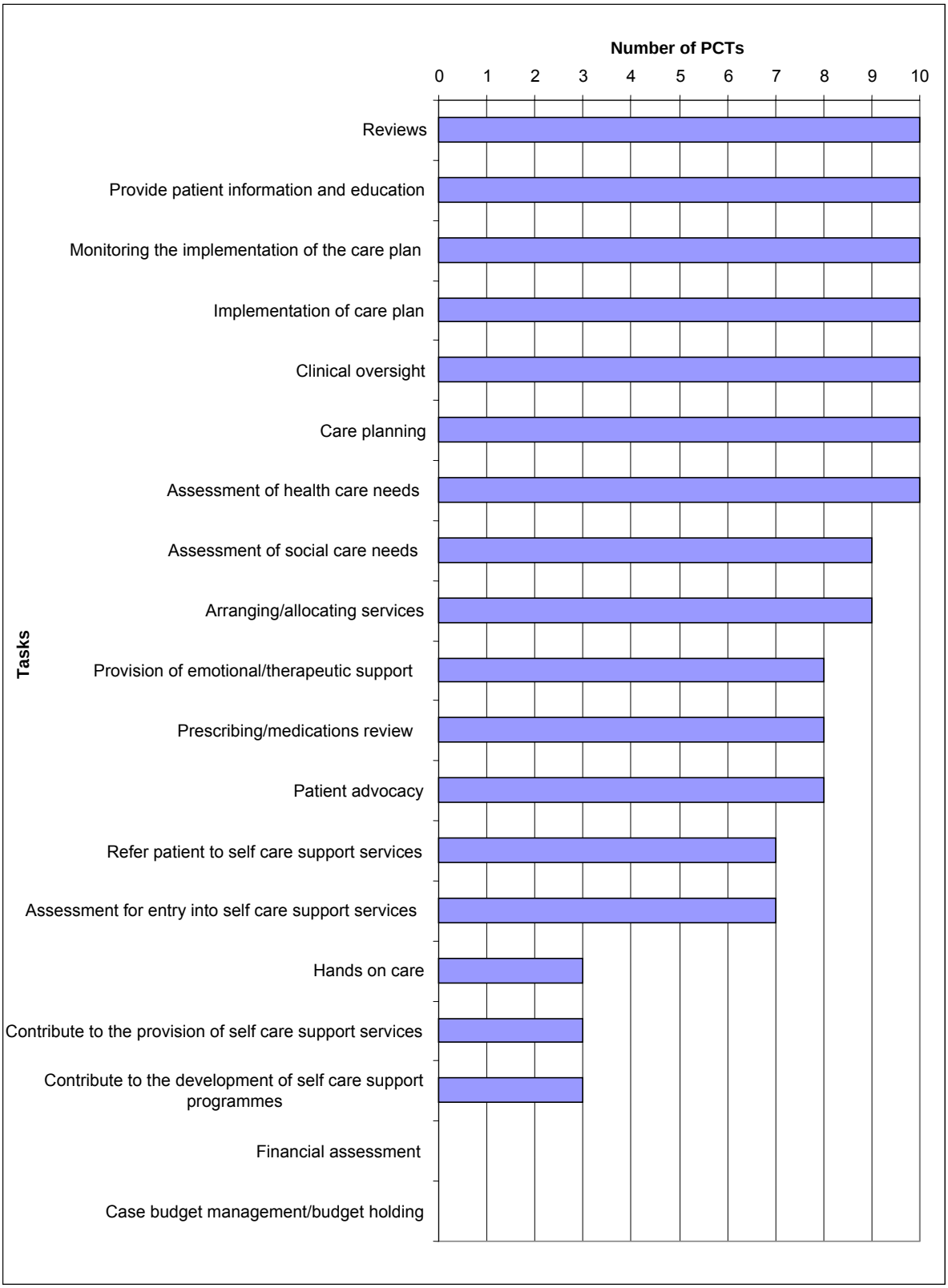
Respondents were asked to specify whether the tasks described were those which case managers usually carried out, those which they would sometimes and also which were never undertaken, these are detailed in table A.3.5 Appendix 3. Figure 3.4 illustrates the tasks 'usually' undertaken by active case managers. Seven tasks were regularly undertaken by active case managers from all ten of the PCTs. They were: assessment of health care needs; care planning; implementation of care plan; monitoring the implementation of the care plan; reviews; clinical oversight; and provide patient information and education. Case managers did not usually undertake financial assessments or manage budgets for patients in their ACM service in any of the PCTs.

One interviewee spoke of the tasks being carried out by case managers as consisting of too much direct care:

'I think they (case managers) were too hands on, or if they were busy or somebody was off sick, they just reverted back to district nursing. Yes, so I don't think they saw themselves as active case managers, and certainly if you were in meetings with them, they would say, my name is such a body and I'm a district nurse, and you would think, no you are not, you are a case manager.' **PCT 2**

It was felt this situation was due to recruiting predominantly from existing district nurses who did not become full time case managers but simultaneously retained district nursing roles. Training to raise awareness of the case manager role was being undertaken to address this problem.

Figure 3.4: Tasks undertaken by active case managers



Source: Question 19 – Do active case managers undertake the following tasks? Tick one box for each task

Process of active case management

Patient identification

Table 3.8: Targeting ACM at specific diseases or conditions by PCT

	No.	%
Not targeted at a specific disease	6	60
Asthma	3	30
Chronic Obstructive Pulmonary Disease	4	40
Diabetes	4	40
Hypertension	4	40
Cancer	-	-
Coronary Heart Disease	4	40
Stroke and Transient Ischaemic Attack (TIA)	4	40
Epilepsy	3	30
Other neurological conditions	3	30
Hypothyroidism	1	10
Mental Health	1	10
Multiple conditions	4	40
Musculoskeletal conditions	4	40
Other (please specify)	-	-
No. of PCTS	10	

Source: Question 23 - Is ACM in your PCT targeted at specific diseases or conditions?

Table 3.8 shows that four of the PCTs targeted their ACM service at a specific disease or condition. These included Chronic Obstructive Pulmonary Disease, Diabetes, Hypertension, Cancer, Coronary Heart Disease, Stroke and Transient Ischaemic Attack and Musculoskeletal Conditions. Mental health and Hypothyroidism were conditions only targeted within one PCT.

Table 3.9: Identification of high risk patients

	All methods		Most effective method	
	No.	%	No.	%
Referrals from other professionals	10	10	2	20
Castlefields tool	9	90	2	20
Patient at Risk of Re-hospitalisation II (PARR II)	8	80	1	10
Patient at Risk of Re-hospitalisation I (PARR I)	5	50	2	20
Single Assessment Process (SAP) documentation	4	40	-	-
Disease registries	3	30	-	-
Combined predictive model	2	20	-	-
High-impact user manager (Dr Foster)	1	10	-	-
Hand searching patient records	1	10	-	-
Other methods (please specify)	1	10	2	20
No. of PCTs	10		9	

Source: Question 25 - What are the main methods adopted for identifying **high risk** patients within your service? In **column 1** please indicate **all main methods that apply to your service**. In **column 2** please indicate which **one** of the methods listed is most effective within your service.

PCTs were asked to specify which method was the most effective in identifying high risk patients (see Table 3.9). Two PCTs reported PARR II, two the Castlefields model and two referrals from other professionals. The remaining PCTs (2) indicated that they could not specify one of the models as they were dependent on a multiplicity of models to create to identify their high risk patients.

Two methods; high-impact user manager and handsearching patient records were each reported to be used by only one of the PCTs to identify high risk patients.

Interviewees were asked about how they used these methods in practice. All reported the use of referrals from other professionals to identify patients for the ACM service and the majority of them also utilised the Castlefields tool (9) and Patient at Risk of Re-hospitalisation II (PARR II) (8). Several PCTs used more than one method, one PCT using a mixed methods approach commented that they could not have the same level of impact on those patients scoring the highest on PARR II as they could for those with a lower score, as the higher the score the less effective the intervention. In their experience, PARR II or a referral from a professional, plus Castlefields was the way that most of their patients were identified. The representative of one PCT commented:

'…it (PARR) gives a percentage of predicted risk of re-admission (to hospital) and that is very useful, nothing in isolation is successful, but the three and clinical judgment make it very good….
How did you get then from deciding that looking through that data was not getting perhaps the best, to moving towards Castlefield?
What was very evident was that we were looking at the hospital information and what was evident was the information about people's risk of hospital admission was actually kept within the GPs computer system. So that is why PARR is far more successful because then we can actually then we can go and take that back and look at the person in the community post looking at previous admission, when, see to look at the emerging risk as opposed to the past risk.' **PCT 7**

Assessment

Table 3.10: Assessment tools used by active case managers

	No.	%
Locally approved Single Assessment Process (SAP) tool	10	100
Easycare	1	10
Disease specific	1	10
MDS	-	-
FACE	-	-
Other	-	-
No. of PCTS	10	100

Source: Question 27 - Which assessment tools are in use by active case managers? Tick all that apply

Table 3.10 shows the assessment tools which are used by case managers. Within all the PCTs (10) it was reported that case managers used a locally approved Single Assessment Process (SAP) tool to assess ACM patients. In addition to this method of assessment, one PCT reported the use of the Easycare tool and another a disease specific assessment schedule.

Care planning

Table 3.11: Ability of active case managers to authorise the use of local authority resources

	No.	%
Domiciliary care	2	20
Respite care	-	-
Day care	-	-
Other	-	-
No. of PCTS	10	

Source: Question 30 - Can active case managers authorise the use of any local authority resources for patients? Tick all that apply

Respondents were asked whether active case managers in their PCT could authorise the use of local authority resources. Case managers from two PCTs were able to do this and for both this was limited to domiciliary care as reported in Table 3.11. Joint commissioning arrangements had allowed case managers in one PCT to authorise resources:

'…our five (case managers) can micro commission right the way through to make modifications in social care packages without having to go through social care teams.' **PCT 9**

Table 3.12: Policy on case allocation

	No.	%
None	5	50
Level of staff qualification	4	40
Intensity of involvement	4	40
Allocation as staff available	3	30
Length of contact	1	10
Time limited, short term intensive involvement	-	-
No. of PCTs	10	

Source: Question 31 - Does the ACM service have a written policy to allocate cases of different levels of need/complexity/risk to different levels of case management (e.g. low risk patients may be visited monthly and high risk patients may be visited weekly)? If yes, how are cases allocated? Tick all that apply

Table 3.12 illustrates whether the PCT's ACM service had written policies to allocate cases of different levels of need or complexity to different levels of case management. An example of this would be if patients deemed to be low risk were visited monthly and those patients considered to be high risk were visited weekly. Five of the ten PCTs did not have a policy to allocate cases to different levels of case management. Of the five that did, the majority (4) allocated their cases of different levels of complexity according to the intensity of involvement and/or level of staff qualification. No PCT had a policy which involved allocating cases within a time limited, short term intensive model of case management.

Interviewees were asked how cases were allocated, regardless of whether there was a written policy in place. Four interviewees described complex cases being allocated to higher qualified staff:

'…the team runs an allocation session… and (the manager) gives them out according to need and the skill of the practitioner… the advanced practitioner will have very focused and complex clinical skills and clinical needs, ensuring that not only the skill of the member of staff, but also the weight of work on that caseload, so you haven't got people who have got all the high intensity cases in one place…' **PCT 5**

Monitoring and review

Table 3.13: Active caseload size

	No.	%
30	3	30
40	2	10
50	3	30
60	-	-
70	1	10
80	1	10
No. of PCTS	10	

Source: Question 32 - Please estimate a case manager's average **active** caseload size?

Respondents were asked to estimate the average active caseload size for a case manager in their PCT (see Table 3.13). This varied from 30 (the smallest) to 80 (the largest) with the average (mean) being 47. The interviewee from the service with caseloads of 80 felt this number was unmanageable:

'I mean you couldn't possibly manage eighty but that is the target that somebody came up with originally probably with very little evidence but just by sticking their finger up in the air probably and saying, 'Well that looks alright to me!' **PCT 5**

Another interviewee commenting on the target caseload of 80 felt that as some PCTs appeared to be managing this it made it difficult for the others to complain.

Table 3.14: Proportion of the overall active ACM caseload visited at least weekly

	No.	%
0-20%	2	20
21-40%	1	10
41-60%	3	30
61-80%	1	10
81-100%	1	10
No. of PCTS	8	

Source: Question 34 - Please estimate the proportion of the overall active ACM caseload that are visited at least weekly within your service. Please tick one box

Table 3.14 illustrates the proportion which respondents estimated were visited at least weekly by case managers. Out of the eight PCTs which responded to this question the majority (5) estimated that over 40 per cent of patients on caseloads were visited weekly in their service.

Table 3.15: Reasons for case closure

	No.	%
Death	10	100
Leaving locality	5	50
Patient refusing service	5	50
No discernable benefit from ACM service	4	40
Moved to disease specific services	2	20
Moved to community nursing	1	10
Moved to long term care home	1	10
Other	1	10
Moved to informal care	-	-
Moved to self care support	-	-
Moved to social care services	-	-
No. of PCTS	10	

Source: Question 37 - What are the three most common reasons for case closure in your ACM service? Tick the three most frequent reasons

Respondents were also asked to specify the most common reasons for case closures in their ACM service (Table 3.15). Obviously death was reported by all respondents as a reason for case closure. That the patient left the locality or refused the service was also given as a common reason for case closure by half of the respondents (5). One PCT specified that they were still currently building caseloads and so had less reason for case closure.

Several interviewees described cases being stepped down to a 'maintenance level' rather than discharged, one interviewee with a lower caseload in her team overall had not closed any cases. One interviewee described the process of moving a patient down to an inactive status:

'What we say is that the matrons go in and once they have been stable for three months and the matrons feel that they're able to self care, they don't need any more intervention they're not exactly discharged but they put them as inactive. That patient or the GP can then refer themselves back into the service at any time. It's like a tier level reducing input and reducing contact to probably perhaps within the last month it might only be telephone contact and once they seem to be ok well then you are back to the GP for the bulk of your care if you feel you need any input from the matron ring us back.' **PCT 1**

Although, one interviewee (with the highest caseload size) spoke of the necessity of cases being discharged from the service:

'We step them down to inactive, yes, we have started now to find that we will discharge.' **PCT 5**

One PCT described how they planned to operate in the future with regard to case closure and discharge from the service, namely that they intended to develop a twelve week time limited intensive involvement, although a decision to discharge a patient after this time will be would be discussed with the team:

'If we get to the twelve week point and it's not clear to the individual active case manager that patient can be discharged back to primary care there needs to be a discussion within the cluster team and if there is a consensus within a team that yes that patient you've done everything you can they can be supported in primary care then they're discharged, if there is an intervention that's been put in place and it seems to be making a difference but it just you know needs to be a bit more time spent then that's fair enough but that needs to be a team agreement.' **PCT 4**

Measures of Integration

Indicators of an integrated system of care between ACM and partner organisations (primary care, local authorities, intermediate care services and acute/foundation trusts) were developed by the research team (Box 3.1).

Box 3.1: Active case management: Indicators of integrated practice

Primary Care (Table A.3.6)
- ACM service delivered by a GP practice population model
- Case managers based at GP practices
- Formal agreements with community nursing
- Formal agreements with community pharmacy
- Formal agreements with community physiotherapy

Local Authority (Table A.3.7)
- ACM service delivered by an integrated health and social care model
- Social worker undertaking case management
- Agreements with local authority social care
- Case managers can authorise social care resources
- Information shared with local authority social care at multidisciplinary locality meetings

Intermediate Care Services (Table A.3.8)
- Schemes in place to prevent hospital admission

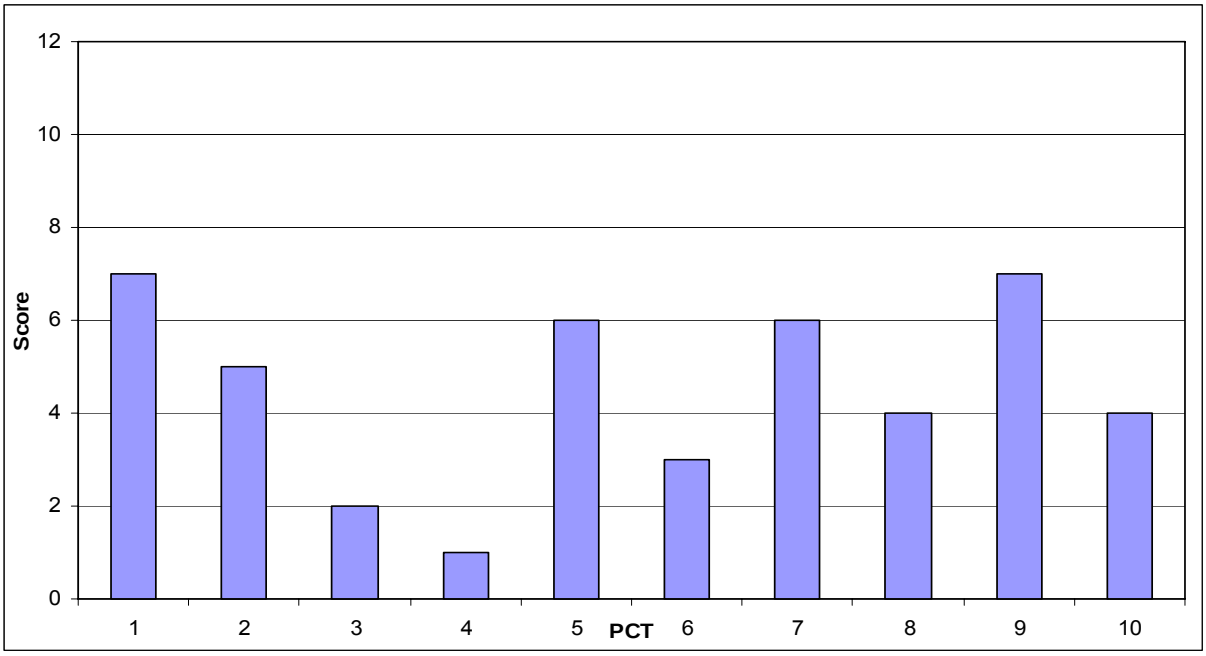
Acute/Foundation Trusts (Table A.3.9)
- Access to hospital records

Table 3.16: Indicators of integrated practice

PCT code	Primary care (max 5)	Local authority (max 5)	Intermediate care services (max 1)	Acute/ Foundation Trusts (max 1)	Total (max 12)
1	3	3	-	1	7
2	2	2	1	-	5
3	-	2	-	-	2
4	-	-	1	-	1
5	3	1	1	1	6
6	-	2	-	1	3
7	4	1	-	1	6
8	3	-	-	1	4
9	4	2	1	-	7
10	2	-	1	1	4

Using these measures, scores indicating the integration between the partner organisations were compared for each of the PCTs (Table 3.16). Both PCT 9 and PCT 7 had the highest score (4) for integration with primary health care, whilst PCT 3, PCT 4 and PCT 6 had the lowest (0). PCT 1 had the highest score for social care, whilst PCT 4, PCT 8 and PCT 10 had the lowest. Further details of variation in these indicators of integration between PCTs can be found in Tables A3.6-A3.9 (Appendix 3).

Figure 3.5: Composite overall integration scores by PCT



The data in the final column of Table 3.16 is depicted in Figure 3.5. The overall composite integration scores are compared for each PCT. PCT 9 and PCT 1 scored highest out of the eight PCTs gaining a total integration score of seven out of a possible twelve.

The interviewee representing one of the PCTs scoring highest on integration described her various connections with other agencies and had worked for both the PCT and the local authority:

'I knew all the networks and who the stakeholders were, who the key players were across the organisations. I knew how to negotiate and initiate not only data collection, but even down to planning a conference for induction, and I think that certainly helped. It was about my credibility in a wider network and knowing who the key players were, but then I still had a lot of work to do with GPs, trying to get them on board and how to sell it to practices…I used to be a senior manager for what used to be a community trust here and I managed all the community nursing service and GP fund holding, so a lot of the GPs already knew me and although I worked for the local authority in a different role, I knew how to pitch the benefits for the GP practices.' **PCT 9**

PCT 4 had the lowest score, meeting only one of the indicators of integrated practice.

Box 3.2: Active case management: Indicators of intensive case management

- Policy for the allocation of cases
- Caseload size is less than 30
- Three or less target conditions for ACM service
- Intensive visiting (over 41% of cases are visited at least weekly)

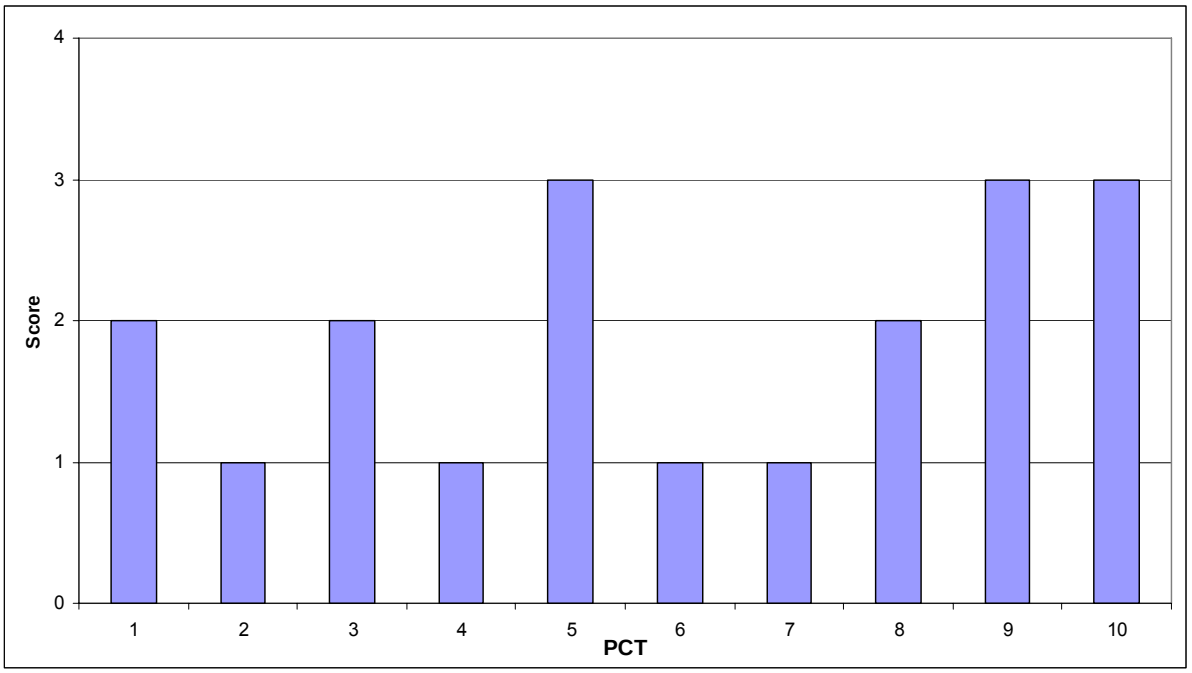
Table 3.17: Indicators of intensive case management

	Indicators of intensive case management			
PCT code	Policy for allocation of cases	Caseload < 30	3 or less target conditions	Intensive visiting[1]
1	-	-	1	1
2	1	-	-	-
3	-	-	1	1
4	-	-	1	-
5	1	1	1	-
6	-	-	1	-
7	-	-	-	1
8	1	1	-	-
9	1	1	-	1
10	1	-	1	1
Total	5	3	6	5

[1] At least weekly

An indicator of intensive case management was also developed (Box 3.2). Figure 3.6 illustrates how the PCTs scored on this indicator of the quality of intensive case management by PCT. PCTs 5, 9 and 10 all scored highly (3), whilst PCTs 2, 4, 6 and 7 and gained the lowest score (1). Details of the presence or absence of each indicator for each PCT is provided in Table 3.17.

