Adrian Baker, Paul Leak, Lewis D Ritchie, Amanda J Lee and Shona Fielding

Anticipatory care planning and integration:

a primary care pilot study aimed at reducing unplanned hospitalisation

Abstract

Background
Anticipatory care for older patients who are frail involves both case identification and proactive intervention to reduce hospitalisation.

Aim
To identify a population who were at risk of admission to hospital and to provide an anticipatory care plan (ACP) for them and to ascertain whether using primary and secondary care data to identify this population and then applying an ACP can help to reduce hospital admission rates.

Design and setting
Cohort study of a service intervention in a general practice and a primary care team in Scotland.

Method
The ACP sets out patients' wishes in the event of a sudden deterioration in health. If admitted, a proactive approach was taken to transfer and discharge patients into the community. Cohorts were selected using the Nairn Case Finder, which matched patients in two practices for age, sex, multiple morbidity indexes, and secondary care outpatient and inpatient activity; 96 patients in each practice were studied for admission rate, occupied bed days and survival.

Results
Survivors from the ACP cohort ($n = 80$) had 510 fewer days in hospital than in the 12 months pre-intervention: a significant reduction of 52.0% ($P = 0.020$). There were 37 fewer admissions of the survivors from that cohort post-intervention than in the preceding 12 months, with a significant reduction of 42.5% ($P = 0.002$). Mortality rates in the two cohorts were similar, but the number of patients who died in hospital and the hospital bed days used in the last 3 months of life were significantly lower for the decedents with an ACP than for the controls who had died ($P = 0.007$ and $P = 0.045$ respectively).

Conclusion
This approach produced statistically significant reductions in unplanned hospitalisation for a cohort of patients with multiple morbidities. It demonstrates the potential for providing better care for patients as well as better value for health and social care services. It is of particular benefit in managing end-of-life care.

Keywords
admission; advance care planning; end-of-life care; general practice; patient readmission.

INTRODUCTION

In the UK in 2010 the population aged over 65 year was 9.6 million (15.1% of the total population), and by 2035 the figure will have increased to 16.1 million (22.0%).[1] The burden of cardiorespiratory disease, cancer, and dementia will increase proportionately;[2] furthermore, multimorbidity further increases demands on health services including end-of-life and palliative care.[3] Discussions regarding end-of-life choices by some specialists may be limited[4,5] and a recent report found that, rather than advanced care planning and palliation taking place, some patients were subjected to excessively active interventions in their last months of life.[6]

Anticipatory care planning has been described as:

'A process of discussion between a patient and a professional carer, which sometimes includes family and friends.'[7]

This open dialogue with patients, and sometimes carers, allows reflection and reorientation of values and wishes prior to a crisis. The anticipatory care plan (ACP) discussion may lead to an advanced directive or a living will being drawn up. This study reports the use of a locally devised ACP to record the wishes of patients and carers, and describes the results of a complex intervention aimed at reducing unplanned hospitalisations of older patients who are frail.

METHOD

Setting and participants

Participants were identified from patients registered with a single general practice of 10 860 patients in Nairn, Scotland. In Scotland, the Scottish Patients At Risk of Readmission and Admission (SPARRA[8]) case-finding tool is conventionally used to identify patients at high risk of admission to hospital. At the time of this study, SPARRA only used secondary data from the local district general hospital's patient administration system and supplied data that was up to 6 months old. The Nairn practice and NHS Highland Health Board developed an algorithm (the Nairn Case Finder; Appendix 1) to identify patients who are at risk of unplanned admission to hospital. The Nairn Case Finder had an area under the receiver operator characteristic (ROC) curve of 0.794 (Appendix 2). This compares favourably with SPARRA, the NHS Scotland case finder, which has a ROC statistic of 0.75.

For this study, the Nairn Case Finder ran on a monthly basis, providing the practice with a new risk score for each patient on its list. A cohort of control patients, who had access to similar inpatient facilities, including a community hospital, was identified from a practice in South East Highland Community Health Partnership. Where possible, patients from the ACP and control cohorts were matched by risk score exactly or as closely as possible.

