

## Crisis resolution/home treatment teams and psychiatric admission rates in England

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**Background** Introduction of crisis resolution/home treatment teams has been associated with a reduction in hospital admissions in trials. Between 2001 and 2004 there was a rapid expansion in the numbers of these teams in England.

**Aims** To examine whether national implementation of these teams was associated with comparable reductions in admissions.

**Method** Observational study using routine data covering working age adult patients in 229 of the 303 local health areas in England from 1998/9 to 2003/4.

**Results** Admissions fell generally throughout the period, particularly for younger working age adults. Introduction of crisis resolution teams was associated with greater reductions for older working age women (35–64 years); teams always on call were associated with additional reductions for older men and younger women. By the end of the study admissions had fallen by 10% more in the 34 areas with crisis resolution teams in place since 2001, and by 23% more in the 12 of these on call around the clock than in the 130 areas without such teams by 2003/4. Reductions in bed use were smaller. Introduction of assertive outreach teams was not associated with overall reductions in admissions.

**Conclusions** Introduction of crisis resolution teams has been associated with reductions in admissions.

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Managing episodes of acute mental illness without admission to hospital has been advocated since the 1960s (Wasylenki *et al*, 1997). In England, government policy for mental healthcare proposed the setting up of 335 crisis resolution teams nationally for this purpose (Department of Health, 1999, 2000). The studies cited to attest to their likely efficacy (Joy *et al*, 1998) describe work from the 1970s and 1980s. At the time it was argued that this evidence base was dated, taking old fashioned asylum care as its reference point, rather than services based around community mental health teams which, by then, were the norm (Pelosi & Jackson, 2000).

Johnson and colleagues (2005a,b), working in North London, have reported a before-and-after and a randomised controlled trial of a crisis resolution team. Both indicated a substantial reduction in admissions. However, both described a service which had recruited one of the foremost clinical leaders in the field. It is thus reasonable for us to ask whether similar gains could be achieved widely.

Between 2001 and 2004 there was a rapid expansion in the number of crisis resolution teams in England (Glover & Barnes, 2002, 2004, 2005). We set out to explore the extent to which these were successful in reducing admissions, comparing admission trends in areas grouped on the basis of their implementation history.

The same government policy also mandated the setting up of a national network of assertive outreach teams providing intensive community-based support for frequently relapsing and difficult-to-engage patients. These were implemented more quickly than crisis resolution teams. We studied these in parallel.

### METHOD

#### Data sources

Outcome data came from English National Health Service (NHS) routine admissions

statistics. Records of general psychiatric admissions for adults under 65 years of age were collated to give numbers and occupied-bed-days for health administrative areas (primary care trusts) for the 6 administrative years 1998/9 to 2003/4. Psychiatric sub-specialties including forensic, psychotherapy and learning disabilities were excluded. Admissions crossing the end of the administrative year (31 March/1 April) were also omitted, as these can sometimes be double counted.

Details of crisis resolution teams and assertive outreach teams were taken from the annual mental health service mapping set up to monitor policy implementation (Glover & Barnes, 2002, 2004, 2005). These were among the most carefully scrutinised items in this source, as they were used for rating local performance and to report progress towards high-profile government targets. Data from 2001, 2002 and 2003 were used to identify the date of first appearance of each team, the primary care trust areas it served and its model fidelity characteristics for each year. From these, primary care trusts were grouped on the basis of the year in which they first acquired any crisis resolution or assertive outreach team (broad definitions), any crisis resolution team on call 24 hours a day, 7 days a week ('24/7'), or assertive outreach team with evening and weekend working (narrow definitions). Other model fidelity characteristics for which data were available were based on softer (adherence to specified working styles) or more contentious (24/7 on call for assertive outreach) criteria.

We used mixed analysis of variance to test the association between team provision and the repeated measure of annual admissions to hospital. Covariates were the size of the population and the Department of Health's Allocation of Resources to English Areas (AREA) mental health needs index (Sutton *et al*, 2000). Separate exercises were undertaken for all working age adults and for younger (age 18–34 years) and older (35–64 years) men and women. Two sets of models were constructed, one using designations based on broad team definitions, the other on restrictive definitions. We estimated the scale of impact of team implementation on hospital admissions and bed use by calculating the differences (attributable reduction) seen in mean values for the change from the first to the last 2-year period for which we had data. Here, primary care trusts with teams established

by 2001, and those with no teams by 2003, were compared using unpaired *t*-tests.