Figure 3.6: Intensive case management quality indicator scores by PCT



Summary – findings part one

This section has described the characteristics of ACM in Greater Manchester, as measured by data gathered through postal questionnaires from all ten of the PCTs and eight interviews. The ten PCTs in Greater Manchester compared favourably on a number of Health Care Commission national indicators relating to case management and supporting people with long term conditions.

The majority of PCTs were based on a GP practice locality model and had worked to establish links with GPs as these were considered to be important to the success of the service. All PCTs reported that case managers were managed by health services staff and the majority were based in a nurse team. Although a range of staff were reported as acting as case managers the staff groups most likely to take on this role were community matrons, district nurses and other qualified community nurses such as disease specialist nurses. A broad range of similar tasks were usually carried out by case managers in all PCTs, although some role conflict was highlighted in relation to a disproportionate amount of 'hands on' care provided by former district nursing staff. Case managers did not usually undertake financial assessments or manage budgets for patients in their ACM service in any of the PCTs.

Size of caseload, an issue of contention, varied from 30 to 80 across the PCTs and some felt that the target caseload of 80 was unrealistic. Five of the ten PCTs had a policy to allocate cases to different levels of case management and several interviewees described cases being stepped down to a 'maintenance level' rather than discharged. Only four of the PCTs targeted their ACM service at a specific disease or condition.

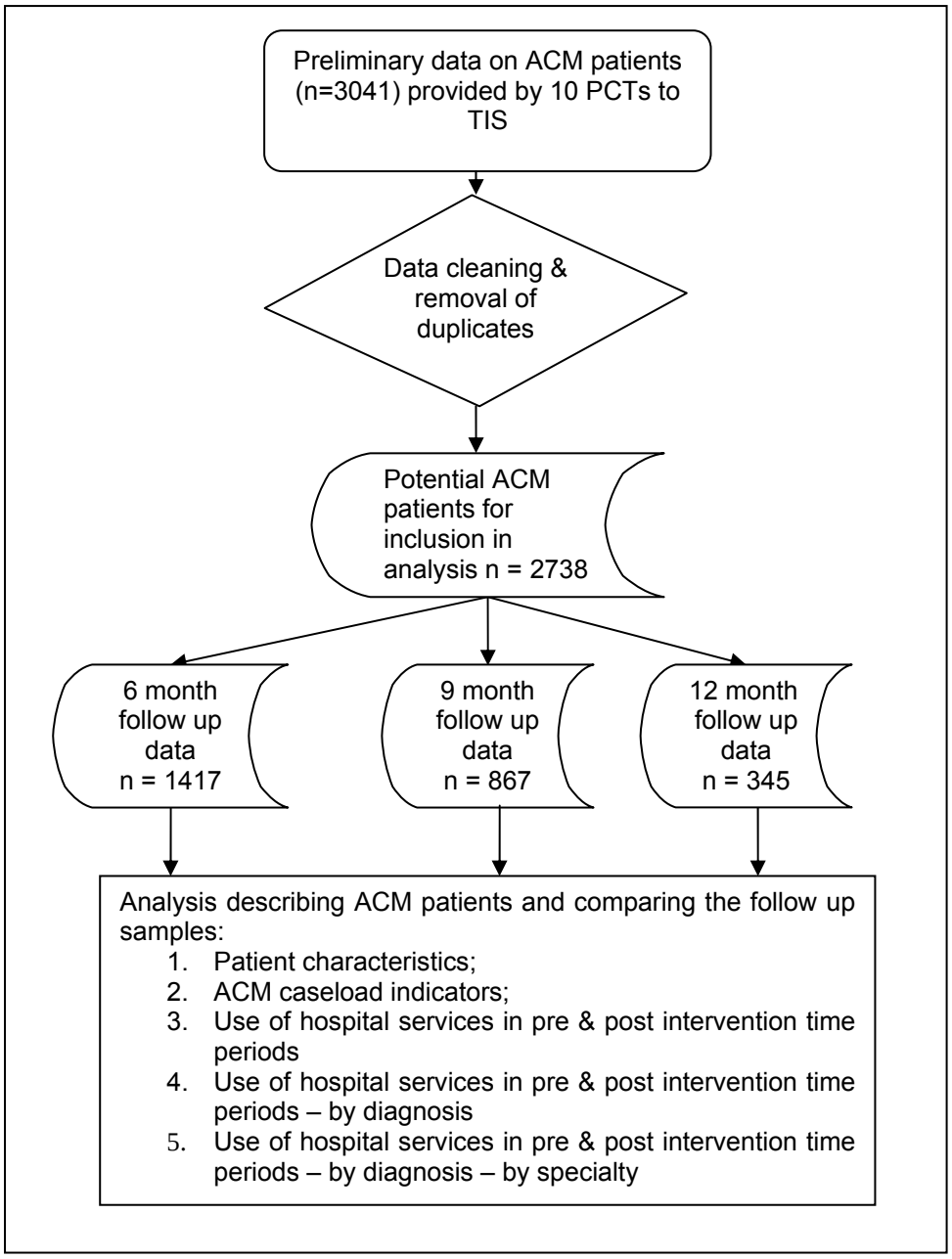
All PCTs reported using referrals from other professionals to identify patients for the ACM service and the majority of them also utilised the Castlefields tool and Patient at Risk of Re-hospitalisation II (PARR II). A locally approved Single Assessment Process (SAP) tool to assess ACM patients was used in all PCTs and the majority of PCTs had formal arrangements for sharing assessment documents within the Single Assessment Process with local authorities. The most commonly established formal agreements were between ACM and community nursing and although establishing links between secondary care and ACM was viewed as positive it was suggested that these links could be slow to develop.

FINDINGS PART TWO: SERVICE UTILISATION

This section of analysis explores the overall contribution of active case management (ACM) service arrangements upon service utilisation.

Potential sample

Figure 3.7: Service utilisation data & analysis flow chart



The preliminary data sent from all ten PCTs to the Tactical Information Service (TIS) identified 3041 new patients (Table 3.18, Figure 3.7) who had received ACM services between the period from 5th July 05 to 30th August 07. Patients in receipt of ACM services were defined as those who had been added to ACM caseloads. The

amount and intensity of ACM input was unable to be measured. Ten per cent (303) of all new patients identified were excluded from the data extraction process due to duplicate entries, insufficient data to identify patients or assign to an appropriate period of time. In PCT 9 half of all ACM cases were excluded in this way.

Table 3.18: Data provided by PCTs and included in the analysis

	Submitted by PCTs (n=3041) n (%)[1]	Included in analysis			
		All[1] (n=2738) n (%)[2]	6 months (n = 1417) n (%)[2]	9 months (n = 867) n (%)[2]	12 months n=345 n (%)[2]
ACM provider PCT					
1	192 (100)	152 (79.2)	61 (31.8)	37 (19.3)	11 (5.7)
2	835 (100)	721 (86.3)	447 (53.5)	348 (41.7)	113 (13.5)
3	459 (100)	459 (100.0)	25 (5.4)	19 (4.1)	8 (1.7)
4	141 (100)	141 (100.0)	99 (70.2)	40 (28.4)	18 (12.8)
5	528 (100)	525 (99.4)	326 (61.7)	192 (36.4)	73 (13.8)
6	293 (100)	288 (98.3)	224 (76.5)	124 (42.3)	62 (21.2)
7	153 (100)	119 (77.8)	58 (37.9)	44 (28.8)	32 (20.9)
8	172 (100)	172(100.0)	96 (55.8)	17 (9.9)	8 (4.7)
9	207 (100)	103 (49.8)	36 (17.4)	19 (9.2)	6 (2.9)
10	61 (100)	58 (95.1)	45 (73.8)	27 (44.3)	14 (23.0)

[1] 303 cases were excluded due to insufficient data to identify patients or assign to an appropriate period of time or duplicate entries.
[2] Based on % of cases submitted by each PCT

Sample selection for analysis

For the purposes of analysis the data was split into four samples – first, the overall eligible ACM sample in receipt of ACM services (n=2738), second, those where at the time of the TIS data extraction six months time had lapsed since they were added to the caseload (n=1417), third, those where at the time of the TIS data extraction nine months had lapsed since they were added to the caseload (n=867) and fourth, those for whom 12 months had lapsed (n=345). Patients were excluded from the respective analysis if they had died within any of the 6, 9 or 12 month periods post addition to an ACM caseload.[2] Patients added to caseloads were variably represented for each ACM provider PCT, with contributions to the sample ranging from 5.4 per cent to 76.5 per cent in the six month cohort sample, from 4.1 per cent to 44.3 per cent in the nine month cohort sample and from 2.9 per cent to 23.0 per cent in the 12 month cohort sample (Table 3.18).

Subsequent results in this second part of the chapter (and also the subsequent part, section three) concentrate on findings related to the nine month cohort sample. It is necessary to focus on a sub sample of the data which extends the follow up period whilst maximising the sample size. Although the longest follow up period available in the dataset is 12 months most PCTs had only a small sample of patients with this data available, due to the intervention being at a relatively early stage of implementation (column 6, Table 3.18). The nine month cohort sample provides the longest period of follow up data available which does not compromise the size of the sample. The corresponding results for the six month cohort sample and the 12

[2] In the 9 month cohort sample 99 patients were excluded because they had died within the 9 month period post addition to an ACM caseload but before the date of data extraction. In the 6 month cohort sample 102 patients were excluded for this reason and in the 12 month sample 55.

month cohort sample can be found in Appendix 4 and are summarised at the end of this section.

Patient characteristics – nine month cohort

The patient characteristics of the sample are described in Table 3.19 (socio-demographics) and Table 3.20 (diagnosis).

Table 3.19: Sample characteristics for the nine month cohort sample (n=867): PCT and socio-demographics

	n (%)
ACM Provider PCT	
1	37 (4.3)
2	348 (40.1)
3	19 (2.2)
4	40 (4.6)
5	192 (22.1)
6	124 (14.3)
7	44 (5.1)
8	17 (2.0)
9	19 (2.2)
10	27 (3.1)
Age at entry to caseload (mean, sd) [1]	78.4 (10.2)
Age at entry to caseload	
<18	1 (0.1)
18>65	62 (7.2)
65>=75	214 (24.7)
>75	561 (64.6)
Not known	29 (3.3)
Gender	
Female	546 (63.0)
Male	317 (36.6)
Not known	4 (0.5)
Ethnicity	
White	763 (88.0)
Other ethnic group	35 (4.0)
Not known	69 (8.0)
Deprivation	
A (most deprived)	428 (49.4)
B	194 (22.4)
C	109 (12.6)
D	68 (7.8)
E (least deprived)	25 (2.9)
Unknown	43 (5.0)

[1] n=838 (age not known; n=29)

The contribution of different PCTs to the longitudinal cohorts is further highlighted in Table 3.19. In the nine month cohort sample PCT 2 contributed to 40.1 per cent of the total sample, compared with seven other PCTs which contributed 5.1 per cent or less of the nine month cohort sample. The subsequent analysis is therefore based upon the combined PCT results due to the wide variation of how well represented the 10 PCTs are in the sample. The majority of ACM patients included in the sample were white (88%), female (62.9%) and over 75 years of age (64.6%). Around half of the sample resided in the most deprived area of the locality (49.3%) (measured by the Index of Multiple Deprivation).

Table 3.20: Sample characteristics nine month cohort sample (n=867): primary and secondary diagnoses at any admission

	n (%)		
	Primary Diagnosis	Secondary Diagnosis	Primary or Secondary
Has diagnosis[1] at any admission[2]			
Symptoms, signs, and abnormal clinical and laboratory findings, not elsewhere classified	317 (36.6)	218 (25.1)	386 (44.5)
Diseases of the circulatory system	244 (28.1)	342 (39.4)	405 (46.7)
Diseases of the respiratory system	227 (26.2)	179 (20.6)	273 (31.5)
Diseases of the digestive system	166 (19.1)	101 (11.6)	202 (23.3)
Injury, poisoning, and certain other consequences of external causes	154 (17.8)	50 (5.8)	172 (19.8)
Diseases of the musculoskeletal system and connective tissue	107 (12.3)	69 (8.0)	140 (16.1)
Diseases of the genitourinary system	95 (11.0)	76 (8.8)	142 (16.4)
Diseases of the eye and adnexa	79 (9.1)	16 (1.8)	84 (9.7)
Malignant neoplasms	48 (5.5)	28 (3.2)	57 (6.6)
Factors influencing health status and contact with health services	45 (5.2)	208 (24.0)	222 (25.6)
Endocrine, nutritional, and metabolic disease	43 (5.0)	114 (13.1)	138 (15.9)
Diseases of the nervous system	39 (4.5)	49 (5.7)	71 (8.2)
Diseases of skin and subcutaneous tissue	39 (4.5)	36 (4.2)	65 (7.5)
Diseases of blood, blood-forming organs, immune mechanism	32 (3.7)	30 (3.5)	52 (6.0)
Infectious and parasitic diseases	23 (2.7)	-	23 (2.7)
Mental and behavioural disorders	23 (2.7)	26 (3.0)	38 (4.4)
In situ neoplasms	13 (1.5)	4 (0.5)	17 (2.0)
Diseases of the ear and mastoid process	2 (0.2)	2 (0.2)	4 (0.5)
Congenital malformations, deformations, and chromosomal abnormalities	1 (0.1)	4 (0.5)	5 (0.6)
External causes of morbidity and mortality	-	137 (15.8)	137 (15.8)
Number of different ICD10 chapter headings for all admissions *(mean, sd)*	2.0 (1.5)	1.9 (1.5)	3.0 (2.2)
Number of different ICD10 chapter headings for all admissions			
0	142 (16.4)	158 (18.2)	142 (16.4)
1	236 (27.2)	220 (25.3)	64 (7.4)
2	219 (25.2)	217 (25.0)	177 (20.4)
3	135 (15.6)	134 (15.4)	138 (15.9)
4	81 (9.3)	83 (9.6)	140 (16.1)
5	36 (4.2)	33 (3.8)	92 (10.6)
6	14 (1.6)	18 (2.1)	55 (6.3)
7+	4 (0.4)	4 (0.5)	59 (6.9)

[1] ICD10 chapter headings

[2] Diagnosis refers to all admissions (not just the diagnoses in the nine months pre and post the patient was added to an ACM caseload).

The primary and secondary diagnoses associated with each admission were explored for each patient (Table 3.20). Only patients admitted to hospital during the nine months before or after they had been added to the caseload have a diagnosis. Diagnoses were described using the chapter titles of the tenth revision of the International Classification of Diseases (ICD10) (WHO). The seven most prevalent primary diagnosis groups in the were (1) *'symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified'* (36.6%), (2) *'diseases of the circulatory system'* (28.1%), (3) *'diseases of the respiratory system'* (26.2%), (4) *'diseases of the digestive system'* (19.1%), (5) '*injury, poising and certain other consequences of external causes'* (17.8%), (6) *'diseases of the genitourinary system'* (11.0%) and (7)

'diseases of the musculoskeletal system' (12.3%). Few patients had *'mental and behavioural disorders'* primary diagnosis (2.7%). Over two thirds of the sample (67.5%) had been admitted for one of the four most prevalent primary diagnoses (ICD10 chapter headings) *('symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified', 'diseases of the circulatory system', 'diseases of the respiratory system', 'diseases of the digestive system'*).

The secondary diagnosis attributed to each admission has also been reported (Table 3.20). Although several of the most common primary diagnosis admissions were also common secondary diagnoses the proportion of cases associated with each diagnosis had altered: *'symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified'* (25.1%); *'diseases of the respiratory system'* (20.6%); *'diseases of the circulatory system'* (39.4%) and *'diseases of the digestive system'* (11.6%). Three of the ICD10 chapters which were most common in each of the cohorts for secondary diagnosis had not been as common for primary diagnosis: *'endocrine, nutritional, and metabolic disease'* (13.1%); *'factors influencing health status and contact with health services'* (24.0%) and *'external causes of morbidity and mortality'* (15.8%). When considering the four most prevalent ICD10 chapter headings *('symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified'; 'diseases of the circulatory system'; 'diseases of the respiratory system'; and 'factors influencing health status and contact with health services'***)** at secondary diagnosis, over half the sample (66.2%) had one of these attributed to their secondary diagnosis at admission.

Around three quarters of the sample (75.2%) were admitted for one of the four most prevalent primary or secondary diagnoses (ICD10 chapter headings). The total number of different diagnoses (ICD10 chapter headings) has also been aggregated to explore whether patients were repeatedly admitted with the same or different diagnoses. The average (mean) number of different primary diagnoses (ICD10 chapter headings) was 2 (for all admissions). This average was the same for secondary diagnosis. When different primary *or* secondary diagnoses were aggregated the number of different diagnoses rose to an average (mean) of 3. It is important to remember that patients would usually have at least two recorded diagnoses per admission (one primary diagnosis and one secondary diagnosis) This is reflected in the data as most patients (76%) had 2 or more ICD 10 chapter headings at primary or secondary diagnosis for all admissions (column 3, Table 3.20). The final rows of table 3.20 show the number of different ICD10 chapter headings for all admissions. Most patients had one or more chapter headings at primary diagnosis or secondary diagnosis. Almost a quarter (23.8%) had primary or secondary diagnoses which fell within 5 more or more ICD10 chapter headings.

Resource utilisation – nine month cohort

Table 3.21 outlines the receipt of ACM services for the nine month cohort sample (See Appendix 4 table A.4.3 for the 6 and 12 month cohort samples). Data from before and after the implementation of ACM are compared in Tables 3.22 -3.25 for the nine month cohort sample (n=867). The results for the six month cohort (n=1417), and 12 month cohort (n=345) samples can be found in Appendix 4 (A.4.4 – A.4.11).

ACM caseload indicators

Table 3.21: ACM caseload indicators for the nine month cohort sample (n=867)

	n (%)
Length of time since addition to caseload at time of data extraction (30/6/07) or when case closed (months) (mean)	11.6
Length of time since addition to caseload at time of data extraction or when case closed (months)[1]	
0 to 2.99[1]	5 (0.6)
3 to 5.991	10 (1.2)
6 to 8.991	12 (1.4)
9 to 11.99	508 (58.6)
12 to 14.99	311 (35.9)
15+	21 (2.4)
Length of time since set up of service (months) *(Start date of caseload – date added)* (mean, sd)	10.7 (4.8)
Length of time since set up of service (months)	
0 to 2.99	60 (6.9)
3 to 5.99	41 (4.7)
6 to 8.99	191 (22.0)
9 to 11.99	320 (36.9)
12 to 17.99	165 (19.0)
18 to 23.99	90 (10.4)
24+	-
Proportion of cases closed at time of data extraction	85 (9.8)
Reason for closure not reported	782 (90.2)
Reasons for closure	
Deceased[2]	50 (58.8)
Discharged, GP & not specified	19 (22.4)
Inappropriate referral	-
Not active[3]	4 (4.7)
Other	-
Discharged nursing, residential, pallitative care	5 (5.9)
Moved away from locality	2 (2.4)
Refused treatment	3 (3.5)
Discharged, community nursing	2 (2.4)

[1] Length of time since added to caseload' is calculated from date a patient was added to a caseload up until the time of data extraction or date of case closure (if known) or date of death. Patient were included in the sample if nine months lapsed since they were added to the caseload, even if during this time their case may have been closed (for any reason other than death). Therefore several patients have a shorter 'length of time since added to caseload' than nine months due to their case being closed within this time. They were included unless they had died witin the nine month period post ACM registration because of their potential use of secondary services.

[2] Patients who died *after* the nine month post addition to an ACM caseload.

[3] Includes patients defined as self managing or 'dependent caseload entry closed'.

For the following analysis ACM caseload indicators and hospital resource use data have been aggregated from the nine month pre ACM intervention period and compared with the nine months post addition to an ACM caseload.

Table 3.21 details aspects of the ACM caseload for all patients in the nine month cohort sample. The average (mean) length of time since a patient had been added to an ACM caseload was 11.6 months. The length of time since added to caseload (months) has been calculated from the 'date added to caseload' to either the time of data extraction or when the case was closed (if known) or death.

The length of time since the set up of the service when each patient was added to a caseload was calculated as an indicator of the level of development of the ACM service for patients included in this sample (Table 3.21). Overall the average (mean) time for the ACM service to have been operating when a patient was added to a caseload was 10.7 months for the nine month cohort sample.

Few ACM cases were recorded as formally closed (with a reason for closure described); 9.8 per cent of cases in the nine month cohort sample were closed. For those cases which were formally closed and for which a reason for closure was given, this was mainly due to the patient having died. For the 85 cases which were closed in the nine month cohort sample (Table 3.21), 50 of these were closed due to death of the patient (58.8%) nine months post addition to an ACM caseload. Several patients were discharged to other specific services e.g. community nursing, (3; 3.5%), nursing, residential or palliative care, (5; 5.9%) or were referred back to their GP or an unspecified service (19; 22.4%).