Proactive case management was

A Baker, MRCGP, MBA, GP, Lodgehill Clinic, Nairn. **P Leak**, CA, BSc(Hons), MSc, integrated resourcing lead, Health and Social Care Directorate, Edinburgh. **Sir LD Ritchie OBE**, FRCGP, James Mackenzie Professor of General Practice, Centre of Academic Primary Care; **AJ Lee**, PhD, professor in medical statistics, Section of Population Health; **S Fielding**, BSc, MSc, PhD, lecturer in medical statistics, Section of Population Health, University of Aberdeen.

Address for correspondence
Adrian Baker, Lodgehill Clinic, Cawdor Road, Nairn IV12 5EE, UK.
E-mail: adrian.baker@nhs.net

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How this fits in

Anticipatory care planning allows patients to express their wishes for care prior to a sudden deterioration in their health. Identifying patients at high risk of admission to hospital, and providing them with supported choices around their possible future care options, allows them to have increased autonomy and inclusion in the decision-making process. Focusing the extended primary care team around patients at risk of hospital admission in the community and in the hospital is effective in reducing hospitalisation and shifting the balance of care from hospital to community settings; the benefits of this are particularly notable at the end of life. Anticipatory care planning aims to provide a patient-centred, cost-effective approach to the care of patients with multiple morbidities and illness trajectories that will deteriorate over time.

achieved by recruiting dedicated additional personnel within the locality using an extended primary care team comprising a case manager post (1.2 whole-time equivalent [WTE]); care workers (2.0 WTE); physiotherapist (1.0 WTE); and occupational therapist (0.5 WTE). The initial patient interview included the question stems shown in Box 1 and an assessment to identify any unmet need.

The case manager had a signposting function: to mobilise support from the extended primary care team, to garner support from local trades people (for minor works; for example, installation of grab rails), and to maximise income via the Citizens Advice Bureau and other voluntary agencies, as deemed appropriate.

An ACP was created from patient discussions, along with issues arising from the responses to the questions in Box 1. This included current best practice, including The Gold Standards Framework[9] and the Liverpool Care Pathway.[10]

To ensure availability of the ACP to all carers at all times, copies were kept in the care homes, the patient's own home, and in GP notes, and were available out of hours at the local community hospital. The ambulance service was notified of any do-not-attempt-resuscitation orders. The ACP was updated every 6 months or on request from patients and/or their carers.

Reactive case management involved rapid provision of home care and transferring patients from hospital to home. Traditional local authority care was not deemed sufficiently flexible or responsive to reduce unnecessary hospital admissions or achieve early discharge for patients. Home care was provided for periods of between 24 hours and 6 weeks, depending on need and local authority capacity.

Box 1. Patient interview question stems

- Carer or cared-for status — how was immediate care provided for the patient?
- Acute medical illness — patient's understanding of their condition.
- Acute surgical illness — patient's understanding of possible diagnosis.
- Illness trajectory — patient's understanding of the likely course of their illness.
- Preferred place of care — in the event of deterioration, patient's preferred care venue.
- Resuscitation status — patient's wishes for resuscitation to be attempted.

Statistical methods

Comparison of ACP and control cohort demographics. Mean age of the ACP and matched control cohorts was compared using a paired *t*-test; the distribution of sex was compared using McNemar's test. Surviving patients' outcomes for hospital utilisation data were based on number of admissions, occupied bed days, and costs during the 12-month period prior to, and after, the intervention. One-tailed significance tests were carried out for change in hospitalisation data. To track admissions, data were obtained from the patient administration system of the local district general hospital and from community and psychiatric hospitals. The cost of unplanned hospitalisation for the survivors and decedents from both cohorts was calculated using the local patient-level costing system at 2007/2008 prices.

