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Original Research

Ambulatory care sensitive conditions: terminology and disease coding need to be more specific to aid policy makers and clinicians

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SUMMARY

Objectives: Ambulatory or primary care sensitive conditions (ACSCs) are those conditions for which hospital admission could be prevented by interventions in primary care. At present, different definitions of ACSCs are used for research and health policy analysis. This study aimed to explore the impact of different definitions of ACSCs and associated disease codes on analysis of health service activity.

Study design: Retrospective cross-sectional study using Hospital Episode Statistics (HES).

Methods: All ACSCs identified by a literature search were documented. Conditions and codes were standardized using International Classification of Diseases (ICD) 10. A subset of ACSCs commonly used in England was compared with all 36 ACSCs identified by the search in a retrospective cross-sectional study using HES.

Results: In total, 36 potential ACSCs were identified, which contained numerous subcategories. The most frequently used subset of ACSCs in the NHS only contains 19 ACSCs. There were 4,659,054 emergency admissions in England in 2005/6, of which 1,900,409 were ACSCs using the full set of 36 conditions. The proportion of these admissions attributable to the NHS subset of 19 ASCS was 35%. The underlying ICD10 codes used to define ACSCs vary widely across subsets of ACSCs used in the NHS. This impacts on rates of admission, length of stay and costs attributable to ACSCs.

Conclusions: Rates of hospital admission for ACSCs are increasingly used as a measure of the effectiveness of primary care. However, different conceptual interpretations of the term 'ACSC' and use of differing definitions and diagnostic codes impact on the proportion of admissions that are attributed as ACSCs. Some resolution of these inconsistencies is required for this measure to be more useful to decision makers.

Introduction

Admissions to hospital are an increasing source of pressure on health system resources in England and other developed countries.[1] In the National Health Service (NHS) in England, changes to commissioning arrangements, including payment by results and practice-based commissioning, have also increased the focus on reducing unnecessary hospital admissions. The majority of avoidable admissions are unplanned rather than elective admissions. Unplanned admissions are those that are non-elective admissions (i.e. not previously arranged). They are also referred to as emergency or urgent admissions. Unplanned admissions represented 36.7% of hospital admissions in England in 2005/6.[2] A recent audit of emergency admissions in England identified that 5.9% of emergency admissions were considered to be unnecessary, and most of these patients could have been cared for in the community.[3] The Department of Health have introduced a national target with the aim of reducing emergency bed-days by 5% by 2008.[4] This is against a background of a projected rise in emergency admissions for ambulatory care sensitive conditions (ACSCs) by 42% by 2028.[5]

ACSCs are those conditions for which hospital admission could be prevented by interventions in primary care.[6] Sets of ACSCs often include conditions for which acute management should prevent admission, e.g. dehydration and gastroenteritis, and chronic conditions where preventative care should prevent later admission, e.g. complications of diabetes. There is a considerable body of research from the USA on the use of ACSCs as markers of primary care effectiveness.[7,8] Research has also been undertaken to develop or validate sets of ACSCs for use in other countries, including Spain, Australia and the UK.[9,10] However, at present, different definitions of ACSCs are used for research, health policy analysis and, increasingly in England, to inform the commissioning of healthcare services. It is recognized that researchers, policy makers and commissioners of care may view the concept of ACSCs in different ways, depending on the purpose for which they are going to be

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used. In addition, the concept of an ACSC will vary in different healthcare systems. In the USA, for example, ACSC admissions were originally used as a measure of health system performance, reflecting ease of access to primary care. In the UK, where access to primary care is universal and free at the point of delivery, interest in these conditions is as a performance measure of the quality of care delivered.

As an illustration of the importance of clarity in both the conceptual and practical use of ACSCs, admissions for ACSCs are currently the focus of a number of initiatives to reduce avoidable admissions in the NHS in England. These initiatives include the Directory of Ambulatory Emergency Care for Adults (DAECA), which lists a number of conditions that can be managed effectively outside hospital with appropriate and prompt access to diagnostic services and specialist advice.[11] Another NHS initiative, Care Outside Hospital, assists primary care trusts who commission care in the NHS with identifying potentially avoidable admissions for ACSCs.[12] Other organizations, e.g. Dr Foster, a private sector body working in partnership with the NHS, feed data back to general practitioners and commissioning staff.[5] However, the conditions and the disease codes targeted by these initiatives are not consistent, which limits their utility for the managers and clinicians who use them and causes confusion if there is lack of clarity about the underlying purpose and derivation of these differing sets of ACSCs.