Hospital services

The use of hospital services in the nine months prior to the ACM intervention and nine months post ACM registration were compared (Table 3.22). The resource utilisation data extracted by TIS has been drawn from the National CDS (Commissioning Data Set) which are generated by the patient administration systems within each hospital (see Chapter 2). Data associated specifically with admissions to secondary care has been drawn from the Admitted Patient Care CDS.

Table 3.22: Use of hospital services in the nine months before and after addition to an ACM caseload (n=867)

	9 months pre	**9 months post**	**Significance**[1]
Number of all admissions (spell) (mean,sd)	1.5 (2.2)	1.2 (2.0)	Z-3.889, p≤0.001
Number of all admissions (spell) n (%)			
0	331 (38.2)	386 (44.5)	
1	231 (26.6)	223 (25.7)	
2	132 (15.2)	116 (13.4)	
3	74 (8.5)	68 (7.8)	
4+	99 (11.4)	74 (8.5)	
Length of stay for all admissions (days) (mean, sd)	15.5 (30.1)	12.1 (26.8)	Z-3.807, p≤0.001
Length of stay for all admissions n (%)			
0	373 (43.0)	469 (54.1)	
1-7	161 (18.5)	139 (16.0)	
8-14	79 (9.1)	63 (7.3)	
15-21	57 (6.6)	41 (4.7)	
22-28	43 (5.0)	28 (3.2)	
29+	154 (17.8)	127 (14.6)	
Method of admission (1 +, range) n (%)			
Emergency admission (A&E)	378 (43.6)	318 (36.7)	Z-4.305, p≤0.001
Emergency admission (GP)	87 (10.0)	67 (7.7)	Z-0.971, p=0.331
Emergency admission (Other)	81 (9.3)	58 (6.7)	Z-2.093, p=0.036
Elective admission	190 (21.9)	199 (23.0)	Z-0.159, p=0.873
Transfer from another hospital provider	13 (1.5)	4 (0.4)	Z-2.001, p=0.045
Tariff[3] for all admissions (spell) (£) (mean/sd)	3435.89 (5250.78)	2547.78 (4172.80)	Z-4.543, p≤0.001
Number of A&E attendances (mean, sd)	0.5 (1.1)	0.9 (1.6)	Z-7.955, p≤0.001
Number of A&E attendances n (%)			
0	619 (71.4)	512 (59.1)	
1	157 (18.1)	178 (20.5)	
2	54 (6.2)	80 (9.2)	
3 + (%)	37 (4.3)	97 (11.2)	
Number of outpatient visits[2] (mean, sd)	4.0 (4.6)	4.2 (4.5)	Z-1.957, p=0.050
Number of outpatient visits[2] n (%)			
0	190 (22.0)	194 (22.4)	
1-3	322 (37.2)	284 (32.8)	
4-6	182 (21.0)	184 (21.2)	
7+ (%)	171 (19.7)	203 (23.5)	
Tariff[3] for outpatient visits (£) (mean/sd)[2]	275.43 (337.54)	275.59 (339.08)	Z-0.161, p=0.872

[1] Wilcoxon signed ranks test
[2] Patients receiving regular dialysis were excluded from analysis of outpatient visits, n = 865.
[3] Calculated using the Payment by Results tariff for 07/08.

All admissions
The average (mean) number of admissions (Hospital Provider Spell) occuring in the nine months before the ACM intervention was 1.5 compared with a slightly reduced 1.2 admissions in the nine months post addition to an ACM caseload ($p \leq 0.001$). A large proportion of the cohort (61.8%) had a hospital admission in the nine months before the ACM intervention and this decreased to 55.5 per cent in the nine months after being added to an ACM caseload. In the 18 month period studied 142 (16%) patients had no admissions.

Length of stay for all admissions
The length of stay in hospital for each patient admitted to hospital was calculated using the date of admission and the date of discharge. The average (mean) hospital length of stay in the nine months before receiving the ACM intervention (15.5 days) decreased slightly in the nine months after being added to a caseload (12.1) ($p \leq 0.001$).

The distribution of the total length of stay in hospital for all admissions, both pre and post the date added to the ACM caseload is also explored in Table 3.22. A large proportion of the sample had no admissions to hospital during the time period evaluated (38% before and 45% after addition to a caseload and 16% overall), and were therefore recorded as having spent no time in hospital. A patient admitted and discharged on the same day will have a 'length of stay' of zero for that hospital admission. This explains why the proportion of the sample which have zero admissions and the proportion which have a length of stay of zero are not equal. In the nine months before addition to a caseload 42 (4.8%) of patients were discharged on the day of admission. This increased to 83 (9.6%) in the nine months after addition to a caseload. Of those patients who had a hospital stay of one or more days (both pre and post addition to an ACM caseload) the largest proportion had a length of stay of between 1-7 days. However, those patients who had a length of stay of 29 days or more made up the third largest proportion of the sample (both pre and post addition to an ACM caseload).

Method of admission
The method of hospital admission for each patient was also recorded and these are explored in Table 3.22. Admissions were recorded as 'elective' (prearranged admissions) or 'emergency' (unplanned admissions) and we have included several subcategories for the analysis of emergency admissions. The majority of hospital admissions were either elective or an emergency admitted via Accident and Emergency (A&E). The proportion of patients admitted as an emergency via A&E nine months before the ACM intervention was 43.6 per cent, decreasing to 36.7 per cent ($p \leq 0.001$) in the following nine month period. A similar reduction was evident for patients admitted as an emergency admission 'Other'; where the patient was admitted as an emergency case although not through A&E or their GP, for example they were admitted through a bed bureau. In the nine months before addition to the caseload 81 (9.3%) patients were admitted this way, which decreased to 58 (6.7%) in the nine months after, this was significant at the five per cent level ($p=0.036$). Admissions which were transferred from another hospital provider also reduced (13 vs 4; $p=0.045$) and this was also significant at the five per cent level. Although the number of patients admitted as an elective admission did increase slightly in the 18

months analysed for this nine month cohort (from 190 to 199) this was not significant.

Tariff associated with all admissions
The average (mean) tariff or cost (using the tariff rules of the current year 07/08 PbR Tariff) reduced slightly from the nine months before ACM intervention to nine months after the intervention (£3435.89 vs £2547.78; p≤0.001) (Table 3.22).

Accident and emergency attendances
The number of Accident and Emergency (A&E) attendances for each patient were extracted from the A&E Commissiong Data Set (CDS). The mean number of A&E attendances rose slightly from an average (mean) of 0.5 during the nine months before the ACM intervention to 0.9 (p≤0.001) nine months after (Table 3.22, row 7). The proportion of those in each sample having attended A&E increased from 28.6 per cent in the nine months before the intervention to 40.9 per cent in the nine months after addition to an ACM caseload. The proportion of patients who attended A&E three or more times increased more than twofold from 4.3 per cent in the nine months before the intervention to 11.2 per cent in the nine months after being added to an ACM caseload. It is important to note here that collecting data for this dataset did not become mandatory until April 2006 for hospital trusts, therefore some attendances may be missing.

Outpatient visits
Data were also provided by TIS for the number of patient outpatient visits and the tariff associated with these visits. These data were extracted from the Outpatients CDS. The number of outpatient appointments rose very slightly from the mean number of outpatient visits in the nine months prior to addition to the ACM caseload (4.0) compared with the nine months post addition to an ACM caseload (4.2) (Table 3.22). This was significant at the five per cent level (p=0.05).

Table 3.22b: Use of hospital services: emergency admissions[1] in the nine months before and after addition to an ACM caseload (n=867)

	9 months pre	9 months post	Significance[1]
Number of emergency admissions (spell) (mean, sd)	1.1 (1.7)	0.9 (1.7)	Z-4.691, p≤0.001
Number of emergency admissions (spell)			
0	407 (46.9)	495 (57.1)	
1	234 (27.0)	190 (21.9)	
2	113 (13.0)	88 (10.1)	
3	50 (5.8)	57 (6.6)	
4+	63 (7.3)	37 (4.3)	
Length of stay for emergency admissions (mean, sd)	13.6 (28.5)	10.7 (24.7)	Z-3.277, p=0.001
Length of stay for emergency admissions			
0	418 (48.2)	508 (58.6)	
1-7	150 (17.3)	122 (14.1)	
8-14	69 (8.0)	54 (6.2)	
15-21	53 (6.1)	41 (4.7)	
22-28	38 (4.4)	25 (2.9)	
29+	139 (16.0)	117 (13.5)	

[1] The number of emergency admissions was calculated using the information about method of admission which was recorded for each hospital admission. Emergency admissions include those made through an Accident and Emergency department (A&E), requested by a GP (GP) or those which may have been requested by a Bed bureau or a Consultant clinic, or transferred through the Accident and Emergency department of another provider (Other).

[2] Wilcoxon signed ranks test

Number of emergency admissions

The average (mean) number of emergency admissions reduced from 1.1 in the nine months before addition to an ACM caseload to 0.9 (p≤0.001) in the nine months after. The proportion of patients admitted to hospital as emergency admissions fell from 53.1 per cent of the sample in the nine months before addition to an ACM caseload to 42.9 per cent in the nine months after.

Length of stay for emergency admissions

The length of stay in hospital for each emergency admission was also calculated. The average (mean) hospital length of stay for an emergency admission in the nine months before addition to an ACM caseload (13.6) decreased slightly in the nine months after being added to a caseload (10.7) (p=0.001).

As mentioned previously, patients with no admissions to hospital during the time period evaluated were recorded as having spent no time in hospital and those patients admitted and discharged on the same day had a 'length of stay' of zero. In the nine months before addition to a caseload 11 (1.2%) of patients were discharged on the day of admission. This increased slightly to 13 (1.5%) in the nine months after addition to a caseload. Of those patients who were admitted as an emergency and had a hospital stay of one or more days (both pre and post addition to an ACM caseload) the largest proportion had a length of stay of between 1-7 days. Those patients who had a length of stay of 29 days or more made up the second largest proportion of the sample (both pre and post addition to an ACM caseload).

Hospital services by diagnosis

Table 3.23: Use of hospital services in the nine months before and after addition to an ACM caseload by primary diagnosis[1] (most prevalent)

	9 months pre	9 months post	Significance[2]
Number of all admissions by diagnosis (spell) (mean/sd)			
Symptoms, signs, and abnormal clinical and laboratory findings, not elsewhere classified (n=317)	2.6 (2.8)	2.0 (2.7)	Z-3.889, p≤0.001
Diseases of the respiratory system (n=227)	2.6 (2.9)	2.2 (2.7)	Z-1.632,p=0.103
Diseases of the circulatory system (n=244)	2.4 (2.3)	1.7 (2.0)	Z-4.004, p≤0.001
Diseases of the digestive system (n=166)	2.6 (2.5)	2.3 (2.7)	Z-2.103, p=0.035
Injury, poisoning, and certain other consequences of external causes (n=154)	2.3 (2.6)	2.0 (2.4)	Z-1.402, p=0.161
Diseases of the genitourinary system (n=95)	2.2 (1.9)	1.6 (2.1)	Z-2.124, p=0.034
Diseases of the musculoskeletal system and connective tissue (n=107)	2.5 (2.5)	1.9 (2.0)	Z-1.976, p=0.048
Length of stay for all admissions by diagnosis (days) (mean/sd)			
Symptoms …not elsewhere classified n=317)	21.5 (31.3)	16.7 (27.9)	Z-2.486, p=0.013
Diseases of the respiratory system (n=227)	23.4 (29.9)	22.4 (35.6)	Z-0.393,p=0.695
Diseases of the circulatory system (n=244)	25.2 (35.8)	15.3 (25.1)	Z-3.745, p≤0.001
Diseases of the digestive system (n=166)	21.4 (30.0)	20.4 (37.1)	Z-1.455, p=0.146
Injury, poisoning….(n=154)	22.0 (30.5)	21.5 (29.2)	Z-0.070, p=0.945
Diseases of the genitourinary system (n=95)	20.3 (32.5)	16.5 (23.2)	Z-0.804, p=0.421
Diseases of the musculoskeletal system (n=107)	25.0 (32.8)	16.5 (25.6)	Z-2.601, p=0.009
Tariff[3] for all admissions by diagnosis (spell) (£) (mean/sd)			
Symptoms …not elsewhere classified (n=317)	5104.42 (5708.75)	3856.63 (4921.28)	Z-3.359, p=0.001
Diseases of the respiratory system (n=227)	5152.94 (5331.85)	4624.33 (5211.15)	Z-0.891, p=0.373
Diseases of the circulatory system (n=244)	5694.05 (6219.96)	3622.72 (4462.89)	Z-4.501, p≤0.001
Diseases of the digestive system (n=166)	5365.22 (6304.40)	4628.51 (5802.14)	Z-1.715,p=0.086
Injury, poisoning….(n=154)	5403.32 (6379.22)	4789.88 (5391.20)	Z-0.748, p=0.455
Diseases of the genitourinary system (n=95)	4936.49 (5729.49)	3501.74 (4300.48)	Z-1.668, p=0.095
Diseases of the musculoskeletal system (n=107)	5687.25 (6412.54)	3737.33 (4365.99)	Z-2.769, p=0.006
Number of emergency admissions by diagnosis (mean/sd)			
Symptoms …not elsewhere classified (n=317)	2.0 (2.3)	1.5 (2.4)	Z-4.148, p≤0.001
Diseases of the respiratory system (n=227)	2.1 (2.4)	1.8 (2.4)	Z-1.754, p=0.079
Diseases of the circulatory system (n=244)	1.9 (2.0)	1.2 (1.5)	Z-4.767, p≤0.001
Diseases of the digestive system (n=166)	1.8 (2.1)	1.4 (1.9)	Z-2.597, p=0.009
Injury, poisoning….(n=154)	1.7 (2.0)	1.5 (1.9)	Z-0.892, p=0.373
Diseases of the genitourinary system (n=95)	1.7 (1.8)	1.3 (1.9)	Z-1.775, p=0.076
Diseases of the musculoskeletal system (n=107)	1.7 (2.2)	1.3 (1.4)	Z-1.519, p=0.129

[1] Diagnosis codes were not mutually exclusive
[2] Wilcoxon signed ranks test
[3] Calculated using the Payment by Results tariff for 07/08.

Admissions by primary diagnosis

In order to consider the combined effect of different clinical diagnoses and receipt of ACM services on the use of hospital services Table 3.23 explores the number of hospital admissions, the length of stay, the tariff for admissions and the number of emergency admissions (nine months before and nine months after ACM

intervention) for patients with the seven most prevalent primary diagnoses. The results for these diagnoses show a slight reduction in the average (mean) number of hospital admissions from the nine months before patients being added to a caseload to the nine months after. The reduction for 'diseases of the circulatory system' (2.4 vs 1.7; p≤0.001) and 'symptoms, signs and abnormal clinical and laboratory findings not elsewhere classified' (2.6 vs 2.0; p≤0.001) were statistically significant at the one per cent level. The reduction for 'diseases of the digestive system' (2.6 vs 2.3; p=0.035), 'diseases of the genitourinary system' (2.2 vs 1.6; p=0.034) and 'diseases of the musculoskeletal system and connective tissue' (2.5 vs 1.9; p=0.048) were significant at the five per cent level.

Length of stay by primary diagnosis
When length of stay is explored by diagnosis, all the results show a reduction between the nine months before and the nine months after addition to an ACM caseload. The reduction for 'diseases of the circulatory system' (25.2 vs 15.3; p≤0.001), 'symptoms, signs and abnormal clinical and laboratory findings not elsewhere classified' (21.5 vs 16.7; p=0.013) and 'diseases of the musculoskeletal system and connective tissue' (25.0 vs 16.5; p=0.009) were significant.

Tariff associated with admissions by diagnosis
When the tariffs for hospital admissions are considered by these diagnoses, again all the results demonstrate a reduction. Three of these show a significant reduction (at the 1% level) 'symptoms, signs and abnormal clinical and laboratory findings not elsewhere classified' (£5104.42 vs £3856.63; p=0.001) and 'diseases of the circulatory system' (£5694.05 vs £3622.72; p≤0.001) and 'diseases of the musculoskeletal system and connective tissue' (£5687.25 vs £3737.33; p=0.006) all demonstrate a reduction.

Emergency admissions by primary diagnosis
The number of emergency admissions were also calculated using the method of admission (reported in Table 3.22). If a patient's method of admission was considered to be an emergency admission (Accident and Emergency, GP or other) they were included in this section of the analysis. As with the total number of hospital admissions, an overall reduction was evident in the number of emergency admissions for patients in the nine months before being added to a caseload and in the nine months after. Three of the diagnoses showed a significant reduction in emergency admissions 'symptoms, signs and abnormal clinical and laboratory findings not elsewhere classified' (2.0 vs 1.5; p≤0.001), 'diseases of the circulatory system' (1.9 vs. 1.2; p≤0.001) and 'diseases of the digestive system' (1.8 vs 1.4; p=0.009).

Hospital services by specialty

For each hospital admission patients were also assigned a specialty function code which was also extracted from the Admitted Patient Care CDS. The codes are those recognized by the UK Department of Health Hospital Episode Statistics (HES), and the UK Royal Colleges and Faculties. Table 3.24 shows the nine most prevalent specialty codes for the nine month cohort sample (all those which had a frequency of 50 cases or more). Over half (55.2%) of the patients in the nine month sample which had a hospital admission, were admitted under the care of the 'general medicine'

specialty. Similarly, over a third (34.7%) were admitted under the care of a 'geriatric medicine' specialty.

Table 3.24: Specialty codes (most prevalent) for the nine month cohort sample (n=867)

Specialty (specialty code)	n (%)
Patient has *any admission* coded as specialty of:	
General medicine (300)	479 (55.2)
Geriatric medicine (430)	301 (34.7)
General surgery (100)	132 (15.2)
Trauma & Orthopaedics (110)	88 (10.1)
Accident & Emergency (180)	86 (9.9)
Respiratory (340)	40 (4.6)
Opthalmology (130)	79 (9.1)
Urology (101)	58 (6.7)
Cardiology (320)	50 (5.8)

Admissions by specialty

Table 3.25 explores the use of hospital services[3] by the 9 most prevalent specialties. There was reduction in mean hospital admissions for these specialties (apart from opthalmology). This reduction was statistically significant (at the 1% level of significance) for 'general medicine' (2.1 vs 1.7; p≤0.001). There was also a statistically significant reduction (at the 5% level) for 'general surgey' (1.9 vs 1.5; p=0.043), 'trauma and orthopaedics' (3.2 vs 2.6; p=0.047), 'accident and emergency' (3.7 vs 2.9; p=0.029) and 'cardiology' (3.0 vs 2.1; p=0.031).

Length of stay by specialty

There was also a reduction in length of stay for patients comparing the nine months before and the nine months after addition to a caseload for each specialty. This reduction was again significant at the one per cent level for 'general medicine' (20.9 vs 16.8; p=0.002). A reduction was also evident for 'geriatric medicine' 22.5 vs 18.3; p=0.033) and 'cardiology' (21.0 vs 14.3; p=0.029) at the five per cent level of significance. The length of stay for patients treated under the respiratory specialty was markedly higher (31 days in hospital in the nine months before being added to a caseload) than for any of the other specialties.

Tariff associated with admissions by specialty

Again, those admissions which were recorded under the specialty 'general medicine' demonstrated a significant reduction (at the 1% level) in the tariff for admissions (£4729.02 vs £3540.76; p≤0.001). The reduction for those admissions coded under the specialty 'cardiology' was also significant (£6476.24 vs 3657.32; p=0.003) at the one per cent level. The reductions for both 'geriatric medicine' (£4861.18 vs £3947.79; p=0.032) and 'respiratory' (£8035.87 vs £5034.10; p=0.045) were significant at the five per cent level. It is also worth noting that in the nine months prior to the ACM intervention admissions under the specialties respiratory (£8035.87) and cardiology (£6476.24) were much higher than the other specialty categories.

Emergency admissions by specialty

The mean number of emergency admissions reduced for certain specialties for the nine month cohort. Again the reduction for 'general medicine' was significant (1.7 vs

[3] number of hospital admissions, length of stay, tariff for admissions and number of emergency admissions

1.3; ; p≤0.001) at the one per cent level of significance. 'Geriatric medicine' (1.8 vs 1.4; p=0.014), 'accident and emergency' (2.9 vs 2.2; p=0.016), 'opthalmology' (1.4 vs 1.1; p=0.026) and 'cardiology' (2.1 vs 1.2; p=0.015) all demostrated a reduction in emergency admissions significant at the five per cent level.