Data were analysed using the Statistical Package for the Social Sciences version 12.01 for Windows.

### Preliminary data inspection and cleaning

Both data sources were inspected in detail for quality before analysis. Of 303 primary care trusts, team provision data were ambiguous for 19, and 2 underwent a boundary change preventing trend analysis. Hospital admission data showed substantial omission of patients' genders in 10 primary care trusts, and worrying discontinuities in admission numbers (a rise or fall by more than 50% or 33% respectively, in any single year) in 130 primary care trusts. In 69 of these, discontinuity problems related to a single year, and three independent observers, masked to the identity or team status of the areas, agreed that the remaining observations indicated an unambiguous trend from which the missing point could be calculated. On this basis, 74 primary care trusts were omitted from analysis, leaving 229, 69 of which had one smoothed point in their admission data. This represents 76% of the total, between them covering 22.6 million people aged 18–64 years.

## RESULTS

Over the 6 years, admissions in the 229 primary care trusts overall fell by 23% for younger and 0.5% for older people. For all ages combined, the median change was –11%, (interquartile range +6% to –23%). Crisis resolution teams were already in place in 34 (15%) of the primary care trusts by 2001; 14 (6%) and 51 (22%) added teams in 2002 and 2003 respectively, leaving 130 (57%) with no team. Crisis resolution teams that were always on call were in place in 12 (5%) primary care trusts in 2001, with 10 (4%) and 30 (13%) reaching this level of provision over the next 2 years respectively. Assertive outreach teams appeared more rapidly; 144 primary care trusts (63%) had this facility by 2001, with 23 (10%) and 36 (16%) following in 2002 and 2003 respectively, leaving only 26 (11%) uncovered. Assertive outreach teams providing evening and weekend working were seen in 86 (38%) primary care trusts in 2001, with a further 18 (8%) and 38 (17%) achieving this in 2002 and 2003 respectively.

Simple inspection of the change in hospital admission numbers suggested that crisis resolution teams were associated with greater falls; 74% of primary care trusts with a broadly defined crisis resolution team and 83% of those with a narrowly defined team in place by 2001 showed a fall in total admissions, compared with only 60% of those with no team by 2003/4. The impact appeared greater for older patients and for women. By contrast, the effect of assertive outreach teams was erratic with, if anything, smaller proportions of primary care trusts with assertive outreach teams showing a fall.

Figure 1 shows plots of the modelled trends in the average annual hospital admission numbers for primary care trusts, grouped by year of first provision, from the mixed analysis of variance. The two plots on the left are drawn from the model using broad definitions for both team types. Those on the right are based on restrictive definitions and include an additional category for primary care trusts with teams but not reaching the narrow definition level. Both graphs in relation to crisis team provision show the line for primary care trusts with teams in place by 2001 falling much more sharply than that for those with no team. For assertive outreach, primary care trusts with no provision show sharper falls than others although, in this case, in the model using restrictive team definitions the plots are not statistically significantly different even at the  $P < 0.05$  level.

Models were calculated for all hospital admissions, and for the four age/gender subgroups. For broadly defined crisis resolution teams, only the model for women aged 35–64 years showed a significant effect at the  $P < 0.001$  level. For restrictively defined crisis resolution teams, this level was reached by the models for all admissions, and admissions for older men and women. The model for younger women was highly significant ( $P = 0.003$ ), but not that for younger men ( $P = 0.03$ ). Broadly defined assertive outreach team status was significantly associated with less reduction in admission at the  $P < 0.01$  level only in the model for older women ( $P = 0.005$ ), narrowly defined status not at all. Models for bed usage generally produced weaker significance levels. At the  $P < 0.01$  level, only restrictively defined crisis resolution team status figured significantly (all people,  $P = 0.005$ ; younger women,  $P = 0.005$ ; older men,  $P < 0.001$ ). To check that the process of data smoothing for the 69 primary care

trusts with isolated defective data points had not substantially altered the result, all these analyses were re-run omitting these records. Apart from generally weaker significance levels, the pattern was unchanged.