As clinicians and researchers, the authors identified this as a problem for those working in public health, commissioning and primary care. Therefore, this study aimed to explore the impact of different definitions of ACSCs and associated disease codes on analysis of health service activity. ACSCs previously cited in the literature or utilised by clinicians, researchers and policy makers in England and abroad were identified. Having identified these ACSCs, an analysis was conducted to compare the prevalence and resource impact of a subset of ACSCs frequently used in the NHS with a comprehensive set based on the literature search.

Methods

MEDLINE, CINAHL, EMBASE, AMED Cochrane collaboration and DARE databases were searched using the following terms: ambulatory/primary care sensitive, ambulatory/primary care sensitive conditions and ambulatory/primary care sensitive hospital admissions. The Internet was searched using the same search terms. In addition, the authors hand searched the reference lists of all identified sources and contacted experts in the field in both research and health policy and public health. The original search date was October 2006, with an updated search in November 2007.

All ACSCs identified in papers and sources found by the literature search were documented. Disease codes were recorded from these papers and sources where possible. Disease codes identified were either World Health Organization International Classification of Diseases (ICD) codes or Healthcare Resource Groups version 3.5 (HRG) codes created by the Casemix Service of the Department of Health in England.[13,14] Disease codes were then standardized to ICD10 codes. This was achieved using manual conversion from ICD9, and the NHS Information Centre's on-line HRG version 3.5 Explorer for conversion from HRG codes.[15,16]

To identify admissions for ACSCs, a retrospective cross-sectional study was undertaken using Hospital Episode Statistics (HES).[2] The HES dataset covers all admissions in England to NHS hospitals for a financial year. Duplicate records were removed based on matching of: HES ID number, date of admission, episode order, episode start date, episode end date and primary diagnosis. Admission was defined as first episode for a general emergency admission not resulting from a transfer from another hospital trust. Admissions were identified as ACSCs based on the full set of ICD10 codes derived from the literature search. A widely used set of NHS ACSC ICD10 codes was identified from the websites of the NHS Institute for Innovation and Improvement and Dr Foster.[5,12] The codes used by these organizations were identical and constitute the NHS subset of ACSCs. Counts of admissions were derived based on the full set of codes and on the NHS subset of codes. Costs of admission were based on length of stay (number of bed-days) and the NHS tariff 2005/6.[17]

Results

The literature search confirmed that the majority of work on defining ACSCs comes from the USA. Further work based on the initial development of conditions in the USA has been undertaken in Australasia, Spain and the UK. A small number of original papers that provided definitive lists of ACSCs were identified.[7,9,10,18,19] The authors have cited these original source papers which are cited directly or indirectly (via other papers) by many further papers. Of the websites identified, those citing ACSCs used by a national or federal department of health,[11,12,20] or those working in partnership with a department of health have been included.[5,8,21,22]

By combining all the ACSCs identified in the search, a set of 36 potential ACSCs was identified. The full set of identified ACSCs is listed in Table 1. The NHS subset of ACSCs only contains 19 of these conditions.

There were 4,659,054 emergency admissions in England in 2005/6. Using the full set of ACSCs ($n = 36$) identified by the literature search, the number of admissions attributable to this group of admissions is 1,900,409. Of these, 657,599 (35%) are included in the commonly used NHS subset of ACSCs ($n = 19$) and 1,242,810 (65%) are not included. Tables 1 and 2 show the resource impact for individual ACSCs and the overall impact of the NHS subset in terms of length of stay and total costs based on the NHS tariff.

Table 3 shows the underlying ICD10 codes associated with admissions for the ACSCs commonly used in the NHS. Table 4 shows the disease codes for the ACSCs not currently included in the NHS core set.

As demonstrated in Table 3, depending on the condition, there is considerable variation in the ICD10 codes used by different NHS information resources, even within the limited NHS set of ACSCs. This can be explained, in some cases, by the terminology used. For example, admissions for kidney and urinary tract infection may be limited to those for pyelonephritis (as used by Dr Foster), or may be for any kidney or urinary tract infection (as used in the former NHS Performance Indicators). The number of admissions coded as pyelonephritis in 2005/6 was 10,167, but total admissions for all kidney and urinary tract infections was 98,704.

Considerable variation is also seen in admissions for angina and chest pain. Using the usual NHS codes for this condition (ICD I20 and I24), the total number of angina admissions in 2005/6 for England was 78,061. However, when the additional codes which are referenced in the DAECA (I25, R072, R073, R074, Z034 and Z035) are added, the number of admissions rises to 314,966 (Table 5). The majority of these extra admissions are for ICD10 code R07 which includes symptoms rather than specific diagnoses.