For each of the three outcomes (admissions, occupied bed days, costs), and separately for each of the ACP and control cohorts, a within-group analysis using the Wilcoxon signed rank test was carried out to compare the distribution of these outcomes in the 12 months before intervention compared with the 12 months post-intervention. In addition, a between-groups analysis (ACP versus control) on the change in these outcomes from pre-intervention to post-intervention was undertaken using a Mann-Whitney test. A matched analysis could not be completed as not every ACP survivor had a surviving matched control and vice versa.

The number of transfers for the survivors in the ACP cohort in the 12-month period from the date of the ACP was compared

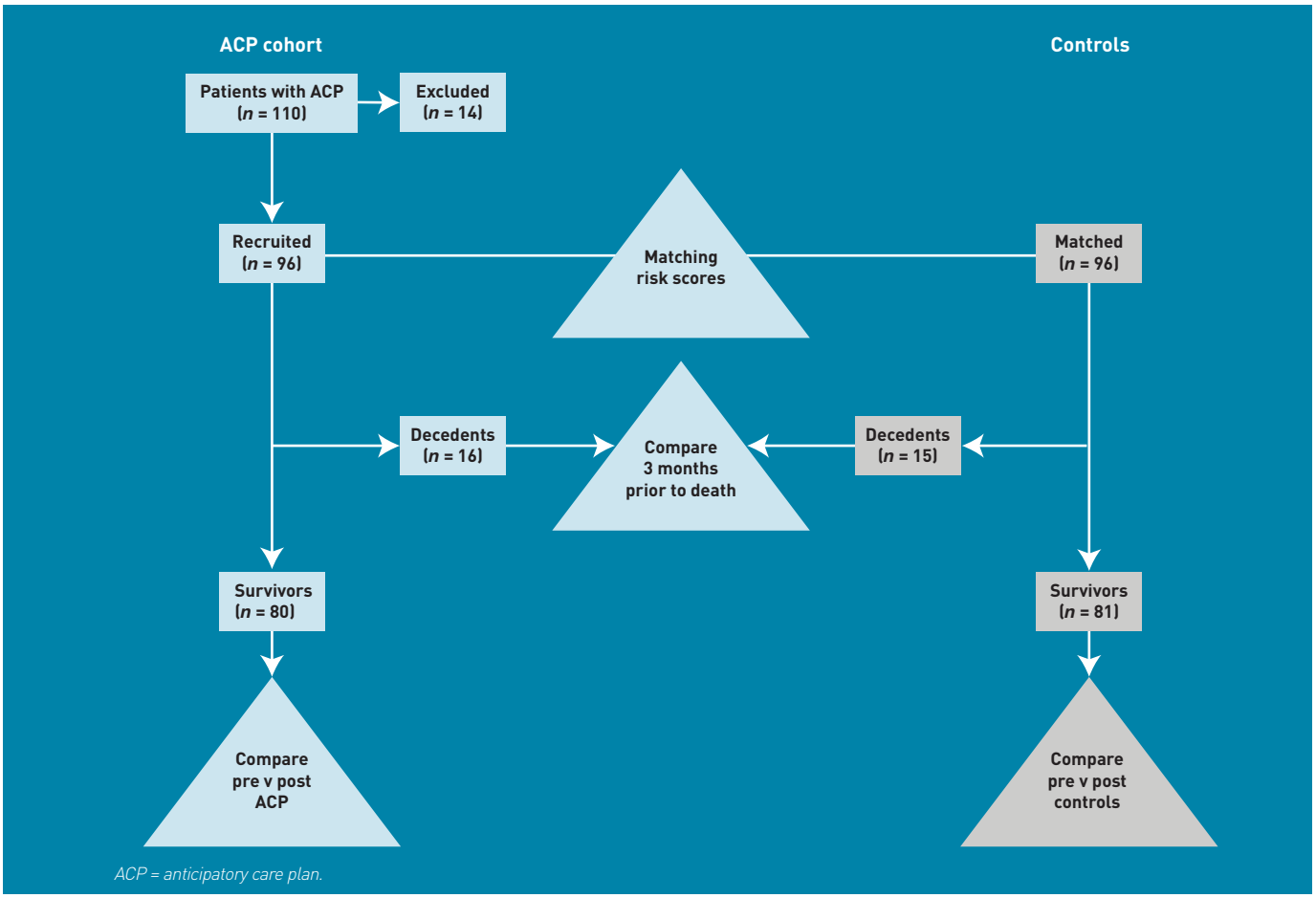

Figure 1. Overview of study results.