Table 3.25: Use of hospital services in the nine months before and after addition to an ACM caseload by specialty[1] (most prevalent)

	9 months pre	9 months post	Significance[2]
Number of all admissions by specialty (spell) (mean/sd)			
General medicine (n=479)	2.1 (2.3)	1.7 (2.1)	Z-3.501,p≤0.001
Geriatric medicine (n=301)	2.1 (2.3)	1.8 (2.0)	Z-1.849, p=0.064
General surgery (n=132)	2.5 (2.4)	2.1 (2.4)	Z-1.488, p=0.137
Trauma & Orthopaedics (n=88)	1.9 (2.3)	1.5 (1.6)	Z-2.023, p=0.043
Accident & Emergency (n=86)	3.2 (3.4)	2.6 (4.1)	Z-1.988, p=0.047
Respiratory (n=40)	3.7 (3.8)	2.9 (4.6)	Z-2.183, p=0.029
Opthalmology (n=79)	2.2 (2.6)	2.2 (3.4)	Z-0.438, p=0.662
Urology (n=58)	2.6 (2.5)	2.0 (1.9)	Z-1.710, p=0.087
Cardiology (n=50)	3.0 (2.5)	2.1 (1.7)	Z-2.163, p=0.031
Length of stay for all admissions by specialty (days) (mean/sd)			
General medicine (n=479)	20.9 (29.9)	16.8 (30.4)	Z-3.024, p=0.002
Geriatric medicine (n=301)	22.5 (31.0)	18.3 (30.4)	Z-2.132, p=0.033
General surgery (n=132)	26.0 (35.8)	20.2 (28.2)	Z-1.104, p=0.270
Trauma & Orthopaedics (n=88)	23.6 (35.0)	17.0 (28.0)	Z-1.569, p=0.117
Accident & Emergency (n=86)	20.9 (30.0)	19.0 (27.3)	Z-0.856, p=0.392
Respiratory (n=40)	31.0 (38.5)	21.2 (33.0)	Z-1.183, p=0.237
Opthalmology (n=79)	13.6 (21.3)	10.0 (20.7)	Z-1.591, p=0.112
Urology (n=58)	15.8 (23.4)	14.5 (21.1)	Z-0.014, p=0.988
Cardiology (n=50)	21.0 (22.9)	14.3 (22.9)	Z-2.177, p=0.029
Tariff[3] for all admissions by specialty (spell) (£) (mean/sd)			
General medicine (n=479)	4729.02 (5636.05)	3540.76 (4564.61)	Z-3.941, p≤0.001
Geriatric medicine (n=301)	4861.18 (5475.48)	3947.79 (4534.28)	Z-2.140, p=0.032
General surgery (n=132)	5822.81 (6250.48)	4663.20 (5280.92)	Z-1.501, p=0.133
Trauma & Orthopaedics (n=88)	5486.50 (7278.77)	3864.27 (4968.25)	Z-1.472, p=0.141
Accident & Emergency (n=86)	5329.37 (5138.59)	4575.77 (5968.66)	Z-1.215, p=0.224
Respiratory (n=40)	8035.87 (9292.65)	5034.10 (6444.74)	Z-2.003, p=0.045
Opthalmology (n=79)	3671.11 (4111.39)	3030.87 (4654.20)	Z-1.186, p=0.236
Urology (n=58)	4275.96 (4679.16)	3459.03 (3884.02)	Z-0.840, p=0.401
Cardiology (n=50)	6476.24 (5844.43)	3657.32 (3529.18)	Z-2.974, p=0.003
Number of emergency admissions by specialty (mean/sd)			
General medicine (n=479)	1.7 (1.9)	1.3 (1.6)	Z-4.181, p≤0.001
Geriatric medicine (n=301)	1.8 (2.0)	1.4 (1.6)	Z-2.460, p=0.014
General surgery (n=132)	1.7 (1.8)	1.4 (2.0)	Z-1.574, p=0.116
Trauma & Orthopaedics (n=88)	1.3 (2.1)	1.0 (1.3)	Z-1.184, p=0.236
Accident & Emergency (n=86)	2.9 (3.3)	2.2 (3.7)	Z-2.403, p=0.016
Respiratory (n=40)	2.8 (3.1)	2.3 (4.4)	Z-1.786, p=0.074
Opthalmology (n=79)	1.4 (2.5)	1.1 (3.3)	Z-2.219, p=0.026
Urology (n=58)	1.3 (1.5)	1.0 (1.2)	Z-1.525, p=0.127
Cardiology (n=50)	2.1 (2.3)	1.2 (1.6)	Z-2.428, p=0.015

[1] Specialty codes were not mutually exclusive
[2] Wilcoxon signed ranks test
[3] Calculated using the Payment by Results tariff for 07/08.

Resource utilisation – summaries of other cohort samples

Six month cohort

For the following analysis ACM caseload indicators and hospital resource use data are aggregated from the six month pre ACM intervention period and are compared with the six months post addition to an ACM caseload. These results can be found in Appendix 4 Tables A.4.4 – A.4.7.

Overall, the reductions across each of the hospital service indicators for the six month cohort sample are similar to the nine month cohort sample. The number of admissions (1.1 vs 0.9; p≤0.001), the length of stay (10.6 vs 8.8; p≤0.001) and the tariff for admissions (£2430.04 vs £1831.66; p≤0.001) reduced significantly for patients from the six months before being added to a caseload compared with the six months following (p≤0.001). These results can be found in table A.3.4. The number of Accident and Emergency (A&E) attendances stayed the same (neither increasing or reducing) in this six month cohort. When these results were analysed by primary diagnosis the six month sample has a similar pattern of results as the nine month cohort. Several more diagnosis categories show a statistically significant reduction in admission and length of stay at the one per cent level of significance (Table A.3.5). The six month sample show a reduction in admission across the seven diagnoses and the majority of categories show a statistically significant reduction at the one per cent or five per cent level. This may be due in part to the larger sample size compared to the nine month cohort sample. When analysed by (most prevalent) specialty, again the six month sample (A.3.7) illustrates a similar picture of overall reductions for admissons, length of stay, tariff for admissions and emergency admissions to the nine month cohort. Again the majority of results when analysed by specialty were significant at the one or five per cent level of significance. The greater number of significant reductions in the six month cohort sample compared to the nine month cohort may be partly due to the larger sample size.

12 month cohort

For the following analysis ACM caseload indicators and hospital resource use data aggregated from the 12 month pre ACM intervention period, are compared with the 12 months post addition to an ACM caseload. These results can be found in Appendix 4 Tables A.4.8 – A.4.11.

The 12 month cohort (A.3.8) also demonstrated similar trends to the 6 and nine month cohort samples. Fewer of these reductions were statistically significant, which may be due to the smaller sample size of the 12 month cohort. It is also important to note here that the 12 month cohort sample is not fully representative of the ten PCTs within Greater Manchester (Table A.3.1), due to few patients having received the ACM intervention for a full 12 months at the time of data extraction. This ranged from 27 per cent to 23 per cent of all patients added to ACM caseloads in each PCT. The mean length of stay did reduce significantly (at the 5% level) from the 12 months before compared with the 12 months after a patient was added to a caseload (18.9 vs 14.8; p=0.045). The tariff for admissions also reduced significantly (£4849.33 vs £4189.64; p=0.013). In the 12 month cohort sample the mean Accident and Emergency attendances rose from the 12 months before a patient was added to an

ACM caseload (0.3) and the 12 months after (1.1) ($p \leq 0.001$). This increase may be explained by the change in reporting methods for Accident and Emergency attendances, since collecting data for this dataset did not become mandatory until April 2006 for hospital trusts, therefore some attendances may be missing before this date.

When analysed by diagnosis the results from this sample also show a reduction from the 12 months before addition to a caseload and the 12 months after. This reduction is only significant (at the 5% level) for one of the diagnoses, 'diseases of the genitourinary system'. When analysed by specialty (most prevalent), the 12 month cohort sample showed a similar pattern to that found in the six month and nine month cohort samples. The number of all admissions, the length of stay for all admissons and the tariff for all admissions reduced between the 12 months before and the 12 months after addition to an ACM caseload for most of the specialty subgroups. Only admissions coded as Urology increased (across all of the above variables). The number of emergency admissions reduced across all specialties when 12 months before and 12 months after addition to an ACM caseload are compared. However, due to the small size of these sub groups (hospital services by specialty) none of these results were significant (either to the 1% or 5% level).

Summary – findings part 2

This chapter has utilised data from the Tactical Information Service (TIS) to explore the overall contribution of active case management (ACM) service arrangements upon service utilisation. It was necessary to focus on a nine month cohort sub sample of the data which provided the longest period of follow up data without compromising the size of the sample. The 10 PCTs were unequally represented in the nine month cohort sample. The majority of ACM patients included in the sample were white, female and over 75 years of age and around half of the sample resided in the most deprived area of each locality. Around three quarters of the sample were admitted for one of the four most prevalent primary or secondary diagnoses (ICD10 chapter headings). Few ACM cases were recorded as formally closed (with a reason for closure described).

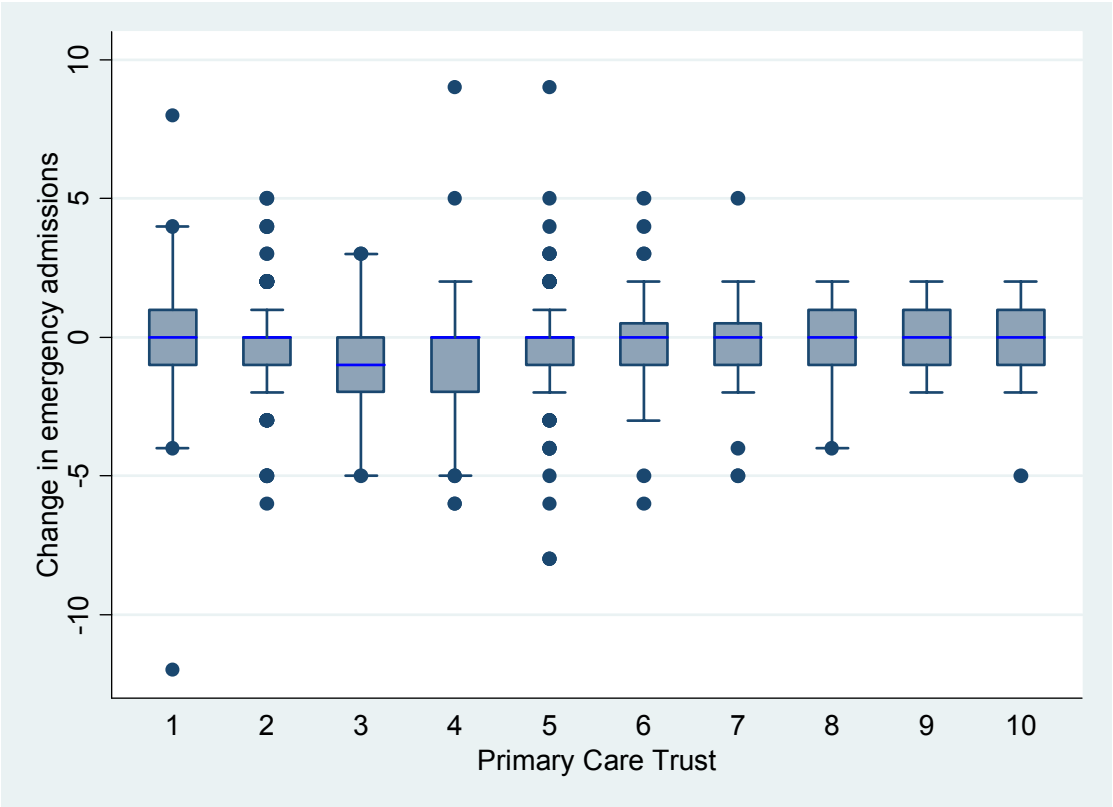
The use of hospital services in the nine months prior to the ACM intervention and nine months post ACM registration were compared. The mean number of hospital admissions, the mean length of stay and the mean tariff for all admissions reduced significantly at the one per cent level. A similar pattern of results was detected in the number of emergency admissions and associated length of stay. However, the results for outpatient vists and accident and emergency attendances did not follow this pattern. The use of hospital services for this sample was also explored by the seven most prevalent primary diagnoses and the nine most prevalent specialties. When analysed this way the majority of the results showed a reduction but due to the small subgroups of the sample fewer of these findings were significant.

FINDINGS PART THREE: THE RELATIONSHIP BETWEEN SERVICE UTILISATION AND ACTIVE CASE MANAGEMENT

The analysis presented in this section explores the overall contribution of ACM service arrangements upon service utilisation. We will address what factors explain changes in patient level health service utilisation outcomes using the nine month cohort sample. The analysis will focus upon two main health service utilisation outcome measures: change in emergency admissions and change in length of stay for emergency admissions. A summary of the main conclusions from this analysis is presented at the end of this section. In this section we describe the two indicators of health service utilisation, whose potential predictors are identified by means of two regression models (ANCOVA).

Figure 3.8 contains PCT specific box plots visualising the central tendency and spread of the change in emergency admissions. It is noticeable that in most PCTs the distribution is nearly perfectly symmetrical, with most medians being on or very close to the zero-line. In other words, on balance it is observable that for each patient who experienced a reduction in emergency admissions, there was one who experienced an increase.

Figure 3.8: Box plot of the change in emergency admissions (nine months post ACM – nine months pre ACM) by Primary Care Trust (n=867) [1]



[1] Box plots show the interquartile range (box), lower/upper adjacent values (whiskers), median (mid-line) and outliers (dots)

Table 3.26 expands the insight gained from the box plots and adds basic information on the statistical significance of the observed group differences. It is obvious,

however, that the numbers in most PCTs are too small to make reliable judgements – that is their confidence intervals are largely overlapping. The mean of the change variable for all PCTs suggests a small reduction in emergency admissions in the nine months after the inception of active case management. The appropriate (non-parametric) statistical test for the difference between pre and post ACM observations is the Wilcoxon signed-rank test; it confirms the statistical significance of this small reduction (z=-4.691, P≤0.001.

Table 3.26: Change in emergency admissions by Primary Care Trust (n=867)

PCT code (n)	Mean	Standard Deviation	95% confidence interval[1]	
1 (37)	-0.4	2.9	-1.4	0.6
2 (348)	-0.2	1.3	-0.3	0.0
3 (19)	-0.7	2.1	-1.7	0.3
4 (40)	-0.6	2.7	-1.4	0.3
5 (192)	-0.5	1.9	-0.8	-0.2
6 (124)	0.0	1.3	-0.2	0.3
7 (44)	-0.3	1.8	-0.8	0.2
8 (17)	-0.2	1.5	-1.0	0.5
9 (19)	0.2	1.3	-0.5	0.8
10 (27)	-0.1	1.4	-0.6	0.5
All PCTs (867)	-0.3	1.7	-0.4	-0.1

[1]Definition of 95% confidence interval: Assuming cases represent a simple random sample, statistical estimates lie within the reported confidence interval boundaries with a 95% probability

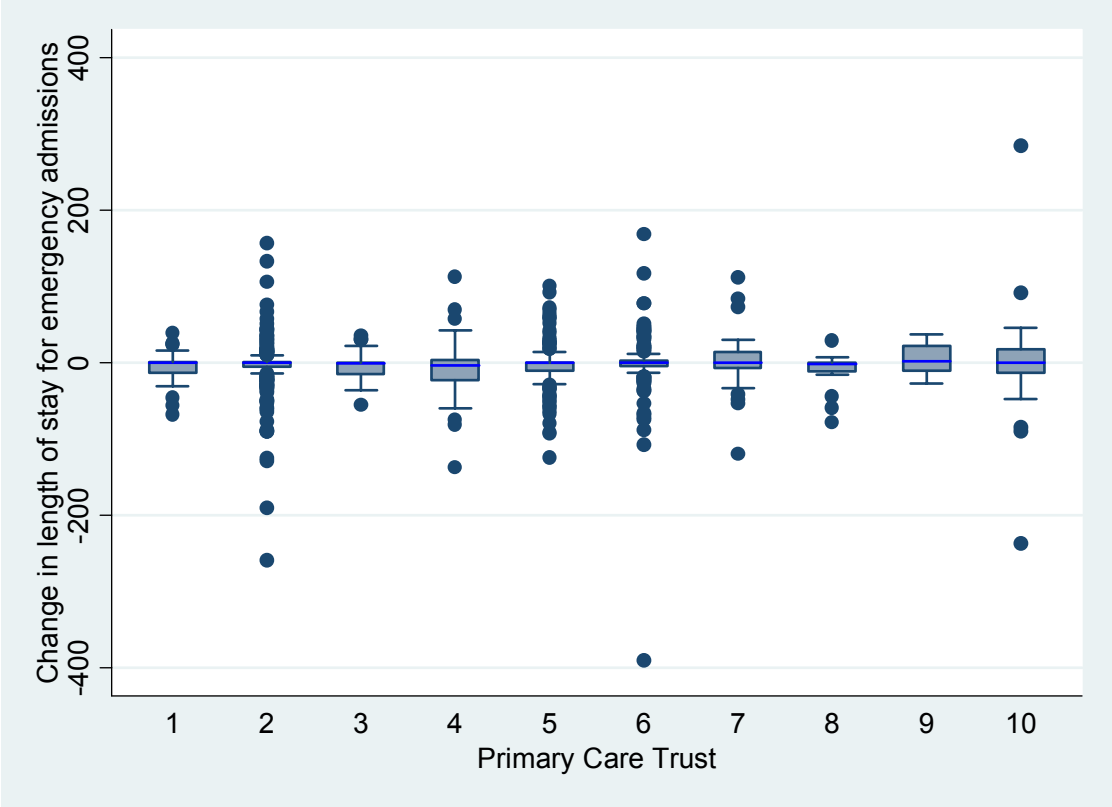
Figure 3.9 and Table 3.27 merely repeat the description for the second outcome measure: change in length of stay for emergency admissions. As before, only the overall reduction of 2.9 days in length of stay for emergency admissions is clearly statistically significant using the Wilcoxon signed-rank test (z=-3.277, P=0.001).

Table 3.27: Change in length of stay for emergency admissions by Primary Care Trust (n=867)

PCT code (n)	Mean	Standard Deviation	95% confidence interval[1]	
1 (37)	-5.7	21.5	-12.8	1.5
2 (348)	-3.0	30.2	-6.2	0.2
3 (19)	-3.5	23.3	-14.7	7.8
4 (40)	-7.7	41.1	-20.8	5.5
5 (192)	-3.8	27.2	-7.7	0.1
6 (124)	-1.6	47.8	-10.1	6.9
7 (44)	2.3	35.2	-8.4	13.0
8 (17)	-10.9	26.2	-24.4	2.6
9 (19)	5.6	18.5	-3.3	14.5
10 (27)	-1.3	80.7	-33.2	30.6
All PCTs (867)	-2.9	35.2	-5.3	-0.6

[1]Definition of 95% confidence interval: Assuming cases represent a simple random sample, statistical estimates lie within the reported confidence interval boundaries with a 95% probability

Figure 3.9: Box plot of the change in length of stay for emergency admissions (nine months post ACM – nine months pre ACM) by Primary Care Trust (n=867) [1]



[1] Box plots show the interquartile range (box), lower/upper adjacent values (whiskers), median (mid-line) and outliers (dots)

Regression results

Of the two outcome variables of interest, change in length of stay for emergency admissions is better suited for regression analysis, as it has a more normal distribution and was thus chosen for this sections lead model. Table 3.28 summarises the best ANCOVA model that could be fitted for Y_1: change in length of stay for emergency admissions. Nine cases with unusually large positive changes were omitted from this analysis due to their strong biasing influence on other coefficients and model fit. While we do not consider these cases to be incorrect, we do acknowledge that this model cannot predict extremely large positive changes on the basis of the available information.

The model predicts approximately 74 per cent of the variation in our sample (adjusted R^2). However, it must be stressed that the contribution of each individual predictor towards the overall model fit was unequal. The partial sum of squares column indicates roughly how much of the model sum of squares (the explained share of variance) each accounts for. It reveals that the baseline 'explains' the lion's share of the predictive quality of this model. This is unsurprising given the nature of the data and the model's formulation (regressing a change-score on the baseline which is a part of that change score). The baselines strong negative coefficient indicates regression towards the mean. So, for each day spent in hospital before ACM, patients are predicted to experience a reduction of nearly one day after ACM.

A large proportion of patients with pre-ACM emergency admissions had no further admissions after the inception of ACM. It is expected that over time those patients with many admissions either show improvement or in the most serious cases die. All this contributes towards a negative relationship between baseline and the outcome measure, in addition to any potential effects of ACM. Conversely, a nearly equal share of the sample shows an increase in length of stay for emergency admissions. Apart from a zero or very low scores pre-ACM, the number of primary and secondary diagnoses is the main contributor towards explaining increases in length of stay for emergency admissions. Each added diagnosis is associated with a 2.4 day increase in length of stay, everything else being equal.

Table 3.28: Analysis of covariance for Y1: Change in length of stay for emergency admissions

Model summary n = 858 (Y_1>100 omitted) adjusted R-squared = 0.74 F (significance) = 0.000		Model Sum of Squares 634,728 (10 df) Residual Sum of Squares 218,994 (847 df) Total Sum of Squares 853,722 (857 df)		
Predictors	Coefficients[1]	Standard Errors (P)[2]	Robust Standard Errors (P)[2]	Partial Sum of Squares (ANOVA)
Constant	*0.26*	*1.29 (0.84)*	*1.28 (0.84)*	-
Length of stay for emergency admissions pre 9-months (baseline)	-0.99	0.02 (0.00)	0.02 (0.00)	616,379
Number of primary and secondary diagnoses	2.41	0.27 (0.00)	0.32 (0.00)	20,105
Diagnoses with negative[3] impact (dummy coded)				
Detection of Malignant neoplasms	-5.54	2.31 (0.02)	2.56 (0.03)	1,491
Diseases of the nervous system	-7.58	2.15 (0.00)	2.15 (0.00)	3,206
Diseases of eye and adnexa	-4.64	1.93 (0.02)	1.91 (0.02)	1,477
Diagnoses with positive impact (dummy coded)				
Infectious or parasitic diseases	9.08	3.64 (0.01)	5.24 (0.08)	1,609
Mental and behavioural disorder	8.53	2.76 (0.00)	5.47 (0.12)	2,460
Diseases of the respiratory system	4.71	1.35 (0.00)	1.53 (0.00)	3,132
Injury, poisoning etc.	4.41	1.54 (0.00)	1.81 (0.02)	2,120
ACM characteristics (dummy coded)				
Example: Whether ACM patients can be identified on hospital systems	-2.91	1.23 (0.02)	1.29 (0.02)	1,446

[1] 95% Confidence Intervals for regression coefficients are calculated as +/- 1.96 times the standard error
[2] Interpretation of P-values: the probability of observing an effect of this magnitude if the null-hypothesis is correct (i.e. there is no effect on Y)
[3] A negative coefficient is associated with a reduction in emergency admissions.

A number of dummy coded specific diagnoses have further negative or positive impacts on length of stay. Detection of malignant neoplasms, for instance, is associated with a reduction in length of stay, which may well be a reflection of the higher mortality risk among those patients. It should be noted that these indicators are related to relatively basic summary categories of types of diagnoses. A more detailed analysis might reveal better interpretable causal pathways from diagnoses to associated reductions or increases in the outcome measure.

The only ACM variable included is one of several which could produce comparable negative impacts (and corresponding positive impacts, depending on how a quality characteristic is operationalised and coded). Examples are 'whether the ACM service is aimed at improving the extent and scope of services' and 'whether the PCT operates a computerised client record system'. However, these very selective impacts of PCT characteristics as identified in their questionnaire responses also appear to be a reflection of three geographical groups within the Greater Manchester area (i.e. there are groups of neighbouring PCTs which, if pooled together, show either small negative, positive or neutral effects on the outcome variable while controlling for all other predictors). The design of this study does not permit us to go beyond speculation at this point. It may well be that these effects hint at unknown structural factors which are in some way associated with the local areas and/or their populations. In any case, these speculative influences, or the observable ACM influences for that matter, contribute very little to our ability to predict changes in service utilisation.