Discussion

Summary of findings

From the literature, 36 potential ACSCs were identified. The most frequently used subset of ACSCs in the NHS in England only contains 19 of these conditions. There were 4,659,054 emergency admissions in England in 2005/6, of which 1,900,409 were ACSCs using the wider set of definitions. The proportion of these admissions attributable to the common NHS subset of ASCS was 35%. Even within the NHS, the underlying diagnostic codes used to

Table 1
Ambulatory care sensitive conditions (ACSCs) identified by literature search ($n = 36$) and National Health Service (NHS) secondary care resource impact.

ACSCs in common use in the NHS[a] ($n = 19$)	Cost of admissions (£) (NHS tariff/HES 05/06)	Other ACSCs identified by literature search ($n = 17$)	Cost of admissions (£) (NHS tariff/HES 05/06)
Angina	132,500,720	Alcohol-related diseases	43,508,698
Asthma	61,950,509	Atrial fibrillation and flutter	121,436,338
Cellulitis	101,980,871	Constipation	51,490,352
Congestive heart failure	203,157,431	Deliberate self-harm	39,960,854
Convulsions and epilepsy	83,233,723	Dyspepsia and other stomach function disorders	50,094,540
Chronic obstructive pulmonary disease	240,668,133	Failure to thrive	2,263,765
Dehydration and gastroenteritis	36,680,970	Fractured proximal femur	340,429,029
Dental conditions	9,154,111	Hypokalaemia	2,284,354
Diabetes complications[b]	49,417,359	Low birth weight	27,918,700
Ear, nose and throat infections	50,019,642	Migraine/acute headache	36,304,454
Gangrene	8,309,002	Neuroses	136,700,798
Hypertension	8,217,533	Peripheral vascular disease	23,278,230
Influenza and pneumonia	127,225,723	Ruptured appendix	19,301,085
Iron-deficiency anaemia	20,153,984	Tuberculosis	13,428,572
Nutritional deficiency	221,756	Schizophrenia	415,868,025
Other vaccine-preventable diseases	2,727,824	Senility/dementia	265,619,001
Pelvic inflammatory disease	7,236,864	Stroke	356,053,053
Perforated/bleeding ulcer	25,869,083		
Pyelonephritis	14,779,140		
Total	1,183,504,566		1,714,009,244

HES, Hospital Episode Statistics.
[a] Used by Dr Foster and NHS Institute for Innovation and Improvement.[5,12]
[b] Including Type 1 and Type 2 diabetes, short- and long-term complications and lower extremity amputations.

define ACSCs vary widely across differing sets of ACSCs, including those issued by the same agency.[11,12] This impacts on reported rates of admission and, in turn, on secondary care costs attributable to ACSCs.

Strengths and limitations

To the authors' knowledge, this is the first literature review to attempt to discover all previously defined ACSCs. HES data have been criticized because of errors in coding and the completeness of data records.[23] However, data quality has improved recently due to the move to payment by results in England, and given the large numbers of admissions involved, it is unlikely that coding errors have biased results considerably.

The NHS tariff was used to estimate costs of admissions for ACSCs. The NHS tariff is not designed to reflect actual costs of an inpatient admission, and therefore these figures do not represent actual costs. In addition, admissions for mental health conditions did not carry a condition-specific rate in 2005/6. Therefore, the standard daily rate for an acute mental health admission was used to estimate costs.

Comparison with the literature and other data sources

As the authors did not identify any previous literature reviews in this area, it was not possible to compare the present findings directly with other sources. However, the numbers of admissions identified by these analyses are similar to admission numbers generated by other sources generating data about hospital admissions, including Dr Foster and the national HES dataset.[2,5]

Table 2
Resource impact of ambulatory care sensitive conditions (ACSCs) on the National Health Service (NHS).

ACSCs	Emergency admissions HES 05/06	Bed-days (millions) HES 05/06	Cost (£ billion) NHS tariff 05/06
19 'NHS' ACSCs	657,599 (35%)	4.38 (26%)	1.18 (41%)
17 additional ACSCs	1,242,810 (65%)	12.24 (74%)	1.71 (59%)
Total ACSCs	1,900,409 (100%)	16.62 (100%)	2.89 (100%)

HES, Hospital Episode Statistics.