with the number of transfers for the same patients in the 12 months prior to receipt of the ACP using conditional Poisson regression. A similar analysis was repeated for the control cohort.

For those patients who died, the proportion of deaths that occurred in hospital from the ACP cohort was compared with the proportion from the control cohort who died in hospital using the χ^2 test. The Mann-Whitney test was used to compare hospital utilisation data for unplanned admissions in the last 3 months life between patients in the ACP cohort and controls. Patients in both cohorts who died also had their admissions to either the district general hospital or community hospitals compared using a nested mixed-effects model.

RESULTS

Figure 1 gives an overview of the number of patients at each stage of the study process. Between April 2007 and November 2008, 110 patients in the intervention group had an ACP recorded. Of these, 14 were excluded, as they were care home residents who did not receive care from the study practice. The remaining 96 patients (the ACP cohort) had a mean age of 80.6 years (standard deviation 9.3); they constituted 0.9% of the practice list, and accounted for 12% of the unplanned bed days and 10% of the unplanned admissions in the study practice during 2006/2007. Table 1 summarises the characteristics of the 96 patients who had an ACP and those of their matched controls.

Admissions, bed days, and costs

In the 12 months prior to the intervention, the ACP cohort had 1581 days in hospital resulting from 105 admissions; the control cohort had 2167 days in hospital from 107 admissions. In the 12 months post-intervention, the ACP cohort had 676 days in hospital resulting from 66 admissions, 774 (53.4%) fewer days than predicted by the Nairn Case Finder algorithm; the control cohort had 1540 days from 102 admissions, 358 (18.9%) fewer days than predicted by the algorithm. During the 12-month post-intervention period, 16 patients from the ACP cohort and 15 patients from the control cohort died. Table 2 shows the summary hospitalisation data for both periods for the 80 survivors from the ACP cohort and the 81

Table 1. Characteristics of the anticipatory care plan (ACP) and control cohorts

Characteristic	ACP patients (*n* = 96)	Controls (*n* = 96)	*P*-value
Male, *n* (%)	34 (35.4)	40 (41.7)	0.345[a]
Age in years, mean (SD)	80.6 (9.3)	79.5 (11.6)	0.352[b]
Risk score			
Maximum	71.8	71.8	–
Minimum	2.2	2.2	–
Median (IQR)	34.3 (24.5 to 41.8)	36.7(24.6 to 44.1)	

[a]McNemar test. [b]Paired t-test. IQR = interquartile range. SD = standard deviation.

survivors from the control cohort.

There were 37 fewer admissions of the survivors from the ACP cohort post-intervention than in the 12 months before the intervention, with a significant reduction of 42.5% ($P = 0.002$) in the admission rate; the 23.7% reduction in the admission rate in the control cohort was not statistically significant ($P = 0.087$). Post-intervention, the survivors from the ACP cohort had 510 fewer days in hospital than in the 12 months before the intervention took place: a significant reduction of 52.0% ($P = 0.020$). The 12.7% reduction in the control cohort was not statistically significant ($P = 0.188$). The cost of unplanned hospitalisation for survivors from the ACP cohort fell by £161 944, a significant ($P = 0.029$) reduction of 48.6%; the cost for the survivors from the control cohort fell by £50 163, giving a reduction of 12.0%, which was not statistically significant ($P = 0.221$).