Several technical comments must accompany the model presented in Table 3.28. While it has proved fairly robust to a number of changes in its operationalisation, the actual size of coefficients should not be overrated, as they do to some extent depend on the aforementioned decisions of model fitting (in particular the exclusion of 'outliers'), and are subject to sampling variation. Instead, one should merely acknowledge that there are fairly robust positive and negative influences on the outcome measure. Furthermore, the inclusion of specific diagnoses and other potential predictors is ultimately dependent on the sample size and the chosen significance level. In other words, it is likely that a bigger sample would have produced more statistically significant predictors, which in this case were rejected on the basis that their p-values were just above five per cent.

It is an assumption of linear regression that the model's residuals should be normally distributed in order to calculate reliable standard error estimates. This is not entirely the case here, as there is a certain degree of heteroscedasticity manifest in the error terms. In plain English, a regression model should predict the outcome equally well along the full range of values provided by its continuous predictors. In this case, the model is much better at predicting reductions in length of stay (associated with high baseline values) than increases in length of stay (associated with many diagnoses). Robust standard errors are a more conservative way of assessing the coefficients' statistical significance if the homoscedasticity assumption is violated. Overall, they confirm the statistical significance of most coefficients, with only two of them becoming (borderline) insignificant.

A corresponding 'direct analysis of change' (i.e. essentially the same model but without the baseline measure) (not shown) would remove most significant effects.

Only ‘diseases of the nervous system’ and ‘injury, poisoning etc.’ retain comparable and significant effects. Crucially, the strongest predictor next to the baseline, the number of primary and secondary diagnoses, appears not to be associated with increases in Y_1 anymore (coef=-0.48, p=0.36). Direct analysis of change would thus suggest that, on average, the number of identified conditions and most specific diagnoses are not associated with increases or decreases in length of stay. As outlined in the methods section, conflicting results from ANCOVA and change-score analyses are a matter of ongoing debate in the statistical literature. Care must be taken not to make strong causal claims on the basis of ANCOVA results from observational data. Nevertheless, there is good reason to believe that with careful data exploration and model checking it is possible to substantively interpret such findings.

To summarise, direct analysis of change does not reveal the same predictors because their impact is clearly concentrated on roughly half of the sample. More specifically, the number of conditions and other moderating specific diagnoses are largely predictive of positive changes (increases) in length of stay, which are more likely to come from those patients with few prior admissions. In other words, their impact appears largely restricted to only one tail of the approximately normally distributed outcome variable (in the afore-presented box plots those are shown as spreading out upwards from the zero-line). Indeed, if direct analysis of change is performed on only positive changes (patients with increases in length of stay), a picture emerges that is very similar to the one seen in the ANCOVA model. Accordingly, the ANCOVA model expresses the predictors conditional upon the baseline of the outcome measure, which introduces additional significant effects into the regression results. It reveals what the ‘average’ perspective hides; for those patients with increases in length of stay there is indeed a moderate association with predictors other than the baseline, which itself explains most of the observed reductions. The fact that different analysis perspectives on the data can be put together like parts of a mosaic increases our confidence in the findings of the ANCOVA model.

Table 3.29: nine month pre- and post-ACM comparison: length of stay for emergency admissions

		9 months post-ACM					
		0 days	1-7 days	8-14 days	15-21 days	22+ days	*n*
nine months pre-ACM	0 days	70	12	4	3	11	*418 100%*
	1-7 days	52	18	8	5	17	*150 100%*
	8-14 days	49	17	9	13	12	*69 100%*
	15-21 days	49	11	13	2	24	*53 100%*
	22+ days	44	14	6	7	29	*177 100%*
	Total	59	14	6	5	16	*867 100%*

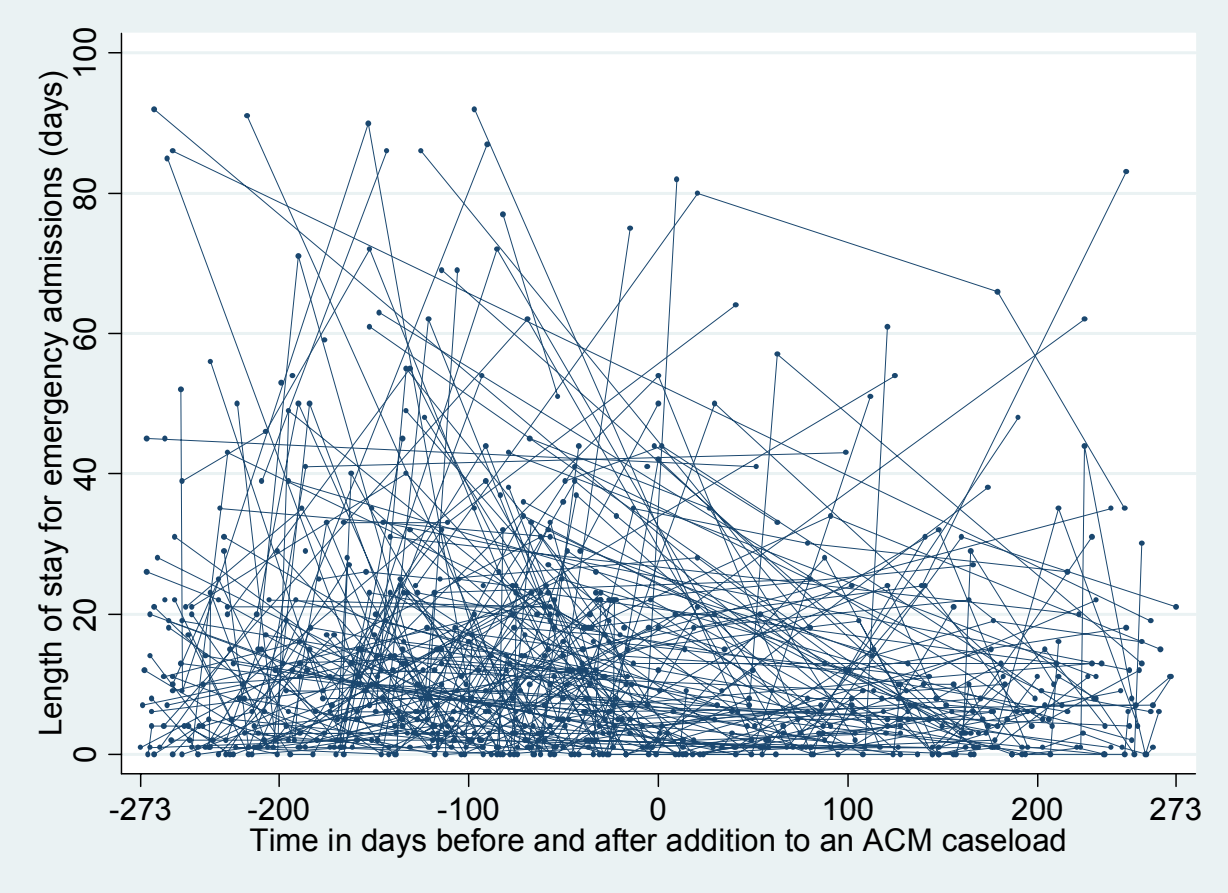
Note: rounded row percentage

In Table 3.29 one can visualise how the outcome variable has actually been generated. Categories of pre and post durations in hospitals after emergency admissions are cross-tabulated in the form of a longitudinal mobility table. The diagonal gives the percentages for those who experience no change; for example 70 per cent of those with zero days pre ACM also have zero days post ACM. Cells above the diagonal identify increases and cells below the diagonal identify reductions. It is noticeable that nearly half of respondents who had spent at least one day in hospital in the first nine months spent zero days in the subsequent nine months.

We found that two lessons can be derived from the ANCOVA model and both are visualised in this table. On the one hand, most patients with a history of emergency admissions experienced a marked improvement over time (the baseline coefficient of -0.99). On the other hand, a third of those without any or with few admissions experienced an increase in admissions and corresponding length of stay, while a certain proportion of frequent service users also experienced an increase or remained at a high level (associated with the number of diagnoses coefficient of 2.41 and also additional factors unknown to this model, as indicated by the aforementioned heteroscedastic error variance).

The following figures illustrate these lessons in an alternative way. Connected line graphs are a useful tool for indicating the trajectories of cases on a particular characteristic over time. Here individuals' emergency admissions are plotted on a duration scale (y) against a timeline (x). Each dot represents an admission episode and the lines connect these episodes within individuals. The first graph reveals the extent to which patients with an above-average history of emergency admissions tend to follow downward trajectories (i.e. registering as negative changes in Y_1). It is noticeable that the occurrence of relatively long stays of more than ten days appears particularly reduced at around the zero-time point, that is when cases were added to an ACM caseload. Uncharacteristically rising or flat trajectories in this group of patients are partly attributable to case complexity.

Figure 3.10: Trajectories of patients with more than 17 days (median) of emergency-related hospitalisation pre ACM

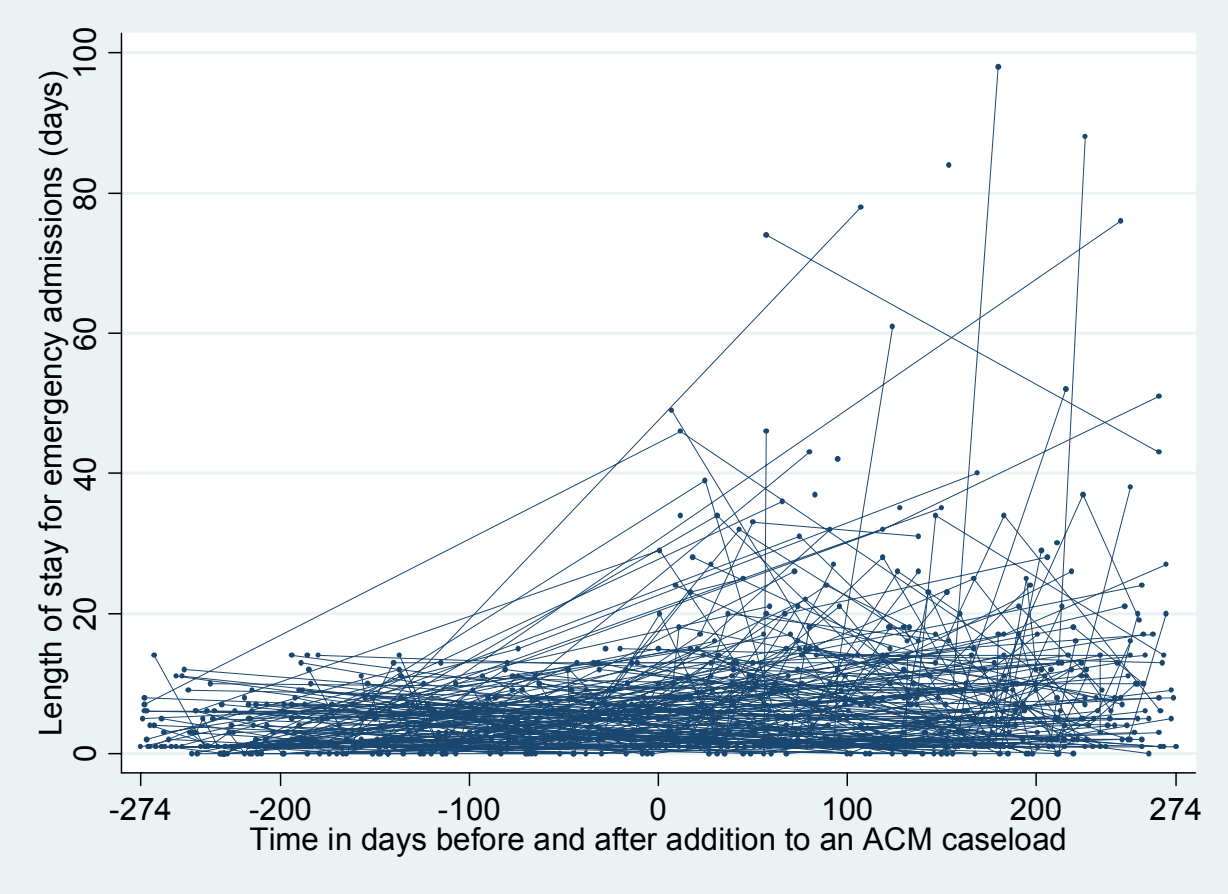


Note: lines connect observations belonging to one patient; 12 patients with individual stays that were longer than 100 days were omitted for presentational reasons (n is 810 observations for 190 patients)

The next figure, on the other hand, reveals an almost opposite effect for patients with a below-average history of emergency admissions. A certain proportion of patients clearly followed upward trajectories (i.e. registering as positive changes in Y_1). This effect was moderately associated with case complexity, although much of it can certainly also be attributed to regression towards a higher group mean. As these two graphs look at roughly two halves of the sample, overlapping them would give some hints as to how the underlying causes of opposite trajectories can

cancel each other out in a change-score analysis, which fails to take into account different baselines.

Figure 3.11: Trajectories of patients with fewer than 17 days (median) of emergency-related hospitalisation pre ACM



Note: lines connect observations belonging to one patient; 4 patients with individual stays that were longer than 100 days were omitted for presentational reasons (n is 837 observations for 358 patients)

All analyses were repeated for Y_2: change in emergency admissions (Table 3.31). Essentially, the following model is a reflection of the previous regression (Y_1) and lends support to its findings. The outcome variable is characterised by a very tight distribution (basically reducing it to three discreet values in most cases: -1, 0, 1) which undermines its potential for regression analysis. As a direct result, we would fully expect reduced r-squared values and fewer significant coefficients, given an identical sample size. It was not deemed necessary to remove outliers for Y_2, as there was very little variation in the first place. Nevertheless, as the mobility table for emergency admissions suggests (Table 3.30), the pattern of emergency admissions was obviously closely related to the pattern of length of stay after such admissions.

Table 3.30: Nine month pre- and post-ACM comparison: emergency admissions

		9 months post-ACM					
		0 visits	1 visit	2 visits	3 visits	4+ visits	*n*
nine months pre-ACM	0 visits	69	19	8	3	1	*407 100%*
	1 visit	58	24	11	6	2	*234 100%*
	2 visits	48	27	11	9	6	*113 100%*
	3 visits	26	26	20	22	6	*50 100%*
	4+ visits	21	21	14	19	25	*63 100%*
	Total	57	22	10	7	4	*867 100%*

Note: rounded row percentages

Table 3.31: Analysis of covariance for Y_2: Change in emergency admissions

Model summary n = 867 adjusted R-squared = 0.37 F (significance) = 0.000		Model Sum of Squares 918 (6 df) Residual Sum of Squares 1,549 (860 df) Total Sum of Squares 2,468 (866 df)		
Predictors	Coefficients[1]	Standard Errors (P)[2]	Robust Standard Errors (P)[2]	Partial Sum of Squares (ANOVA)
Constant	*-0.09*	*0.11 (0.40)*	*0.09 (0.34)*	-
Number of emergency admissions pre 9-months (baseline)	-0.75	0.03 (0.00)	0.19 (0.00)	877
Number of primary and secondary diagnoses	0.18	0.02 (0.00)	0.05 (0.00)	127
Diagnoses with negative[3] impact (dummy coded)				
Detection of Malignant neoplasms	-0.50	0.18 (0.01)	0.16 (0.00)	13
Diagnoses with positive impact (dummy coded)				
Mental and behavioural disorder	0.77	0.23 (0.00)	0.44 (0.09)	20
Diseases of the respiratory system	0.35	0.11 (0.00)	0.12 (0.00)	19
ACM characteristics (dummy coded)				
Example: Whether ACM patients can be identified on hospital systems	-0.20	0.10 (0.05)	0.10 (0.05)	7

[1] 95% Confidence Intervals for regression coefficients are calculated as +/- 1.96 times the standard error
[2] Interpretation of P-values: the probability of observing an effect of this magnitude if the null-hypothesis is correct (i.e. there is no effect on Y)
[3] A negative coefficient is associated with a reduction in emergency admissions

Summary- findings part three

The analysis presented in this section explored the overall contribution of ACM service arrangements upon service utilisation. We addressed the factors explaining changes in patient level health service utilisation outcomes using the nine month cohort sample. The analysis focused upon two main health service utilisation outcome measures: change in emergency admissions and change in length of stay for emergency admissions. There were a number of fairly robust positive and negative influences on these outcome measures allowing us to draw some tentative conclusions. On the one hand, most patients with a history of emergency admissions experienced a marked improvement over time. On the other hand, most of those without any or with few admissions experienced an increase in admissions and corresponding length of stay, while a certain proportion of frequent service users with particular diagnoses, also experienced an increase or remained at a high level.

CHAPTER 4: DISCUSSION

This multi-method study has attempted to examine, in one locality, Greater Manchester, the development of a new initiative to prevent inappropriate hospital utilisation. The study has looked at the structure and processes of active case management, the patients who receive the service and the service level outcomes which have been key to the policy, namely hospital utilisation. In many ways the study is unique because it proved possible to integrate primary data sources such as the style and type of ACM with routinely collected NHS data at the patient level for people identified by the Greater Manchester PCTs as being in receipt of ACM by being formally added to a caseload. Access to this patient level data describes numbers and types of hospital admissions, length of stay, primary and secondary diagnoses, A&E attendances and outpatient visits. The capacity to link these different sources of NHS data in a pseudonymised fashion suitable for research purposes was only possible due to the recent development of the Tactical Information Service (TIS) by the NHS Northwest. The future opportunities that such datasets will permit to examine health service utilisation and outcomes are immense and it has been exciting to be engaged in a very early employment of this data for research purposes.

The study has integrated the use of standardised questionnaires, qualitative interviews and routine service level data at the patient level. This combination of data from different sources has permitted us to explore the possible relationships between different forms, features and types of case management, patient characteristics and service level outcomes. As yet most other studies have not been able to examine significant amounts of data at the individual patient level. We were fortunate to have had the commitment and support of all ten primary care trusts in Greater Manchester in undertaking this work.

The organisation of case management in the ten PCTs studied was found to vary in some aspects despite a high level of coordination and inter-Trust communication across the conurbation. Most ACM services were GP practice based, whereas formal links with social care, such as social workers acting as case managers, were relatively uncommon. Similarly, the extent to which ACM was linked to self care arrangements, one means of ensuring effective step down from case management, was not wide-ranging. Interestingly, ACM services in all PCTs used the SAP tools for assessment but only four PCTs targeted the service at specific chronic conditions. Case load size proved to be a marker of variation with only one PCT having caseloads at 80, the level recommended by the policy document *Supporting People with Long Term Conditions* (DH, 2005b). However, caseload size concealed considerable variations in definition over what constituted an active or an inactive or maintained case. Some PCTs addressed this by having a clear two tier system of active and maintenance within caseloads. In some PCTs role confusion was evident for staff who experienced difficulty in discriminating the role of case manager from that of a more general nursing responsibility such as district nursing. This confusion has been found elsewhere where staff occupy the role of care manager and that of social worker or community nurse (Challis et al, 1995; 2002).

The analysis of service utilisation focused upon a cohort of patients who had had involvement with case management for a period of at least nine months. Comparing pattern of hospital utilisation between the nine month period before and after addition to an ACM caseload, the mean number of all and emergency hospital admissions and mean lengths of stay were reduced. In order to explore the simultaneous effect of diagnosis and features of ACM service provision on admissions patterns multivariate models were employed. Unsurprisingly it was found that case complexity measured by the number of diagnostic categories present (as measured by ICD 10 chapter headings) was associated with a greater number of emergency admissions and greater length of stay. A very modest effect was shown with regard to ACM features suggesting possibly the benefit of good communication between ACM and hospital services. A clustering of effects was observed whereby geographically adjacent PCTs appeared to have reductions or increases in the length of stay related to emergency admissions. Further investigation of wider phenomena which may be related to this may be useful.

Interestingly, the most powerful predictor of emergency hospital admission within nine months from being added to an ACM caseload was prior admissions. This is consistent with the attempts to reduce readmissions in patients by focusing on those with prior recent admissions. However, it does not constitute definitive evidence that the reduction is attributable to ACM. This was the premise upon which much of the Long Term Conditions Policy (DH, 2005b) was founded. However, as we discuss below, any measure of impact of this kind in a non-randomised trial risks the effect of regression towards the mean being the major cause of reduction in both hospital admissions and length of stay. Nonetheless, and related to this observation the number of patients who had no recorded length of stay (as they were admitted and discharged on the same day of an admission) rose in the post nine months cohort. This could be inferred to suggest that the process of preventing admissions was having some effect under case management. Therefore, whilst the maximum possible gain is indicated by the reduction in the number of episodes and days in hospital after case management, the 'true effect' is likely to be below this.

Despite the unique mix of primary and secondary data in this study there were a number of limitations inherent in the work. The design was an observational study which in effect used each individual patient as their own control or comparator through time. One potential bias arising from this is the lack of a control group simultaneously experiencing the same severity of health status as the patients in this study. Consequently, directly attributing the reductions in mean number of emergency hospital admissions and associated mean length of stay to the effect of the ACM intervention is not possible without a number of caveats. The study risks the effect of regression to the mean on indicators such as hospital admissions and length of stay. Since patients were identified precisely because of their high hospital utilisation prior to active case management, it could be argued that any reduction in hospital utilisation could be attributed to a reduction in their health problems from the peak at the point of identification for ACM. This has previously been found to be the case in an analysis of Hospital Episode Statistic data relating to frail older people (Roland et al., 2005). Furthermore, contrary to our original intention, we were unable to include data relating to the amount and intensity of the ACM intervention at the individual patient level in our analysis. Although hospital

and case management data were available on a linked basis, community health data systems were not sufficiently developed in the majority of PCTs to permit indicators of the amount and intensity of ACM input to be used.
Another potential source of bias was the decision to only include patients with a full nine month follow up data in the analysis and thus exclude those who had died during the nine month follow up period of case management. However, other analyses of the data suggested that exclusion of this group made no difference to the overall hospital utilisation rate.