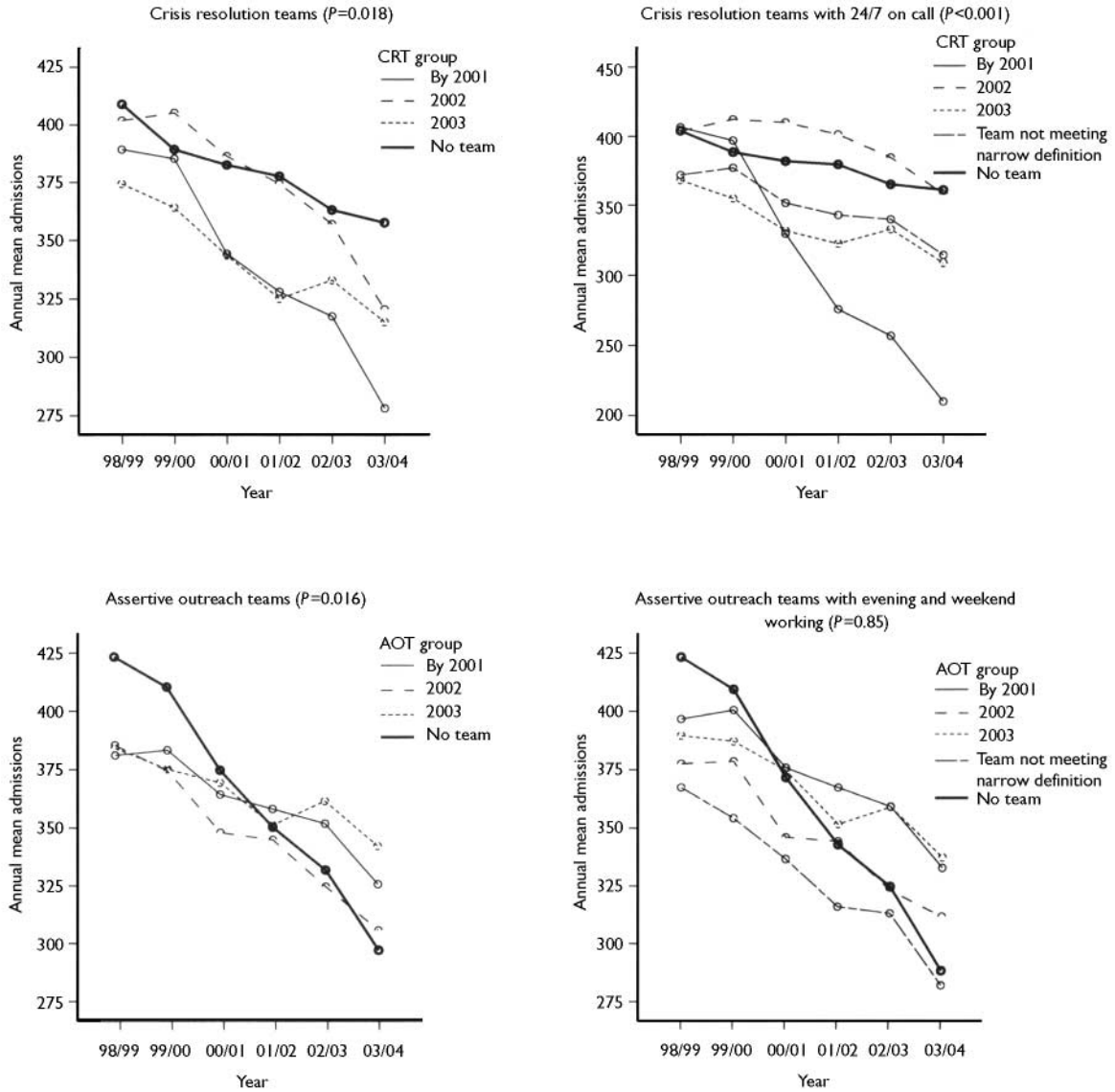
If greater reduction in hospital admissions was a consequence of implementation of crisis resolution teams, it should follow in time. Figure 2 shows plots for modelled admission numbers in primary care trusts classified by the year of first provision of restrictively defined crisis resolution teams for younger and older working age adults separately. In the chart for those aged 35–64 years, the gradient of the plot for primary care trusts introducing teams in 2002 shows a marked change at the appropriate point. This time-related feature was seen in plots for both women and men in this age-group, but not in plots for younger people. The plot for areas introducing teams by 2001 shows a falling trend preceding 2001; as noted above, many of these teams were in place several years before this date.