Transfers and length of stay

Data for length of stay and transfers for survivors are detailed in Tables 3 and 4 respectively. There were no significant differences in the individual length of stay of those who were admitted. The number of transfers increased for patients with ACPs and controls, but the increase was not statistically significant ($P = 0.24$ and $P = 0.83$ respectively). For those with an ACP, the risk ratio (for an additional transfer) from the conditional Poisson regression was 1.67 (95% confidence interval [CI] = 0.72 to 3.89). For the control cohort, the risk ratio was 1.09 (95% CI = 0.50 to 9.32), suggesting no significant difference in the number of transfers post-intervention compared with pre-intervention.

Mortality during the study

There was a significant difference ($P = 0.007$) in the proportion of deceased patients who died in hospital; three (18.8%, 95% CI = 5.0 to 46.3) deceased ACP patients died in hospital and 11 (73.3%, 95% CI = 44.8 to 91.1) decendents from the control cohort died in hospital. Table 5 shows the hospitalisation data for the deceased patients in the two cohorts in the 3 months before death; Table 6 summarises the results of the nested mixed-effects models for individual length of stay in this period.

The cost of unplanned hospitalisation in the 3 months prior to death for decedents with an ACP was £58 293 lower than for the controls who died ($P = 0.036$; data not shown).

Impact of unplanned hospitalisation on cost

To calculate the overall impact on the cost of unplanned hospitalisation of both survivors and decedents from the ACP cohort, the difference in costs for survivors in the cohort between the pre- and post-intervention periods was added to the difference in costs for decedents in the cohort between receipt of ACP and death, and the corresponding periods in the previous year. This gave a net total reduction in cost of £126 605.

For the control cohort, the difference in

Table 2. Hospitalisation data for survivors

	Admissions			Occupied bed days			Cost, £		
	Total, *n*	Median (IQR)	Rate	Total, *n*	Median (IQR)	Rate	Total, *n*	Median (IQR)	Rate
ACP patients (*n* = 80)									
Pre	87	0.5 (0–2)	1.09	981.6	0.17 (0–12.75)	12.27	333 020	101 (0–4879)	4162.75
Post	50	0 (0–1)	0.63	471.6	0 (0 –3.92)	5.9	171 076	0 (0–1879)	2138.45
Difference	–37	0 (–0–1)	–0.46	–510	0 (0 –3.92)	–6.38	–161 944	0 (–3261–0)	–2024.3
Within-group *P*-value		0.002			0.020			0.029	
Controls (*n* = 81)									
Pre	80	0 (0–2)	0.99	1284.9	0 (0–7)	15.86	418 335	0 (0–2579)	5164
Post	61	0 (0–1)	0.75	1122.3	0 (0–4.5)	13.86	368 173	0 (0–1731)	4545.35
Difference	–19	0 (–1–0)	–0.23	–162.6	0 (0–2.67)	–2.01	–50 162	0 (–1327–0)	–619.28
Within-group *P*-value		0.087			0.188			0.221	
Between-group *P*-value		0.538			0.414			0.538	

ACP = anticipatory care plan. IQR = interquartile range.

Table 3. Results of nested mixed-effects models for individual lengths of stay for survivors

	Total admissions	Pre–post	95% CI	*P*-value
ACP patients: district general hospital	71	3.57	–2.78 to 9.90	0.27
ACP patients: community	64	–1.76	–6.28 to 2.73	0.43
Controls: district general hospital	64	–1.82	–8.95 to 5.30	0.61
Controls: community	71	1.25	–17.0 to 19.5	0.89

ACP = anticipatory care plan.

Table 4. Details on transfers and admissions for survivors

	Admitted patients, *n* (%)	Total admissions	Number of transfers	Transfers as % of admissions
ACP patients (*n* = 80)				
Pre-intervention	40 (50.0)	87	6	6.9
Post-intervention	26 (32.5)	50	10	20.0
Controls (*n* = 81)				
Pre-intervention	38 (46.9)	80	11	13.8
Post-intervention	26 (32.1)	61	12	19.7

ACP = anticipatory care plan.

costs for survivors between the pre- and post-intervention periods was added to the difference in costs for decedents in the cohort between 1 April 2007 and death (post-intervention), and 1 April 2006 and death (pre-intervention). This gave a net total increase in costs of £16 941; as such, the total net change in costs of unplanned hospitalisation for survivors and decedents from the ACP cohort was £143 546 less than for the control cohort.