This multi-site study benefited from a fairly large sample size, comparable with other studies of the same initiative (Patrick et al., 2006). However, differences in the form and type of case management provided by the ten PCTs in Greater Manchester were less than would have been found in a sample of non-interconnected trusts. This was a deliberate policy arising from the commitment of the Association of Greater Manchester PCTs to work together and develop common approaches to implementation. From this perspective it clearly enabled a more coherent regional development and permitted concerted approaches to roll out from a group of PCTs in relation to such matters as workforce and case management. However, from a research perspective it meant that the degree of variation in case management strategies and processes was less than would have been the case in the absence of such coordinated development. Hence, our findings of the lack of impact of different ACM approaches could in part be attributable to this reduced degree of variation. This effect would be increased by the variation in sample size from different PCTs. For example, sample sizes from some of the PCTs included in the nine month cohort sample varied from 4 per cent to 44 per cent of the ACM patients originally submitted by PCTs for use in the analysis. This variation in proportions was in part, due to the different timescales of the commencement of each ACM service (which varied from Jan 2005 to June 2006). Hence, due to the need to obtain nine month follow up data before our data extraction cut off date, those ACM services which started later were less well represented in the final analysis.

It must be remembered that the design of the study deliberately replicates the policy model whereby patients are identified through high hospital utilisation using tools such as PARR I and II and the combined predictive model. Nonetheless only with a properly designed randomised control trial, would it be possible to identify the size of the outcome effect of ACM on the use of hospital resources. The methodology used in this study does however offer some benefits in relation to other sources of evidence. The follow up period employed to asses the impact of case management was nine months rather than shorter periods used in other studies (e.g. Patrick et al., 2006) and the data was also available at the individual patient level thereby permitting further exploration of patient level characteristics upon outcome rather than relying upon aggregates (Gravelle et al., 2007).

This study along with comparable studies (Roland et al., 2005; Gravelle et al., 2007; Patrick et al., 2006) has relied on processes of data extraction by Acute and Foundation Trusts in relation to hospital admissions. Although organisations involved in these data flows seek to encourage and facilitate the submission of complete and valid data and to reduce the possibility of any inaccuracies, some shortcomings will inevitably remain. It is also worth noting that our more robust

findings related to number of emergency bed days rather than the number of emergency admissions. This is consistent with emergency bed days being used as an indicator of unplanned use of acute care resources by the Health Care Commission when compiling their national targets.
Clearly the findings of the present study are exploratory and cannot be definitive. There is a clear need for adequately funded and methodologically robust evaluations to look at the effects of ACM, including the relative cost effectiveness of different approaches and involving the perspectives of patients, carers and health care staff and management. Ideally such a design would be a randomised control trial which would permit the evaluation to address effects such as that of variations in targeting. However, such a strategy would seem unlikely in the short term on the grounds of cost and feasibility given the national roll out of the policy. Hence, in the absence of such a robust RCT, there remains a need to explore further the costs, process and outcomes of ACM programmes with wider, more diverse PCTs representation adopting a longitudinal approach with greater collection of process related data through local health and social care systems. This would permit greater exploration of the implications of differences in ACM systems and processes as well as closer links between the activities undertaken by case managers and the service level outcomes experienced by patients.

One important observation from the present study was the extent to which caseload management processes varied according to definitions of active and passive cases. Clearly effective case management of highly vulnerable people is only possible with manageable caseloads (Challis, 2003) and a variety of approaches can contribute to this. One strategy is to have clearly designed systems for step down of patients to less intensive modes of support. One outcome of the study has been that PSSRU has obtained funding from the NHS SDO to investigate nationally the role of self care in relation to case management and the extent to which closer links with self care permit more effective case load management.

The Long Term Conditions Policy has been predicated on good quality methods of case finding and targeting of case management resources upon people at high risk of repeated unplanned hospital admissions. Despite the investment of time and resources into a variety of case finding methodologies, it appeared that a considerable proportion (38%) of people identified for case management did not have an episode of hospital care in the nine month period prior to their entry to case management. It is possible that further work on the process of caseload management could yield benefits. This would need to address not just issues of targeting and case finding, but also the regular review of cases and caseloads so as to ensure that those selected for case management are those who are most likely to benefit.

Closely related to the issue of targeting, which has been a perennial concern in the literature examining effective case management (Challis, 2003), is the severity and complexity of patients' needs in this study. The multivariate analyses revealed that the probability of greater hospital utilisation, measured by emergency bed days, was associated with a measure of complexity and severity of need. Each added diagnosis was associated with a 2.4 day increase in length of stay, everything else being equal. Indeed this clinical complexity, which is akin to the concept of frailty

as identified by Rockwood (2007) is indicated by a quarter of the sample having primary or secondary diagnoses which fell within 5 or more ICD10 chapter headings. Clearly, targeting this group with multiple problems should be considered as a priority.

The Long Term Conditions Policy has worked under a tight set of PSA targets until 2008. Following this target period there would seem to be a need to explore the sustainability of the active case management approach and examine the new roles and levels of staffing required. The present study has shed relatively little light on the impact of different approaches to case management upon outcomes, due in part to the relative homogeneity of the ways of working across Greater Manchester. However, the related literature also indicates that there is a need for greater clarity about the impact of different case management models and approaches upon outcomes. Articulating these different models and identifying their relative effectiveness and cost remains an area where further work is required.

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APPENDIX ONE: POSTAL QUESTIONNAIRE

PERSONAL SOCIAL SERVICES RESEARCH UNIT

Supporting People with Long-Term Conditions:
Active Case Management (ACM) in Greater Manchester / England

The purpose of this questionnaire is to describe variations in the nature and implementation of primary health care provision for people with long- term conditions. A particular focus is the contribution of self care support to this process. In this questionnaire Active Case Management (ACM) is defined as an activity for those with highly complex or multiple needs.

An electronic version of this questionnaire is also available

Respondent's name _____

Job title _____

Primary Care Trust _____

Telephone number _____

Email address _____

BACKGROUND

1. How many GP practices are within your PCT?

   [ ]

2. What is the size of the resident population served by your PCT?

   [ ]

3. From which acute trust does the largest proportion of patients in your Active Case Management (ACM) service receive care?

   [ ]

4. How many local authorities does your ACM service **routinely** negotiate with? (please state number)

   [ ]

5. Is your current ACM service(s) based on a previous initiative(s)?

   Yes [ ]
   No [ ]

   If yes, please describe

   _____

   _____

6. On what date was the first patient accepted into the ACM service?

   Month [ ] Year [ ]

CASE MANAGEMENT OBJECTIVES

7. Which of these statements describe the **goals** of your **ACM service** for people with long-term conditions? **TICK ALL THAT APPLY**

To provide more **intensive long term support** in the community	☐
To improve the **extent and scope of services**	☐
To improve the **coordination of care** to people living in the community	☐
To improve the **quality of life** of people with long-term conditions	☐
To divert people away from **inappropriate hospitalisation**	☐
To arrange more speedy and effective **hospital discharge**	☐
To reduce hospital **length of stay**	☐
To assist in the **rehabilitation** of people with long- term conditions	☐
To achieve **improved accountability**	☐
To divert people from **inappropriate residential and nursing home care**	☐
To increase the **independence** of people with long-term conditions	☐
To improve the **health** of people with long-term conditions	☐
To promote **self care support** for people with long-term conditions	☐

8. Which of these statements describe your department's ACM arrangements for people with long-term conditions? **TICK ALL THAT APPLY**

A **specific job** undertaken by designated members of staff who are called **case managers**	☐
A **single member of staff** responsible for assessment, care planning, monitoring and review tasks for a **particular patient**	☐
A way of categorising or describing the arrangements through which people coming to the service are assessed and a response made to their needs	☐
A response provided to the **majority** of these patients	☐
A response provided only to a **limited number** of these patients	☐
An activity by which people with complex needs receive intensive help **different in nature and scope** to other patients	☐
A means of providing **long term support** and **coordinated care** incorporating assessment and review at home	☐
An activity by which **needs are assessed** and **care plans implemented**	☐
An activity involving the coordination, delivery and monitoring of services to such a degree of complexity that **caseloads are, as a consequence, small**	☐
A response to complex needs involving **multiple services**	☐
A means of promoting the development of new forms and styles of **service response**	☐

9. Which of the following best describes how ACM for people with long-term conditions is primarily being delivered in your PCT? **TICK ALL THAT APPLY**

A GP practice population model ☐

A geographical locality based model (pan GP practice) ☐

Integrated health and social care teams ☐

Disease group based service/s (e.g. stroke, COPD) ☐

Other arrangement ☐

If other, please give details

_____

_____

LINKS WITH OTHER SERVICES

10. Does your PCT have agreements in place with local authority social care services for people with long-term conditions?

Yes ☐

No ☐

If yes, is there an agreement with social care services partners over:

	Yes	No	Under discussion
Respective target populations for ACM and care management in social care			
Eligibility criteria for ACM			
Assessment tools for entry into ACM			
How active case managers access social care service resources			
Other (please specify)			

11. Please indicate with which of the following services your ACM service has developed a formal agreement: **TICK ALL THAT APPLY**

	Yes	No	Under discussion
Acute / Foundation trusts Accident and emergency			
Cardiology			
General medicine			
Geriatric medicine			
Hospital pharmacy			
Old age psychiatry			
Specialist disease nursing e.g. COPD, epilepsy			
Intermediate care services Schemes to prevent hospital admission e.g. hospital at home schemes			
Schemes to facilitate early discharge from hospital			
Ambulance trust Emergency hospital admissions			
Primary care services Community nursing services			
Community pharmacy services			
Community physiotherapy services			
Other (please specify)			

12. Do you have any dedicated specialist physician sessions to support ACM?

Yes ☐

No ☐

If yes, please describe in terms of speciality and number of programmed activities per week.

_____

_____

_____

13. Does your ACM service have any links with an End of Life Care Programme initiative in your area?

Yes ☐

No ☐

If yes, please specify _____

_____

_____

14. Are there specific arrangements for ACM patients with an emergency outside of normal working hours?

Yes, specific arrangements ☐

No, standard primary care arrangements ☐

If yes, please describe _____

_____

_____

15. Does your ACM service have formal arrangements for sharing information about individual patients with partner organisations? **TICK ALL THAT APPLY**

	Acute/ Foundation NHS trusts	Local authority	Intermediate care services
Joint access to computerised client record systems			
Case managers have access to hospital patient records to extract and import information			
Multidisciplinary locality meetings			
Via a designated person (e.g. a nurse working in local authority social care services)			
Shared assessment documents within the SAP			
Shared assessment documents outside the SAP			
Shared review documents			
Single case file			
Exchange of written information			
Patient-held records			
Disease registers			
Other, please specify			

STAFF MIX AND TASKS

16. Which staff groups work with people with long- term conditions and act as case managers within the ACM service? Which staff groups work with Very High Intensity Users? **TICK ALL THAT APPLY**

	Case managers	**Case managers for VHIU**
Community matrons		
Qualified advanced practitioners/Nurse consultant (Masters level)		
Advanced practitioners in training (Masters level)		
District nurses		
Other qualified community nurses, **please specify**		
Qualified occupational therapists		
Qualified physiotherapists		
Qualified social workers		
Case manager assistants/support workers/assistant practitioners		
Other, please specify		
Other, please specify		
Other, please specify		
Other, please specify		

17. Where are case managers/case manager assistants for people with long-term conditions, or those undertaking the equivalent role, based? **TICK ALL THAT APPLY**

*(For staff working at more than one site, please tick their **primary** location.)*

- GP practices ☐
- Health and social care integrated team ☐
- Nurse team in primary health care ☐
- Health and social care integrated old age team ☐
- Health and social care integrated old age mental health team ☐
- Hospital ☐
- Local authority social care services team ☐
- Other, please specify _____

18. Which organisation provides the manager for case managers? **TICK ALL THAT APPLY**

Health services only ☐

Jointly managed, with health services holding the major* responsibility ☐

Jointly managed, with social care services holding the major* responsibility ☐

Local authority social care only ☐

Other please specify _____

_____

*

By 'major' we mean responsibility for the day-to-day operation of the service including issues such as the allocation of referrals.

19. Do you have a programme of training for your ACM service for the year ending March 2008?

Yes ☐
No ☐

If yes, what are the current priorities for this training programme?

_____

_____

_____

_____

20. Does your ACM service initiate or participate in any staff training initiatives specific to self care or self care support?

Yes ☐
No ☐

If yes, please describe

_____

_____

_____

_____

21. Do active case managers undertake the following tasks? **TICK ONE FOR EACH TASK**

	Usually	Sometimes	Never
Assessment of health care needs			
Assessment of social care needs			
Assessment for entry into self care support services			
Financial assessment			
Care planning			
Arranging/allocating services			
Implementation of care plan			
Case budget management/budget holding			
Monitoring the implementation of the care plan			
Reviews			
Hands on care			
Clinical oversight			
Patient advocacy			
Provision of emotional / therapeutic support			
Prescribing / medications review			
Provide patient information and education			
Refer patient to self care support services			
Contribute to the provision of self care support services			
Contribute to the development of self care support programmes			

PROCESS OF ACTIVE CASE MANAGEMENT

PATIENT IDENTIFICATION

22. Does the ACM service have locally agreed written referral / eligibility criteria?

Yes ☐

No ☐

If yes, please include a copy when you return the completed questionnaire.

23a. Is ACM in your PCT targeted at specific diseases or conditions?

Yes ☐
No ☐

23b. If yes, which long term condition groups (the list below incorporates QOF categories)?

TICK ALL THAT APPLY

Asthma	
Chronic Obstructive Pulmonary Disease	
Diabetes	
Hypertension	
Cancer	
Coronary Heart Disease	
Stroke and Transient Ischaemic Attack (TIA)	
Epilepsy	
Other neurological conditions	
Hypothyroidism	
Mental Health	
Multiple conditions	
Musculoskeletal conditions	
Other (please specify)	

24. Of these, which, if any, are the **priority groups** in your PCT? Please specify

_____

_____

_____

25. What are the main methods adopted for identifying **high risk** patients within your service? In **column 1** please indicate **all main methods that apply to your service**. In **column 2** please indicate which **one** of the methods listed is most effective within your service.

	TICK ALL MAIN METHODS THAT APPLY	TICK THE ONE MOST EFFECTIVE
Patient at Risk of Re-hospitalisation I (PARR I)		
Patient at Risk of Re-hospitalisation II (PARR II)		
Combined predictive model		
High-impact user manager (Dr Foster)		
Castlefields tool		
Single Assessment Process (SAP) documentation		
Referrals from other professionals		
Handsearching patient records		
Disease registries		
Other methods (please specify)		

ASSESSMENT

26. In your area, are assessments made under the SAP accepted as part of the assessment information for active case management?

Yes ☐
No ☐

27. Which assessment tools are in use by active case managers? **TICK ALL THAT APPLY**

Easycare ☐
MDS ☐
FACE ☐
Locally approved Single Assessment Process (SAP) tool ☐
Disease specific (please specify) ☐

_____

Other (please specify) ☐

_____

28. Can ACM service staff undertake assessments for provision of local authority funded social care services?

Yes ☐
No ☐

If yes, for which services, please specify

_____

CARE PLANNING

29. For ACM patients, do care plans routinely detail the contribution made by the following: **PLEASE TICK ONE BOX PER LINE**

	Usually	Sometimes	Never
ACM / Primary care services			
Acute Foundation Trust services			
Intermediary care services			
Social care services			

30. Can ACM's authorise the use of any local authority resources for patients? **TICK ALL THAT APPLY**

Domiciliary care	☐
Respite care	☐
Day care	☐
Other	☐

If other, please describe

_____

31. Does the ACM service have a written policy to allocate cases of different levels of need/ complexity/ risk to different levels of case management (e.g. low risk patients may be visited monthly and high risk patients may be visited weekly)?

Yes ☐
No ☐

If yes, how are cases allocated? **TICK ALL THAT APPLY**

Level of staff qualification	
Length of contact	
Intensity of involvement	
Time limited, short term intensive involvement e.g. 13 weeks	
Allocation as staff available	

MONITORING AND REVIEWS

32. Please estimate a case manager's average **active** caseload size? ☐☐☐

33. How often does the **same practitioner** within the ACM service remain responsible for assessment, case management, monitoring and review within a single patient episode*?* **PLEASE TICK ONE BOX PER LINE**

	Usually	Sometimes	Never
For cases closed within 3 months			
For cases open after 3 months for longer term monitoring/review			

34. Please estimate the proportion of the overall active ACM caseload that are visited at least weekly within your service. **PLEASE TICK ONE BOX**

0 – 20%	☐	41 – 60%	☐	81 – 100%	☐
21 – 40%	☐	61 – 80%	☐		

35. Please estimate the proportion of ACM cases which typically fall within the following categories to named case managers within your service, 6 months from their entry. **PLEASE TICK ONE BOX PER LINE**

	Proportion of cases (%)				
	0 – 20%	21 – 40%	41 – 60%	61 – 80%	81 – 100%
Active ACM					
Routine monitoring within ACM					
Disease management					
Self care support					
Inactive					
Case closed					

36. Does the ACM service have systems in place for reviewing ACM service patients?

Yes ☐

No ☐

If yes, which of the following methods do you currently routinely employ for active and inactive cases? **PLEASE TICK WHICH METHODS YOU USE FOR ACTIVE CASES IN COLUMN ONE AND WHICH YOU USE FOR INACTIVE CASES IN COLUMN TWO**

	Active	Inactive
Multi-disciplinary team -with patient		
Multi-disciplinary team -without patient		
Case manager face to face contact with patient		
Assistant practitioner face to face contact with patient		
Information from carer		
Letter		
Telephone		
Other, please specify		

37. What are the three most common reasons for case closure in your ACM service? **TICK THE THREE MOST FREQUENT REASONS**

Moved to disease specific services	
Moved to social care services	
Moved to self care support	
Moved to long term care home	
Moved to community nursing	
Moved to informal care	
Patient refusing service	
Leaving locality	
No discernable benefit from ACM service	
Death	
Other (Please specify)	

SELF CARE SUPPORT SERVICES

38. Does your PCT have a designated lead for self care support services?

Yes ☐
No ☐

39. Have you, as ACM lead, been involved in the development of the commissioning strategy for self care support services in your PCT?

Yes ☐
No ☐

40. Does your ACM service have any formal links with voluntary organisations specifically designed to support self care for patients with long-term conditions?

If yes, please specify

_____

_____

_____

41. In relation to the following disease categories, please tell us whether your PCT funds self care support services and estimate their frequency of use by case managers? **PLEASE COMPLETE EACH ROW**

Disease category	**Self care support available?**		**Frequency of use by case managers**			
	Yes	**No**	**Often**	**Occasionally**	**Rarely**	**Never**
Asthma						
Chronic obstructive pulmonary disease						
Diabetes						
Hypertension						
Cancer						
Coronary heart disease						
Stroke and transient ischaemic attack (TIA)						
Epilepsy						
Hypothyroidism						
Mental health						
Musculoskeletal						
Multiple conditions						
Other (please detail)						
Other (please detail)						

42. Following on from your previous answer, please indicate the content of self care support services currently operating in your PCT / locality for **patients in receipt of ACM** in each disease category

PLEASE TICK ALL THAT APPLY FOR EACH DISEASE CATEGORY (ROW)

Disease category	**Self care support service**						
	Informal therapeutic intervention	Accessible advice and information	Technology and equipment to promote self care	Self care support training *(generic)*	Self care support training *(condition specific)*	Self help groups	Alternative therapies
Asthma							
Chronic obstructive pulmonary disease							
Diabetes							
Hypertension							
Cancer							
Coronary heart disease							
Stroke and transient ischaemic attack (TIA)							
Epilepsy							
Hypothyroidism							
Mental health							
Musculoskeletal							
Multiple conditions							
Other (please detail)							
Other (please detail)							

43. What proportion of the active case management caseload would you estimate are currently using self care support services? _____ %

44. Does your PCT have a directory of local services for supporting self care support available to ACMs?

Yes ☐

No ☐

Under development ☐

Please enclose any documentation relating to available self care support services (either paper or electronic) E.g. Local policy relating to self care support, web addresses, electronic spreadsheets, local resource information.

INFORMATION SYSTEMS

45. Does your PCT have a computerised client record system for assessment and case management for ACM patients?

Yes ☐
No ☐

If yes, is it **TICK ALL THAT APPLY**

Linked to other record systems within primary care (e.g. Lorenzo) ☐
ACM service specific ☐
Other ☐

If other, please describe

_____

46. Which of these statements describe ACM information systems in your PCT? **TICK ALL THAT APPLY**

ACMs can electronically access all information on ACM patients within the PCT ☐
ACM patients can be identified on hospital record systems ☐
The ACM service has a specific computerised client record system ☐
None of the above ☐

47. What information about individual patients is held in the electronic information system relating to the ACM service? **TICK ALL THAT APPLY**

Personal details		Care plans	
Ethnic origin		Reviews	
Medical information		Diagnoses	
SAP Assessments:		**Services received:**	
Specialist assessments		NHS Services	
Overview assessment		Social care services	
Other, please specify		**ACM service only**:	
		Self care support services	
		All services	

SERVICE DEVELOPMENT

48. Has there been a formal evaluation of your ACM service?

Yes ☐
No ☐

If yes, please enclose the report or summary of findings

49. What are the key issues in developing your ACM service?

Please also use the space below to add any further comments to expand upon any issues of relevance covered or not covered in the questionnaire

Please remember to include the relevant documents relating to:

Written eligibility criteria for ACM (Q22) ☐

Please enclose any documentation relating to available self care support services (either paper or electronic) E.g. Local policy relating to self care support, web addresses, electronic spreadsheets, local resource information. (Q44) ☐

Evaluation of your ACM service (Q48) ☐

Thank you for your assistance in completing this form

Please return the questionnaire in the SAE to: Personal Social Services Research Unit, Dover Street Building, The University of Manchester, Oxford Road, Manchester, M13 9PL by 20/07/2007. Alternatively complete an electronic version which can be emailed to you. For this or any queries telephone 0161 275 5677 or email Jessica.Abell@manchester.ac.uk

APPENDIX TWO: INTERVIEW SCHEDULE

PERSONAL SOCIAL SERVICES RESEARCH UNIT

Supporting People with Long term Conditions:
Active Case Management (ACM) in Greater Manchester / England

Interview Schedule

Introduction:

Purpose of interview: to gain further information about the ACM service.

Go over questionnaire.

1. Background

1.1 How long have you been in post?

1. 2 How is your service structured?

Prompt:
How is a CM 'team' defined?
Where are teams based?
How many CM teams in PCT?
How has it developed over time?