Implications for policy and practice

The use of differing definitions of ACSCs has an impact on the resource utilization attributable to hospital admissions for these conditions. The ACSCs in most common use in England are based on a set of conditions derived to measure access to primary care in the USA.[8] As England has almost universal access to primary care, the inclusion of conditions which have a low incidence in England (e.g. gangrene) in the NHS data set may seem unhelpful and may not reflect the priority of commissioners. However, when these admissions occur, they are expensive. Admissions for gangrene cost the NHS in England over £8 million in 2005/6. Some of the conditions not currently included in the NHS set of ACSCs, such as dyspepsia and other stomach function disorders, may seem to be obviously preventable by primary care. Conversely, some conditions such as fractured proximal femur may not seem to be preventable by primary care. However, fractured femur is included in a set of indicators used by one NHS institution on the grounds that 'some fractures are potentially preventable through interventions aimed either at whole populations (e.g. reducing smoking rates, promoting better nutrition and higher levels of physical activity) or at people at risk of having a fracture. The latter include timely identification of those at risk (e.g. those with osteoporosis, likelihood of having an accident) and management of risk (e.g. medication, home safety, mobility aides, padded clothing etc.)'.[21]

These inconsistencies highlight several issues, the first of which is differing definitions of the term 'ambulatory care'. In the USA, this is perceived as care outside an inpatient hospital, including specialist outpatient care. In the UK, this is a less clear-cut concept as it does not fit with the term 'primary care' which tends to exclude care delivered by specialists. However, the DAECA, which lists a number of conditions that can be effectively managed outside hospital, assumes that conditions including, for example, self-harm, can be managed without inpatient admission, with appropriate and prompt access to diagnostic services and specialist advice.

Table 3
Disease codes associated with ambulatory care sensitive conditions (ACSCs) in common use in the National Health Service (NHS) ($n = 19$).

ACSCs	ICD10 codes used in common NHS subset of ACSCs[5,12]	Additional ICD10 codes used in other subsets of ACSCs within the NHS
Angina	I20, I24.0 I24.8 I24.9	I25 R072 R073 R074 Z034 Z035[a]
Asthma	J45, J46	
Cellulitis	L03 L04 L08.0 L08.8 L08.9 L88 L98.0	I891 L010 L011 L020 to L024 L028 L029[a]
Congestive heart failure	I11.0 I50 J81	I130 I255[a] [DAECA]
Convulsions and epilepsy	G40 G41 R56 O15	G253 R568[a]
Chronic obstructive pulmonary disease	J20 J41 J42 J43 J47	J44[b] J40X[a]
Dehydration and gastroenteritis	E86 K52.2 K52.8 K52.9	A020 A04 A059 A072 A080 A081 A083 A084 A085 A09 K520 K521[c]
Dental conditions	A69.0 K02 K03 K04 K05 K06 K08 K09.8 K09.9 K12 K13	
Diabetes complications	E10.0–E10.8 E11.0–E11.8 E12.0–E12.8 E13.0–E13.8 E14.0–E14.8	E139, E149[a]
Ear, nose and throat infections	H66 H67 J02 J03 J06 J31.2	J040[c]
Gangrene	R02	
Hypertension	I10 I11.9	
Influenza and pneumonia	J10 J11 J13 J14 J15.3 J15.4 J15.7 J15.9 J16.8 J18.1 J18	J189 J120 J121 J122 J128 J129 J160 A481 A70x[a]
Iron-deficiency anaemia	D50.1 D50.8 D50.9	D460 D461 D463 D464 D510–D513 D518 D520 D521 D528 D529 D531 D571 D580 D581 D590–D592 D599 D601 D608 D609 D610 D611 D640 to D644 D648[a]
Nutritional deficiency	E40 E41 E42 E43 E55.0 E64.3	
Other vaccine-preventable diseases	A35 A36 A37 A80 B05 B06 B16.1 B16.9 B18.0 B18.1 B26 G00.0 M01.4	
Pelvic inflammatory disease	N70 N73 N74	
Perforated/bleeding ulcer	K25.0–K25.2 K25.4–K25.6 K26.0–K26.2 K26.4–K26.6 K27.0–K27.2 K27.4–K27.6 K280–282 K284–K286	K920 K921 K922 K20x K210 K219 K221 K226[a]
Pyelonephritis	N10 N11 N12 N13.6	N300 N390 N159[c] N308 N309[a]

ICD, International Classification of Diseases.
[a] Directory of Ambulatory Emergency Care for Adults.[11]
[b] PARR.[22]
[c] National Centre for Health Outcomes Development.[21]