DISCUSSION

Summary

The current study has shown that an ACP and a coordinated team-based approach with a clearly identified population that is at high risk of hospitalisation can reduce admission rates and occupied bed days. This approach to care also leads to an increased likelihood of being allowed to die at home.

Strengths and limitations

This was a complex intervention of patients with multiple conditions, all of whom were at high risk of admission to hospital. The effect of this multifaceted intervention reflects the reality and complexity of general practice.

The present project was qualitatively evaluated[11] using 14 patients comprising three focus groups, along with 10 staff groups. The findings showed that the service was well received by users and carers (unpublished data). The multidisciplinary team was also shown to have benefited from increased clarity around its purpose and a reinforcing of the philosophy of care for patients in the community, wherever possible.

A reduction in admission rates is mediated by an increase in transfers out from secondary hospitals to the community hospital and home. This was due to a number of factors: improved community support from families and carers who had a better understanding of the likely disease trajectory, along with care workers who were able to prevent admissions and provide rapid support on discharge, as well as a coordinated approach and good liaison between the case manager, local nursing, and the practice. By contrast, in the control cohort, the changes were more modest and these may well reflect additional changes in NHS Highland during the study period.

The reduced hospitalisation seen in the control cohort, although not statistically significant, may well reflect system-wide changes in NHS Highland during the study period, including the introduction of a receiving physician in the district general hospital and the work of the Health Board Unscheduled Care Collaborative, which targeted unplanned admissions of older people.

The current study had a number of limitations due to the incremental administration of the ACPs and the fact that no data were collected on the cost of GP contacts, prescribing, or on planned hospitalisations for either cohort.

It is acknowledged that one practice in one locality may not be representative of all

Table 5. Hospitalisation data for decedents in the 3 months before death

	Admissions			Occupied bed days			Cost, £		
	Total, *n*	Median (IQR)	Rate	Total, *n*	Median (IQR)	Rate	Total, *n*	Median (IQR)	Rate
ACP patients (*n* = 16)	14	0 (0–2)	0.88	134	1.67 (0–20)	8.38	45 758	90 (0–6610)	2859.9
Controls (*n* = 15)	24	1 (0–3)	1.6	307.99	10 (0.33–6)	20.5	104 051	3540 (131–11 626)	6936.7
Between-group *P*-value	0.063			0.045			0.036		

ACP = anticipatory care plan. IQR = interquartile range.

Table 6. Results of nested mixed-effects models for decedents' individual lengths of stay in last 3 months of life

		Difference in length of stay		
	Total admissions	Control ACP patients	95% CI	*P*-value
Community	22	3.25 days	−7.41 to 13.9	0.52
District general hospital	18	6.86 days	−17.2 to 31.0	0.55

general practices as general practice is not homogenous and further development of this model will depend on the willingness of, and acceptability by, practices to use data and the extended primary care team in this way.

Comparison with existing literature

On reviewing the literature regarding intensive case management, using a generic approach to multiple long-term conditions, rather than a disease-specific approach, appears to have significant advantages. For example, the case-management (Evercare) model[12] has been trialled in various parts of the UK using community matrons to provide intensive community support to small caseloads of selected patients with a single long-term condition, such as chronic obstructive pulmonary disease.[13,14] The evidence for the effectiveness of this model has been described as mixed and weak,[15] with the greatest success being with interventions that integrate health and social care for defined risk-stratified populations.[16–18]