2. Links

2.1 In your opinion, how well developed are **formal networks** between primary and secondary care with regard to the implementation of ACM for people with long term conditions in your PCT?

Prompt:
Joint planning between Primary and secondary care
Partnerships with secondary NHS services
Involvement of specialists in improving primary care e.g. Are there any dedicated specialist physician sessions (geriatrician) to support ACM available
Arrangements for out of hours care
How many acute trusts do you currently liaise with and is it the same protocol for liaising with each?
Patient information sharing
Are there informal networks at work?
Has this changed over time?

2.1.1 What about links with health and social care services?

Prompt:
Joint planning between health and social care
How many local authorities do you currently liaise with and is it the same protocol for liaising with each?
Links with SAP in your locality
Partnerships with voluntary organisations (including service providers, patient and carer representation groups.)
Patient information sharing
Has this changed over time?

2.1.2 And links with GP practices?

Prompt:
formal / informal
Has this changed over time?

3. Staff mix

3.1 Has the staff balance changed since the implementation of the service e.g. more emphasis on recruiting nurses?

Prompt:
Has the role of case manager altered/remained the same?
Difficulties with regards to filling these roles?
Did introducing the post cause difficulties? How were they managed?
Does the service have a full time manager / pt with a caseload /other managerial arrangement?

4. Process of ACM

4.1 How do people get into the services? Can you talk me through the process for your team?

Prompt:
Methods for identifying high risk patients
How successful is it? Inappropriate referrals?
Has this changed over time?

4.2 Once referrals are accepted is it possible to allocate according to level of complexity / need / risk

Prompt:
Are cases prioritised?
Frequency of input?
By qualification level of staff?
Has this changed over time?

4.3 How manageable are the caseloads for your team?

Prompt:
What is an active case?
How long are they open?
When are they closed?
Balance of high risk patients
Enough CMs
Predicted and actual caseload size
Has this changed over time?

4.4 What do you think is the contribution of self care support to Case Management in your locality?
Prompt:
Has there been training or awareness raising?
Is it included in assessment?
Has this changed over time?
Do CMs make many referrals to self care support services?

5. Closing questions

5.1 What model is used to organise chronic care? *(E.g. Wagner's Chronic Care Model, Kaiser's triangle, Evercare, Unique Care / Castlefields, NPDT collaborative e.g. on COPD, Expert Patient Programme, Pursuing Perfection, PARR tool developed by King's Fund.)*

5.2 If the service were to be set up elsewhere, is there anything you would recommend was done differently?

Addendum

1. **Perception of how well developed links are in your PCT with regard to the implementation of ACM for people with long term conditions**

a. Development of **formal networks** between primary and secondary care.

*requires **most** development* ☐ ☐ ☐ ☐*requires **least** development*

b. Development of links between health and social care services.

*requires **most** development* ☐ ☐ ☐ ☐*requires **least** development*

c. Development of links with GP practices.

*requires **most** development* ☐ ☐ ☐ ☐*requires **least** development*

d. Development of **informal networks** .....

*requires **most** development* ☐ ☐ ☐ ☐*requires **least** development*

APPENDIX THREE: SUPPLEMENTARY TABLES FROM CHAPTER 3.1

A.3.1: Agreements with LA social care services

	No.	%
None	4	40
Respective target populations	1	10
Eligibility criteria for ACM	3	30
Assessment tools for entry into ACM	3	30
Accessing social care service resources	4	40
Other	1	10
No. of PCTS	10	

Source: Question 10 – Does your PCT have agreements in place with local authority social care services for people with conditions?

A.3.2: Date first patient accepted into the ACM service

	No.	%
January 2005	1	10
February 2005	1	10
April 2005	1	10
October 2005	2	20
December 2005	1	10
May 2006	2	20
June 2006	1	10
No. of PCTs	9	

Source: Question 6 - On what date was the first patient accepted into the ACM service?

A.3.3: Formal agreements between ACM service and other services

	Yes		Under discussion		No	
	No.	%	No.	%	No.	%
Acute / Foundation trusts						
Accident and emergency	4	40	4	40	2	20
Cardiology	1	10	2	20	7	70
General medicine	3	30	2	20	5	50
Geriatric medicine	4	40	2	20	4	40
Hospital pharmacy	1	10	1	10	8	80
Old age psychiatry	1	10	1	10	8	80
Specialist disease nursing e.g. COPD, epilepsy	4	40	3	30	3	30
Intermediate care services						
Schemes to prevent hospital admission e.g. hospital at home schemes	5	50	2	20	3	30
Schemes to facilitate early discharge from hospital	1	10	4	40	5	50
Ambulance trust						
Emergency hospital admissions	3	30	1	10	6	60
Primary care services						
Community nursing services	7	70	2	20	1	10
Community pharmacy services	4	40	1	10	5	50
Community physiotherapy services	2	20	2	20	6	60
Other	1	10	-	-	9	90

A.3.4: Staff groups acting as case managers within the ACM service and working with Very high Intensity Users

	CM		CM/VHIU	
	No.	%	No.	%
Community matrons	7	70	7	70
Qualified advanced practitioners/Nurse consultant	5	50	4	40
Advanced practitioners in training	4	40	6	60
District nurses	7	70	3	30
Other qualified community nurses	6	60	3	30
Qualified occupational therapists	3	30	2	20
Qualified physiotherapists	3	30	-	-
Qualified social workers	2	20	1	10
Case manager assistants/support workers/assistant practitioners	5	50	3	30
Other	-	-	-	-
No. of PCTS	10		8	

Source: Question 16 - Which staff groups work with people with long term conditions and act as case managers within the ACM service? Which staff groups work with Very High Intensity Users? Tick all that apply

A.3.5: Tasks undertaken by active case managers

	Usually		Sometimes		Never	
	No.	%	No.	%	No.	%
Assessment of health care needs	10	100	-	-	-	-
Assessment of social care needs	9	90	1	10	-	-
Assessment for entry into self care support services	7	70	1	10	2	20
Financial assessment	-	-	4	40	6	60
Care planning	10	100	-	-	-	-
Arranging/allocating services	9	90	-	-	1	10
Implementation of care plan	10	100	-	-	-	-
Case budget management/budget holding	-	-	-	-	10	100
Monitoring the implementation of the care plan	10	100	-	-	-	-
Reviews	10	100	-	-	-	-
Hands on care	3	30	4	40	3	30
Clinical oversight	10	100	-	-	-	-
Patient advocacy	8	80	2	20	-	-
Provision of emotional / therapeutic support	8	80	2	20	-	-
Prescribing / medications review	8	80	2	20	-	-
Provide patient information and education	10	100	-	-	-	-
Refer patient to self care support services	7	70	2	20	1	10
Contribute to the provision of self care support services	3	30	6	60	1	10
Contribute to the development of self care support programmes	3	30	4	40	3	30

Source: Question 19 – Do active case managers undertake the following tasks? Tick one box for each task

A. 3.6: Indicator of integration with primary health care (5 items)

	Indicator of integration with primary care					
PCT code	ACM delivered by GP model	Case Managers based at GP practices	Formal agreements community nursing	Formal agreements community pharmacy	Formal agreements community physiotherapy	Total
1	1	-	1	-	1	3
2	1	-	1	-	-	2
3	-	-	-	-	-	-
4	-	-	-	-	-	-
5	1	-	1	1	-	3
6	-	-	-	-	-	-
7	1	1	1	1	-	4
8	1	-	1	1	-	3
9	-	1	1	1	1	4
10	1	-	1	-	-	2
Total	6	2	7	4	2	

A.3.7: Indicator of integration with social care (5 items)

	Indicator of integration with social care					
PCT code	ACM delivered by integrated model	Social workers as case managers	Agreements with LA social care	Case managers can authorise social care resources	Information sharing at multidisciplinary locality meetings	Total
1	1	1	1	-	-	3
2	-	-	1	-	1	2
3	-	-	1	1	-	2
4	-	-	-	-	-	-
5	-	-	1	-	-	1
6	-	1	1	-	-	2
7	1	-	-	-	-	1
8	-	-	-	-	-	-
9	-	-	1	1	-	2
10	-	-	-	-	-	-
Total	2	2	6	2	1	

A.3.8: Indicator of integration with intermediate care (1 item)

	Indicator of integration with intermediate care
PCT code	Schemes in place to prevent hospital admission
1	-
2	1
3	-
4	1
5	1
6	-
7	-
8	-
9	1
10	1
Total	5

A.3.9: Indicator of integration with acute/foundation trusts (1 item)

	Indicator of integration with acute/foundation trusts
PCT code	Access to hospital records
1	1
2	-
3	-
4	-
5	1
6	1
7	1
8	1
9	-
10	1
Total	6

APPENDIX 4: SUPPLEMENTARY TABLES FROM CHAPTER 3.2

Table A.4.1: Sample characteristics for the 6, 9 and 12 month cohort samples: PCT and socio-demographics.

	All n=2738 n (%)	**6 months n=1418 n (%)**	**9 months (n = 868) n (%)**	**12 months n=345 n (%)**
ACM Provider PCT				
1	152 (5.6)	61 (4.3)	37 (4.3)	11 (3.2)
2	721 (26.3)	447 (31.5)	348 (40.1)	113 (32.8)
3	459 (16.8)	25 (1.8)	19 (2.2)	8 (2.3)
4	141 (5.1)	99 (7.0)	40 (4.6)	18 (5.2)
5	525 (19.2)	326 (23.0)	192 (22.1)	73 (21.2)
6	288 (10.5)	224 (15.9)	124 (14.3)	62 (18.0)
7	119 (4.3)	58 (4.1)	44 (5.1)	32 (9.3)
8	172(6.3)	96 (6.8)	17 (2.0)	8 (2.3)
9	103 (3.8)	36 (2.5)	19 (2.2)	6 (1.7)
10	58 (2.1)	45 (3.2)	27 (3.1)	14 (4.1)
Age at entry to caseload (mean, sd)	78.1 (11.1) (n=2677) (60 sysmis)	78.5 (10.2) (n=1379) (39 sysmis)	78.4 (10.2) (n=839) (29 sysmis)	79.6 (9.6) (n=342) (3 sysmis)
Age at entry to caseload				
<18	5 (0.2)	2 (0.1)	1 (.1)	-
18>65	243 (8.9)	98 (6.9)	62 (7.2)	22 (6.4)
65>=75	635 (23.2)	353 (24.9)	214 (24.7)	74 (21.4)
>75	1795 (65.6)	925 (65.3)	561 (64.7)	246 (71.3)
Not known	60 (2.2)	39 (2.8)	29 (3.3)	3 (0.9)
Gender				
Female	1656 (60.5)	882 (62.2)	546 (63.0)	225 (65.2)
Male	1073 (39.2)	531 (37.5)	317 (36.6)	120 (34.8)
Not known	9 (0.3)	4 (0.3)	4 (0.5)	-
Ethnicity				
White	2382 (87)	1236 (87.2)	763 (88.0)	303 (87.8)
Other ethnic group	99 (3.6)	53 (3.7)	35 (4.0)	14 (4.1)
Not known	257 (9.4)	128 (0.9)	69 (8.0)	28 (8.1)
Deprivation				
A (most deprived)	1323 (48.3)	729 (51.4)	428 (49.4)	149 (43.2)
B	589 (21.5)	284 (20.0)	194 (22.4)	83 (24.1)
C	391 (14.3)	175 (12.4)	109 (12.6)	50 (14.5)
D	229 (8.4)	114 (8.0)	68 (7.8)	31 (9.0)
E (least deprived)	121 (4.4)	60 (4.2)	25 (2.9)	12 (3.5)
Unknown	85 (3.1)	55 (3.9)	43 (5.0)	20 (5.8)

Table A.4.2: Sample characteristics 6, 9 and 12 month cohort samples: primary and secondary diagnoses at any admission.

	Primary diagnosis				Secondary diagnosis			
	All n=2738 n (%)	**6 months n=1417 n (%)**	**9 months (n = 867) n (%)**	**12 months n=345 n (%)**	**All n=2738 n (%)**	**6 months n=1417 n (%)**	**9 months (n = 867) n (%)**	**12 months n=345 n (%)**
Has diagnosis[1] at any admission[2]								
Symptoms, signs, and abnormal clinical and laboratory findings, not elsewhere classified	886 (32.4)	498 (35.1)	317 (36.6)	128 (37.1)	646 (23.6)	352 (24.8)	218 (25.1)	85 (24.6)
Diseases of the respiratory system	747 (27.3)	377 (26.6)	227 (26.2)	94 (27.2)	508 (18.6)	271 (19.1)	179 (20.6)	76 (22.0)
Diseases of the circulatory system	741 (27.1)	390 (27.5)	244 (28.1)	95 (27.5)	1013 (37.0)	558 (39.4)	342 (39.4)	140 (40.6)
Diseases of the digestive system	487 (17.8)	284 (20.0)	166 (19.1)	67 (19.4)	348 (12.7)	186 (13.1)	101 (11.6)	43 (12.5)
Injury, poisoning, and certain other consequences of external causes	396 (14.5)	234 (16.5)	154 (17.8)	74 (21.4)	124 (4.5)	82 (5.8)	50 (5.8)	23 (6.7)
Diseases of the genitourinary system	320 (11.7)	170 (12.0)	95 (11.0)	41 (11.9)	239 (8.7)	123 (8.7)	76 (8.8)	32 (9.3)
Diseases of the musculoskeletal system and connective tissue	296 (10.8)	162 (11.4)	107 (12.3)	40 (11.6)	202 (7.4)	113 (8.0)	69 (8.0)	31 (9.0)
Diseases of the eye and adnexa	165 (6.0)	110 (7.8)	79 (9.1)	36 (10.4	47 (1.7)	29 (2.0)	16 (1.8)	10 (2.9)
Malignant neoplasms	157 (5.7)	84 (5.9)	48 (5.5)	21 (6.1)	94 (3.4)	51 (3.6)	28 (3.2)	12 (3.5)
Endocrine, nutritional, and metabolic disease	137 (5.0)	77 (5.4)	45 (5.2)	15 (4.3)	372 (13.6)	188 (13.3)	208 (24.0)	41 (11.9)
Diseases of the nervous system	123 (4.5)	70 (4.9)	43 (5.0)	18 (5.2)	147 (5.4)	79 (5.6)	114 (13.1)	20 (5.8)
Factors influencing health status and contact with health services	123 (4.5)	67 (4.7)	39 (4.5)	21 (6.1)	529 (19.3)	320 (22.6)	49 (5.7)	78 (22.6)
Diseases of skin and subcutaneous tissue	115 (4.2)	62 (4.4)	39 (4.5)	15 (4.3)	102 (3.7)	53 (3.7)	36 (4.2)	10 (2.9)
Diseases of blood, blood-forming organs, immune mechanism	112 (4.1)	56 (4.0)	32 (3.7)	11 (3.2)	111 (4.1)	65 (4.6)	30 (3.5)	11 (3.2)
Infectious and parasitic diseases	70 (2.6)	41 (2.8)	23 (2.7)	10 (2.9)	-	-	-	-
Mental and behavioral disorders	69 (2.5)	31 (2.2)	23 (2.7)	5 (1.4)	101 (3.7)	37 (2.6)	26 (3.0)	6 (1.7)
In situ neoplasms	48 (1.8)	26 (1.8)	13 (1.5)	6 (1.7)	21 (0.8)	10 (0.7)	4 (0.5)	3 (0.9)
Diseases of the ear and mastoid process	3 (0.1)	3 (0.2)	2 (.2)	1 (0.3)	3 (0.1)	2 (0.1)	2 (0.2)	1 (0.3)
Certain conditions originating in the perinatal period	3 (0.1)	-	-	-	2 (0.1)	-	4 (0.5)	-
Pregnancy, childbirth, and the puerperium	2 (0.1)	-	-	-	-	-	-	-
Congenital malformations, deformations, and chromosomal abnormalities	2 (0.1)	1 (0.1)	1 (.1)	-	5 (0.2)	4 (0.3)	-	2 (0.6)
External causes of morbidity and mortality	1 (0.0)	1 (0.1)	-	-	378 (13.8)	204 (14.4)	137 (15.8)	60 (17.4)
Number of different diagnoses for all admissions (mean, sd)	1.8 (1.5)	1.9 (1.5)	2.0 (1.5)	2.0(1.6)	1.8 (1.5)	1.9 (1.5)	2.0 (1.6)	2.0 (1.5)

[1] ICD 10 chapter headings

[2] Diagnosis refers to all admissions (not just the diagnoses months pre and post the patient being added to an ACM caseload).

Table A.4.3: ACM caseload indicators for the 6, 9 and 12 month cohort sample.

	All n=2738 n (%)	6 months n=1418 % (n)	9 months (n = 868) n (%)	12 months n=345 % (n)
ACM Provider PCT				
1	152 (5.6)	61 (4.3)	37 (4.3)	11 (3.2)
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4	141 (5.1)	99 (7.0)	40 (4.6)	18 (5.2)
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6	288 (10.5)	224 (15.9)	124 (14.3)	62 (18.0)
7	119 (4.3)	58 (4.1)	44 (5.1)	32 (9.3)
8	172(6.3)	96 (6.8)	17 (2.0)	8 (2.3)
9	103 (3.8)	36 (2.5)	19 (2.2)	6 (1.7)
10	58 (2.1)	45 (3.2)	27 (3.1)	14 (4.1)
Length of time since addition to caseload at time of data extraction(30/6/07) or when case closed (mths) (mean)	6.9	10.0	11.6	13.3
Length of time since addition to caseload at time of data extraction or when case closed (months)				
0 to 2.99[1]	373 (13.6)	8 (0.6)	5 (0.6)	4 (1.2)
3 to 5.99	811 (29.6)	22 (1.6)	10 (1.2)	8 (2.3)
6 to 8.99	546 (19.9)	544 (38.4)	12 (1.4)	3 (0.9)
9 to 11.99	512 (18.7)	511 (36.1)	508 (58.6)	2 (0.6)
12 to 14.99	311 (11.4)	311 (21.9)	311 (35.9)	307 (89.0)
15+	22 (0.8)	21 (1.5)	21 (2.4)	21 (6.1)
Not applicable[2]	163 (6)	-	-	-
Length of time since set up of service (months) (Start date of caseload – date added) (mean, sd)	14.6 (5.8)	12.8 (5.7)	10.7 (4.8)	9.1 (4.4)
Length of time since set up of service (months)				
0 to 2.99	68 (2.5)	66 (4.7)	60 (6.9)	27 (7.8)
3 to 5.99	70 (2.6)	65 (4.6)	41 (4.7)	20 (5.8)
6 to 8.99	274 (10)	213 (15.0)	191 (22.0)	181 (52.5)
9 to 11.99	566 (20.7)	348 (24.6)	321 (36.9)	23 (6.7)
12 to 17.99	1086 (39.7)	409 (28.9)	165 (19.0)	94 (27.2)
18 to 23.99	473 (17.3)	316 (22.3)	90 (10.4)	-
24+	200 (7.3)	-	-	-
Proportion of cases closed	355 (12.9)	142 (10.0)	85 (9.8)	37 (10.7)
Reason for closure not reported	2383	1275	782	308
Reasons for closure				
Deceased	243 (68.6)	92 (64.8)	50 (58.8)	16 (43.2)
Discharged, GP & not specified	33 (9.3)	22 (15.5)	19 (22.4)	12 (32.4)
Inappropriate referral	21 (5.9)	-	-	-
Not active[3]	18 (5.1)	5 (3.5)	4 (4.7)	1 (2.7)
Other	13 (3.4)	-	-	-
Discharged nursing, residential, pallitative care	8 (2.3)	8 (5.6)	5 (5.9)	3 (8.1)
Moved away from locality	7 (2.0)	5 (3.5)	2 (2.4)	2 (5.4)
Refused treatment	6 (1.7)	4 (2.8)	3 (3.5)	2 (5.4)
Discharged, community nursing	6 (1.7)	6 (4.2)	2 (2.4)	1 (2.7)

[1] 'Length of time since added to caseload' is calculated from date a patient was added to a caseload up until the time of data extraction or date of case closure (if known) or date of death. Patient were included in the sample if nine months lapsed since they were added to the caseload, even if during this time their case may have been closed (for any reason other than death). Therefore several patients have a shorter 'length of time since added to caseload' than nine months due to their case being closed within this time. They were included unless they had died witin the nine month period post ACM registration because of their potential use of secondary services.
[2]Cases where the 'date added to the caseload' is after the date of data extraction.
[3]Includes patients defined as self managing or 'dependent caseload entry closed'.

Table A.4.4: Use of hospital services in the six months before and after addition to an ACM caseload (n=1417).

	6 months pre	6 months post	Significance[1]
Number of all admissions (spell) (mean, sd)	1.1 (1.6)	0.9 (1.5)	Z-5.674, p≤0.001
Number of all admissions (spell)			
0	641 (45.2)	774 (54.6)	
1	393 (27.7)	353 (24.9)	
2	204 (14.4)	150 (10.6)	
3	91 (6.4)	65 (4.6)	
4+ (%)	88 (6.2)	75 (5.3)	
Length of stay for all admissions (days) (mean, sd)	10.6 (20.6)	8.8 (22.1)	Z-4.839, p≤0.001
Length of stay for all admissions (days)			
0	728 (51.4)	885 (62.5)	
1-7	251 (17.7)	204 (14.4)	
8-14	117 (8.3)	84 (5.9)	
15-21	79 (5.6)	54 (3.8)	
22-28	57 (4.0)	46 (3.2)	
29+	185 (13.1)	144 (10.2)	
Method of admission (1 + range)			
Emergency admission (A&E)	542 (38.2)	426 (30.1)	Z -5.588, p≤0.001
Emergency admission (GP)	112 (7.9)	88 (6.2)	Z-1.697, p=0.090
Emergency admission (Other)	84 (5.9)	74 (5.2)	Z -0.675, p=0.500
Elective admission	256 (18.1)	228 (16.1)	Z- 1.715, p=0.086
Transfer from another hospital provider	9 (0.6)	8 (0.6)	Z-0.147, p=0.883
Number of emergency admissions (spell) (mean, sd)	0.8 (1.3)	0.6 (0.6)	Z-5.808, p≤0.001
Tariff[3] for all admissions (spell) (£) (mean / sd)	2430.04 (3767.80)	1831.66 (3558.01)	Z-6.224, p≤0.001
Number of A&E attendances (mean, sd)	0.6 (1.2)	0.6 (1.2)	Z-0.866, p=0.387
Number of A&E attendances			
0	940 (66.3)	935 (66.0)	
1	277 (19.5)	256 (18.1)	
2	106 (7.5)	129 (9.1)	
3 + (%)	94 (6.6)	97 (6.8)	
Number of outpatient visits[2] (mean/sd)	2.9 (3.6)	3.0 (3.5)	Z-0.701, p=0.484
Number of outpatient visits[2]			
0	377 (26.7)	387 (27.4)	
1-3	613 (43.3)	587 (41.4)	
4-6	238 (16.8)	250 (17.7)	
7+ (%)	186 (13.2)	190 (13.4)	
Tariff[3] for outpatient visits (£) (mean / sd)	201.95 (264.29)	195.84 (261.31)	Z-1.159, p=0.246

[1] Wilcoxon signed ranks test
[2] Patients receiving regular dialysis were excluded from analysis of outpatient visits, n = 1414
[3] Calculated using the Payment by Results tariff for 07/08.