Secondly, the issue of which admissions are avoidable or preventable can be confusing. For example, dementia is a chronic progressive disease with limited available clinical interventions. Therefore, admissions for this condition may not be perceived to be avoidable as the disease course is not modifiable. However, the availability of more suitable alternatives to an acute hospital admission, e.g. respite care or home care, can result in admission avoidance in the acute situation. In the case of one of the examples in Table 5, ICD10 code R07 (admissions for symptoms of chest pain or unspecified chest pain), 24-hour rapid access diagnostic services allowing early risk stratification and streaming may prevent some admissions.[11] This concept of an ACSC which is dependent on availability and referral to an alternative service is very different to the original concept of the ACSC as a marker of availability of traditional clinical ambulatory or primary care.

Thirdly, researchers, policy makers and other stakeholders will prioritize which conditions are of interest to them according to different criteria which will have varying weights depending on the viewpoint of the stakeholder. These criteria will include, but will not be limited to, the number of admissions, the cost of admissions

Table 4
Disease codes associated with ambulatory care sensitive conditions (ACSCs) not in common use in the National Health Service (NHS) ($n = 17$).

ACSCs	ICD10 codes used to define ACSCs[g]
Alcohol-related diseases	F10[b]
Atrial fibrillation and flutter	I471 I479 I495 I498 I499 R000 R002 R008[a]
Constipation	K590[d]
Deliberate self-harm	S16[a][HRG code]
Failure to thrive	R629[e]
Fractured proximal femur	S720 S721 S722[c]
Dyspepsia and other stomach function disorders	K30 K21[d]
Hypokalaemia	E876[e]
Low birth weight	P050 P052 P059 P072 P073[f]
Migraine/acute headache	G43 G440 G441 G443 G444 G448 R51x[a]
Neuroses	E10[c] E136–E139, E149[a]
Peripheral vascular disease	I73 I738 I739[e]
Ruptured appendix	K350 K351[f]
Tuberculosis	A15 A16 A17A18 A19[e]
Schizophrenia	F20 F21 F232 F25[c]
Senility/dementia	F00–F03 R54[a]
Stroke	I61 I62 I63 I64[c] I66 I672 I698 R470[a]

ICD, International Classification of Diseases.
[a] Directory of Ambulatory Emergency Care for Adults.[11]
[b] PARR.[22]
[c] National Centre for Health Outcomes Development.[21]
[d] Sanderson and Dixon.[10]
[e] Caminal et al.[9]
[f] Agency for Healthcare Research and Quality.[8]
[g] Converted where necessary from ICD9 to ICD10 using New Zealand Health Information Service ICD9 to ICD10.[15]

Table 5
Emergency admissions for chest pain and angina, England 2005/6.

ICD10 code	Description	Number of admissions
Codes used in commonly used NHS subset of ACSCs[5,12]		
I20	Angina pectoris	76,881
I24	Other acute ischaemic heart diseases	1183
Additional codes used in NHS Directory of Ambulatory Emergency Care[11]		
I25	Chronic ischaemic heart disease	14,761
R07	Precordial chest pain, Chest pain, unspecified, other chest pain	221,204
Z03	Observation for suspected myocardial infarction and other cardiovascular diseases	937
Total		314,966

ICD, International Classification of Diseases; NHS, National Health Service; ACSCs, ambulatory care sensitive conditions.

and the extent to which the condition is sensitive to ambulatory care, i.e. how preventable are the admissions? For commissioners of care, the resource impact is likely to be the priority, whereas for clinicians, the degree to which admissions can be prevented is a major concern. These priorities will also vary across healthcare systems, depending on the prevalence of the ACSCs and the economic and policy drivers in the local healthcare economy.

In summary, lack of consistency in the conditions and the codes used to define them may cause problems for those comparing admissions across different datasets or geographical areas, and confuses the picture for those responsible for delivering interventions to reduce admissions. It is important to ensure that a detailed specification of the conditions and codes is provided when analysing and reporting data on ACSCs. This specification should be based on an agreed conceptual understanding of what is meant by an ACSC.

Future research

The implications for researchers, analysts and clinicians are mainly around ensuring the clarity of definitions of ACSCs and the associated disease codes. Only then can meaningful comparisons be made between organizations, intervention groups or healthcare systems.

Conclusion

Rates of hospital admission for ACSCs are used increasingly as a measure of the effectiveness of primary care. However, different conceptual interpretations, definitions and disease codes impact on the proportion of admissions that are deemed to be ACSCs.

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