The impact of the intervention on those patients in the study who died is worth noting. The difference in the relative risk of dying in hospital demonstrates that the intervention helped to achieve a patient outcome (death at home) that the NHS is historically poor on delivering. The last quarter of life is a period of high-cost care,[19,20] but the evidence here is that this can be materially reduced by avoiding unplanned hospitalisation; the financial savings could be made available to fund alternative care packages. It was possible to obtain earlier transfer of patients from secondary care either to the local community hospital or their own home in this study. This was in line with the Scottish Government's policy objectives in *Better Health, Better Care*.[21]

Implications for practice

Risk stratification of a practice population, as well as generating ACPs for those at highest risk of hospital admission, and having rapidly reactive services, were found to reduce the number of admissions and occupied bed days. The effect of this integrated approach on unplanned hospitalisation, in a period that is frequently characterised by chaotic and fragmented care, is a new finding and the potential savings identified here could have important implications for resourcing alternative care pathways.

The cost of the intervention was £125 000; this was £18 545 less than the difference in the net savings between the ACP and controls (£143 545). If successful with a Community Health Partnership population (n = 92 470), this intervention could result in a significant reduction in hospital bed numbers (estimated to be ~30). Some of the intervention cost has been targeted at improving access to care assistant and allied health professional capacity in the locality; however, given that there is material variation in per capita capacity in community teams across NHS Highland localities, it may be that rolling out the intervention across populations groups will not require this additional investment in all localities. This approach could be shared across groups of practices within a locality and provide a methodology for commissioning older adult care for those who are at high risk of admission to hospital.

Funding

The cost of the additional staffing required for this intervention was £125 000. This was set aside from the total operational budget for the locality to fund this project.

Ethical approval

Ethical permission was sought for patient participation in this project from the NHS Highland Ethical Committee, but was deemed to not be formally required. This committee has been superseded by the National Research Ethics Service, which has reiterated that ethical approval was not required.

Provenance

Freely submitted; externally peer reviewed.

Competing interests

Adrian Baker and Lodgehill Clinic have been paid by NHS Highland and the Scottish Government for travel and absence from the practice while lecturing. There are no other conflicts of interest.

Authors' note

Since the conclusion of this project NHS Highland has implemented this ACP approach to 4000 patients in care homes and in the community from 2009 until 2011, and the process is continuing. The provisional results, against matched control patients, are of a 30% reduction in admissions and a 50% reduction in occupied bed days.

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Appendix 1. Case-finding algorithm

The Nairn Case Finder is an algorithm developed for the Lodgehill Clinic in Nairn, to identify patients who are at risk of an unplanned admission to hospital. Using patient-level data recorded in the practice and in NHS Highland hospitals, logistic regression was used on a series of variables to explain variations in admission rates. Primary care data are taken from the GP system, which at the time of the study was GPASS. This has now been adapted to the GP Vision system.

Primary care variables include age, sex, and chronic disease status as recorded for the Quality and Outcomes Framework; for example, asthma, cancer, coronary heart disease, chronic obstructive pulmonary disease, diabetes, epilepsy, hypertension, and mental health.

Secondary care data were taken from the NHS Highland Patient Administration System. The variables included in the algorithm are outpatient attendance and unplanned admission to hospital in the previous 2 years.

The algorithm gives the risk of an unplanned admission to hospital in the subsequent 12 months, based on the variable scores. The algorithm format is as follows:

$P = e^y / (1+e^y)$
Where:
P = Probability of unplanned hospitalisation in next 12 months for a patient;
$y = (B_0 + B_1X_1 + B_2X_2 + \ldots . B_nX_n)$

(B_0 is a constant; B_n is the regression coefficient for variable n; and X_n is 1 or 0 depending on the presence of the variable n in the patient).

The algorithm is applied to the data for each patient on the practice list to calculate the risk of unplanned admission in the next 12 months.

For the present study, the Nairn Case Finder was run on a monthly basis, providing the practice with a new risk score for each patient on its list, reflecting any changes in the variables occurring in the previous month. From each monthly list, the 1% of patients with the highest risk of admission were defined as the ACP cohort, along with all care home patients.

Appendix 2. Receiver operator characteristic (ROC) curve for the Nairn Case Finder.