Table A.4.5: Use of hospital services in the six months before and after addition to an ACM caseload by primary diagnosis[1] (most prevalent).

	6 months pre	6 months post	Significance[2]
Number of all admissions by diagnosis (spell) (mean/sd)			
Symptoms, signs, and abnormal clinical and laboratory findings, not elsewhere classified (n=498)	1.9 (2.0)	1.5 (2.0)	Z-4.645, p≤0.001
Diseases of the respiratory system (n=377)	1.8 (2.0)	1.5 (2.0)	Z-2.453, p=0.014
Diseases of the circulatory system (n=390)	1.7 (1.7)	1.3 (1.8)	Z-4.783, p<0.001
Diseases of the digestive system (n=284)	1.8 (1.9)	1.5 (1.9)	Z-2.947, p=0.003
Injury, poisoning, and certain other consequences of external causes (n=234)	1.6 (1.8)	1.5 (1.9)	Z-0.974, p=0.330
Diseases of the genitourinary system (n=170)	1.8 (1.6)	1.3 (1.7)	Z-3.410, p=0.001
Diseases of the musculoskeletal system and connective tissue (n=162)	1.9 (2.0)	1.5 (1.9)	Z-2.759, p=0.006
Length of stay for all admissions by diagnosis (days) (mean/sd)			
Symptoms…not elsewhere classified (n=498)	14.8 (22.4)	12.8 (23.3)	Z-2.681, p=0.007
Diseases of the respiratory system (n=377)	15.9 (23.0)	15.4 (29.6)	Z-1.439, p=0.150
Diseases of the circulatory system (n=390)	16.9 (23.6)	11.7 (23.4)	Z-5.103, p≤0.001
Diseases of the digestive system (n=284)	15.7 (22.7)	13.3 (30.5)	Z-3.444, p=0.001
Injury, poisoning…(n=234)	16.7 (25.5)	15.5 (26.5)	Z-0.892, p=0.373
Diseases of the genitourinary system (n=170)	18.08 (27.6)	13.4 (21.6)	Z-2.134, p=0.33
Diseases of the musculoskeletal system (n=162)	18.6 (25.9)	11.3 (21.1)	Z-3.709, p≤0.001
Tariff[3] for all admissions by diagnosis (spell) (£) (mean / sd)			
Symptoms…not elsewhere classified (n=498)	3616.56 (4142.97)	2844.21 (4172.62)	Z-4.037,p≤0.001
Diseases of the respiratory system (n=377)	3608.73 (4137.50)	3407.98 (4810.37)	Z-1.406, p=0.160
Diseases of the circulatory system (n=390)	3972.46 (4107.79)	2738.45 (4222.48)	Z-5.543, p≤0.001
Diseases of the digestive system (n=284)	3765.15 (4455.72)	3074.67 (4802.15)	Z-3.408, p=0.001
Injury, poisoning…(n=234)	3903.17 (4756.02)	3547.43 (5029.81)	Z-1.252, p=0.211
Diseases of the genitourinary system (n=170)	4214.59 (5051.74)	2896.43 (3969.26)	Z-2.983, p=0.004
Diseases of the musculoskeletal system (n=162)	4252.97 (4643.96)	2880.11 (4198.87)	Z-3.722, p≤0.001
Number of emergency admissions at diagnosis (mean/sd)			
Symptoms…not elsewhere classified (n=498)	1.5 (1.7)	1.1 (1.7)	Z-4.275, p≤0.001
Diseases of the respiratory system (n=377)	1.5 (1.8)	1.3 (1.8)	Z-2.206, p=0.027
Diseases of the circulatory system (n=390)	1.4 (1.5)	1.0 (1.4)	Z-5.248, p≤0.001
Diseases of the digestive system (n=284)	1.3 (1.7)	1.0 (1.5)	Z-2.989, p=0.003
Injury, poisoning…(n=234)	1.2 (1.6)	1.1 (1.6)	Z-1.216, p=0.224
Diseases of the genitourinary system (n=170)	1.4 (1.6)	1.1 (1.5)	Z-2.850, p=0.004
Diseases of the musculoskeletal system (n=162)	1.4 (1.8)	1.0 (1.5)	Z-2.475, p=0.013

[1] Diagnosis codes were not mutually exclusive
[2] Wilcoxon signed ranks test
[3] Calculated using the Payment by Results tariff for 07/08.

Table A.4.6: Specialty codes (most prevalent) for the six month cohort sample (n=1417).

	N (%)
Patient has any admission coded as specialty of:	
General medicine	767 (54.1)
Geriatric medicine	506 (35.7)
General surgery	224 (15.8)
Accident & Emergency	159 (11.2)
Trauma & Orthopaedics	128 (9.0)
Opthalmology	109 (7.7)
Cardiology	89 (6.3)
Urology	88 (6.2)
Respiratory	65 (4.6)

Table A.4.7: Use of hospital services in the six months before and after addition to an ACM caseload by specialty[1] (most prevalent).

	6months pre	6months post	Significance[2]
Number of admissions by specialty			
General medicine (n=767)	1.6 (1.7)	1.3 (1.7)	Z-5.139, p≤0.001
Geriatric medicine (n=506)	1.6 (1.8)	1.4 (1.7)	Z-2.748, p=0.006
General surgery (n=224)	1.8 (1.8)	1.5 (2.0)	Z-2.573, p=0.010
Accident & Emergency (n=159)	2.2 (2.3)	1.6 (2.3)	Z-3.664, p≤0.001
Trauma & Orthopaedics (n=128)	1.3 (1.7)	1.1 (1.4)	Z-1.726, p=0.084
Opthalmology (n=109)	1.5 (1.9)	1.4 (2.2)	Z-0.701, p=0.484
Cardiology (n=89)	2.1 (1.9)	1.7 (2.1)	Z-1.640, p=0.101
Urology (n=88)	1.8 (1.6)	1.4 (1.5)	Z-2.356, p=0.018
Respiratory (n=65)	2.1 (2.3)	1.6 (2.6)	Z-2.590, p=0.010
Length of stay (days) by specialty			
General medicine (n=767)	15.6 (23.8)	12.6 (25.8)	Z-4.381, p≤0.001
Geriatric medicine (n=506)	15.5 (22.9)	12.8 (22.5)	Z-2.776, p=0.006
General surgery (n=224)	18.3 (25.9)	14.7 (27.7)	Z-2.286, p=0.022
Accident & Emergency (n=159)	18.0 (26.4)	10.4 (16.8)	Z-3.699, p≤0.001
Trauma & Orthopaedics (n=128)	16.6 (27.3)	12.1 (23.2)	Z-2.088, p=0.037
Opthalmology (n=109)	9.5 (20.5)	7.9 (19.1)	Z-0.992, p=0.321
Cardiology (n=89)	12.6 (16.3)	12.5 (22.6)	Z-1.186, p=0.236
Urology (n=88)	13.9 (25.5)	10.5 (18.4)	Z-0.954, p=0.340
Respiratory (n=65)	16.1 (21.2)	12.2 (24.5)	Z-1.875, p=0.061
Tariff[3] for specialty (spell) (£) (mean / sd)			
General medicine (n=767)	3561.01 (4288.12)	2617.38 (4081.77)	Z-5.732, p≤0.001
Geriatric medicine (n=506)	3466.29 (3990.28)	2845.93 (4023.45)	Z-3.506, p≤0.001
General surgery (n=224)	4069.91 (4378.99)	3365.79 (5083.83)	Z-2.473, p=0.013
Accident & Emergency (n=159)	4124.82 (4240.22)	2834.32 (3976.84)	Z-3.529, p≤0.001
Trauma & Orthopaedics (n=128)	3699.83 (5097.54)	2824.96 (4321.75)	Z-1.723, p=0.085
Opthalmology (n=109)	2605.82 (4089.50)	2183.56 (4073.25)	Z-1.330, p=0.184
Cardiology (n=89)	4049.18 (4045.24)	3285.59 (4606.62)	Z-1.695, p=0.090
Urology (n=88)	3510.07 (5024.69)	2425.11 (3200.95)	Z-1.261, p=0.207
Respiratory (n=65)	4230.21 (5212.37)	2878.21 (4039.90)	Z-2.259, p=0.024
Number of emergency admissions at specialty			
General medicine (n=767)	1.3 (1.5)	0.9 (1.3)	Z-5.636, p≤0.001
Geriatric medicine (n=506)	1.3 (1.6)	1.1 (1.4)	Z-3.020, p=0.003
General surgery (n=224)	1.3 (1.5)	1.1 (1.6)	Z-2.588, p=0.010
Accident & Emergency (n=159)	2.0 (2.3)	1.4 (2.1)	Z-3.981, p≤0.001
Trauma & Orthopaedics (n=128)	1.0 (1.6)	0.8 (1.2)	Z-1.486, p=0.137
Opthalmology (n=109)	0.9 (1.8)	0.8 (2.1)	Z-1.202, p=0.229
Cardiology (n=89)	1.5 (1.7)	1.1 (1.6)	Z-2.220, p=0.026
Urology (n=88)	0.9 (1.2)	0.7 (1.0)	Z-1.352, p=0.176
Respiratory (n=65)	1.6 (1.9)	1.3 (2.6)	Z-1.622, p=0.105

[1] Specialty codes were not mutually exclusive
[2] Wilcoxon signed ranks test
[3] Calculated using the Payment by Results tariff for 07/08.

Table A.4.8: Use of hospital services in the 12 months before and after addition to an ACM caseload (n= 345).

	12 months pre	12 months post	Significance[1]
Number of all admissions (spell) (mean, sd)	1.7 (2.2)	1.5 (1.9)	Z-1.398, p=0.162
Number of all admissions (spell)			
0	120 (34.8)	138 (40.0)	
1	94 (27.2)	75 (21.7)	
2	47 (13.6)	63 (18.3)	
3	34 (9.9)	32 (9.3)	
4+ (%)	50 (14.5)	37 (10.7)	
Length of stay for all admissions (days) (mean, sd)	18.9 (36.1)	14.8 (30.3)	Z-2.008, p=0.045
Length of stay for all admissions (days)			
0	133 (38.6)	175 (50.7)	
1-7	71 (20.6)	52 (15.1)	
8-14	32 (9.3)	29 (8.4)	
15-21	21 (6.1)	22 (6.4)	
22-28	16 (4.6)	7(2.0)	
29+	72 (20.9)	60 (17.4)	
Method of admission (1 or more, range)			
Emergency admission (A&E)	154 (44.6)	150 (43.5)	Z - 0.361, p=0.718
Emergency admission (GP)	34 (9.9)	31 (9.0)	Z – 0.297, p=0.766
Emergency admission (Other)	32 (9.3)	22 (6.4)	Z – 0.964, p=0.335
Elective admission	76 (22.0)	88 (25.5)	Z – 1.745, p=0.081
Transfer from another hospital provider	3 (0.9)	1(0.3)	Z - 0.378, p=0.705
Number of emergency admissions (spell) (mean, sd)	1.3 (2.0)	1.0 (1.0)	Z-2.225, p=0.026
Tariff[2] for admissions (spell) (£) (mean / sd)	4189.64 (6428.97)	3181.45 (4849.33)	Z-2.478, p=0.13
Number of A&E attendances (mean, sd)	0.3 (0.7)	1.1 (1.9)	Z-8474, p<0.001
Number of A&E attendances			
0	263 (76.2)	188 (54.5)	
1	55 (15.9)	69 (20.0)	
2	19 (5.5)	36 (10.4)	
3 + (%)	8 (2.3)	52 (15.1)	
Number of outpatient visits (mean/sd)	4.6 (5.4)	5.3 (5.7)	Z-2.211, p=0.027
Number of outpatient visits			
0	71 (20.6)	65 (18.8)	
1-3	121 (35.0)	110 (31.9)	
4-6	43 (18.6)	72 (20.9)	
7+ (%)	110 (25.8)	98 (28.4)	
Tariff[2] for outpatient visits (£) (mean / sd)	347.06 (429.18)	354.07 (419.08)	Z-0.191, p=0.848

[1] Wilcoxon signed ranks test
[2] Calculated using the Payment by Results tariff for 07/08.

Table A.4.9: Use of hospital services in the 12 months before and after addition to an ACM caseload by primary diagnosis[1] (most prevalent).

	12 months pre	12 months post	Significance[2]
Number of all admissions by diagnosis (spell) (mean/sd)			
Symptoms, signs, and abnormal clinical and laboratory findings, not elsewhere classified (n=498)	2.9 (2.8)	2.4 (2.1)	Z-1.639, p=0.101
Diseases of the respiratory system (n=377)	2.8 (2.9)	2.7 (2.3)	Z-0.059, p=0.953
Diseases of the circulatory system (n=390)	2.7 (2.9)	2.3 (2.3)	Z-0.971, p=0.331
Diseases of the digestive system (n=284)	2.7 (2.5)	2.5 (2.3)	Z-0.623, p=0.533
Injury, poisoning, and certain other consequences of external causes (n=234)	2.6 (2.5)	2.3 (2.2)	Z-0.816, p=0.414
Diseases of the genitourinary system (n=170)	2.8 (2.3)	1.8 (2.1)	Z-2.119, p=0.034
Diseases of the musculoskeletal system and connective tissue (n=162)	3.2 (2.4)	2.8 (2.5)	Z-0.734, p=0.463
Length of stay for all admissions by diagnosis (days) (mean/sd)			
Symptoms…not elsewhere classified (n=498)	2.4 (2.7)	1.9 (1.9)	Z-1.670, p=0.095
Diseases of the respiratory system (n=377)	2.5 (2.8)	2.3 (2.0)	Z-0.119, p=0.905
Diseases of the circulatory system (n=390)	2.3 (2.8)	1.7 (2.0)	Z-1.701, p=0.089
Diseases of the digestive system (n=284)	1.9 (2.4)	1.6 (1.9)	Z-1.198, p=0.231
Injury, poisoning…(n=234)	2.0 (2.3)	1.9 (1.9)	Z-0.322,p=0.747
Diseases of the genitourinary system (n=170)	2.3 (2.2)	1.4 (1.9)	Z-2.245, p=0.025
Diseases of the musculoskeletal system (n=162)	2.2 (2.2)	2.0 (2.2)	Z-0.559,p=0.576
Tariff[3] for all admissions by diagnosis (spell) (£) (mean / sd)			
Symptoms…not elsewhere classified (n=498)	28.0 (43.1)	23.8 (32.8)	Z-0.576, p=0.565
Diseases of the respiratory system (n=377)	29.9 (40.7)	33.1 (45.2)	Z-0.912, p=0.362
Diseases of the circulatory system (n=390)	26.9 (37.3)	23.6 (34.6)	Z-0.952, p=0.341
Diseases of the digestive system (n=284)	27.0 (36.5)	28.8 (50.7)	Z-0.760, p=0.447
Injury, poisoning…(n=234)	33.3 (50.9)	25.1 (31.3)	Z-0.176, p=0.860
Diseases of the genitourinary system (n=170)	27.4 (42.7)	17.6 (27.8)	Z-1.892, p=0.059
Diseases of the musculoskeletal system (n=162)	28.4 (35.6)	25.1 (29.2)	Z-0.600, p=0.548
Number of emergency admissions at diagnosis (mean/sd)			
Symptoms…not elsewhere classified (n=498)	6429.96 (7676.73)	5057.13 (5554.84)	Z-1.509, p=0.131
Diseases of the respiratory system (n=377)	6423.68 (7658.49)	6245.28 (6279.52)	Z-0.418, p=0.676
Diseases of the circulatory system (n=390)	6196.40 (6035.93)	4960.41 (5709.41)	Z-1.542, p=0.123
Diseases of the digestive system (n=284)	6430.01 (7101.94)	5872.28 (7218.15)	Z-1.124, p=0.261
Injury, poisoning…(n=234)	7594.92 (9305.56)	5799.15 (6010.71)	Z-1.060, p=0.289
Diseases of the genitourinary system (n=170)	6338.39 (7086.47)	3457.17 (4380.02)	Z-2.533, p=0.011
Diseases of the musculoskeletal system (n=162)	7359.15 (7482.91)	5967.90 (6354.67)	Z-1.196, p=0.232

[1] Diagnosis codes were not mutually exclusive
[2] Wilcoxon signed ranks test
[3] Calculated using the Payment by Results tariff for 07/08.

Table A.4.10: Specialty codes (most prevalent) for the 12 month cohort sample (n=345).

	N (%)
Patient has any admission coded as specialty of:	
General medicine	184 (53.3)
Geriatric medicine	129 (37.4)
General surgery	51 (14.8)
Accident & Emergency	38 (11.0)
Trauma & Orthopaedics	39 (11.3)
Opthalmology	36 (10.4)
Cardiology	15 (4.3)
Urology	23 (6.7)
Respiratory	18 (5.2)

Table A.4.11: Use of hospital services in the 12 months before and after addition to an ACM caseload by specialty[1] (most prevalent).

	12 months pre	12 months post	Significance[2]
Number of admissions by specialty			
General medicine (n=184)	2.5 (2.5)	2.1 (2.1)	Z-1.379, p=0.168
Geriatric medicine (n=129)	2.4 (2.6)	2.0 (2.0)	Z-1.286, p=0.198
General surgery (n=51)	2.7 (2.2)	2.1 (1.9)	Z-1.265, p=0.206
Accident & Emergency (n=38)	2.2 (2.3)	2.0 (2.0)	Z-0.581, p=0.561
Trauma & Orthopaedics (n=39)	3.33 (3.6)	2.4 (2.3)	Z-1.263, p=0.206
Opthalmology (n=36)	2.4 (2.2)	2.6 (2.1)	Z-0.458, p=0.647
Cardiology (n=15)	3.5 (3.1)	2.7 (1.7)	Z-0.728, p=0.467
Urology (n=23)	2.7 (2.5)	2.9 (3.1)	Z-0.497, p=0.619
Respiratory (n=18)	3.9 (4.4)	2.2 (1.7)	Z-1.253, p=0.210
Length of stay (days) by specialty			
General medicine (n=184)	25.6 (37.9)	22.5 (36.5)	Z-1.105, p=0.269
Geriatric medicine (n=129)	24.3 (32.3)	20.9 (29.2)	Z-1.079, p=0.281
General surgery (n=51)	36.6 (54.7)	22.3 (34.4)	Z-1.841, p=0.066
Accident & Emergency (n=38)	32.0 (47.1)	24.6 (32.8)	Z-0.487, p=0.626
Trauma & Orthopaedics (n=39)	21.0 (32.6)	20.6 (30.0)	Z-0.126, p=0.126
Opthalmology (n=36)	15.9 (20.5)	16.7 (27.7)	Z-0.432, p=0.666
Cardiology (n=15)	22.1 (25.1)	28.4 (37.7)	Z-0.070, p=0.944
Urology (n=23)	13.7 (17.7)	22.5 (34.0)	Z-0.684, p=0.494
Respiratory (n=18)	27.05 (29.7)	29.5 (44.7)	Z-0.065, p=0.948
Tariff[3] for specialty (spell) (£) (mean / sd)			
General medicine (n=184)	5865.79 (7044.67)	4609.25 (5585.19)	Z-1.932, p=0.053
Geriatric medicine (n=129)	5628.37 (5785.35)	4493.81 (4963.20)	Z-1.738, p=0.082
General surgery (n=51)	7780.98 (9652.80)	4937.21 (6124.48)	Z-2.147, p=0.032
Accident & Emergency (n=38)	7172.26 (8835.45)	6079.63 (6889.62)	Z-0.566, p=0.572
Trauma & Orthopaedics (n=39)	5800.38 (5691.00)	4565.46 (5051.30)	Z-0.384, p=0.701
Opthalmology (n=36)	4131.25 (4249.83)	4249.83 (4708.17)	Z-0.262, p=0.793
Cardiology (n=15)	7497.13 (6518.68)	6369.33 (5630.10)	Z-0.568, p=0.570
Urology (n=23)	4041.39 (3708.90)	4601.39 (5646.24)	Z-0.061, p=0.951
Respiratory (n=18)	6986.5 (6245.95)	5597.2 (6378.43)	Z-0.588, p=0.557
Number of emergency admissions at specialty			
General medicine (n=184)	2.0 (2.4)	1.6 (1.8)	Z-1.578, p=0.115
Geriatric medicine (n=129)	2.0 (2.5)	1.6 (1.6)	Z-1.594, p=0.111
General surgery (n=51)	1.8 (1.9)	1.4 (1.8)	Z-1.270, p=0.204
Accident & Emergency (n=38)	1.5 (2.0)	1.4 (1.5)	Z-0.281, p=0.779
Trauma & Orthopaedics (n=39)	2.9 (3.7)	2.0 (2.2)	Z-1.464, p=0.143
Opthalmology (n=36)	1.5 (1.8)	1.2 (1.7)	Z-1.060, p=0.289
Cardiology (n=15)	2.5 (2.6)	1.7 (1.8)	Z-1.092, p=0.275
Urology (n=23)	1.4 (1.7)	1.4 (2.0)	Z-0.097, p=0.923
Respiratory (n=18)	3.6 (4.5)	2.1 (1.8)	Z-0.740, p=0.459

[1] Specialty codes were not mutually exclusive
[2] Wilcoxon signed ranks test
[3] Calculated using the Payment by Results tariff for 07/08.