Finally, we explored the extent to which crisis teams were associated with reductions in hospital admissions and bed requirements. Table 1 shows the differences between the changes seen in primary care trusts with teams established by 2001 and those with no teams. Restrictively defined crisis resolution teams were associated with an attributable reduction of a little over 20% in admissions. The reduction for older adults was about one and a half times that for younger working age adults. When all crisis teams were included, significant falls, but of only half the magnitude, were seen for people aged 35–64 years; for younger adults, no significant fall was seen. Attributable falls in bed usage were lower and less statistically significant.

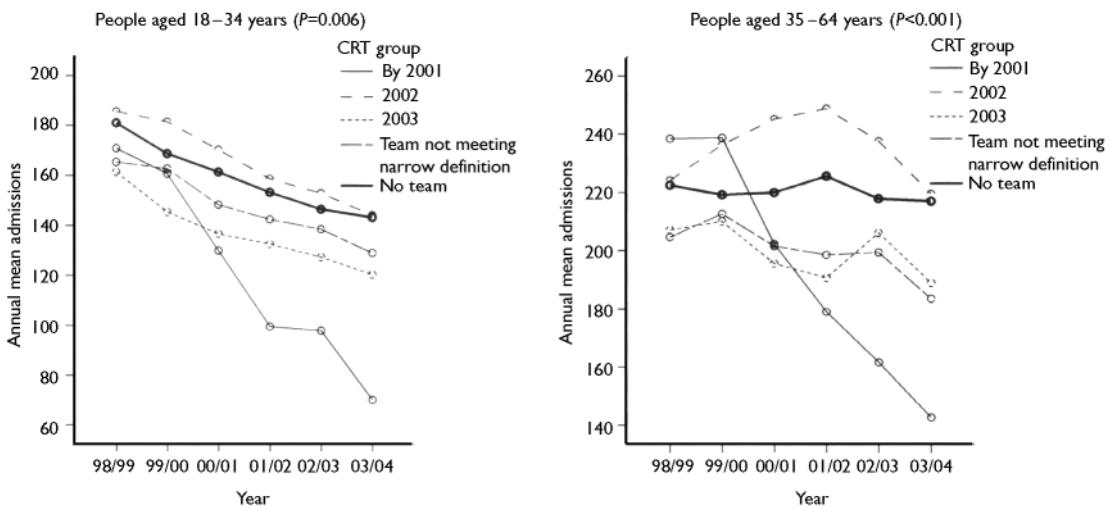
## DISCUSSION

This paper reports an uncontrolled observational study of trends in psychiatric hospital admission across England and their relationship to the implementation of crisis resolution teams and assertive outreach teams. Clearly other factors influencing admissions would have been at work at the same time, but with such large changes in the provision of these teams over such a short period it seems reasonable to explore whether any impact is discernible.

There was a widespread fall in hospital admission numbers over the period we studied, in areas with and without new teams.



**Fig. 1** Modelled trends in mean annual hospital admissions for people of both genders and age-groups, for primary care trusts grouped by team provision status. CRT, crisis resolution team; AOT, assertive outreach team.



**Fig. 2** Modelled trends in mean annual admissions for younger and older people, for primary care trusts grouped by 24/7 crisis team provision. CRT, crisis resolution team.

**Table 1** Difference in mean fall in hospital admissions and bed days, between primary care trusts with crisis resolution teams introduced by 2001 and those with no teams by 2003, using broad ( $n=34$  and 130) and narrow ( $n=12$  and 130) team definitions

Data	Difference, % (95% CI)	P
<i>Broadly defined crisis teams</i>		
Admissions		
All people	-9.9 (-1.7 to -18.1)	0.02
Women		
18-34 years	-8.8 (1.9 to -19.5)	0.103
35-64 years	-14.6 (-3.0 to -26.2)	0.014
Men		
18-34 years	-6.1 (5.7 to -17.9)	0.305
35-64 years	-11.5 (-2.2 to -20.8)	0.016
Bed days		
All people	-3.6 (4.5 to -11.7)	0.373
Women		
18-34 years	-8.0 (2.2 to -18.3)	0.123
35-64 years	-13.1 (3.3 to -29.4)	0.117
Men		
18-34 years	5.0 (20.1 to -10.1)	0.51
35-64 years	-7.2 (5.5 to -20.0)	0.263
<i>Narrowly defined crisis teams</i>		
Admissions		
All people	-22.7 (-7.1 to -38.4)	0.008
Women		
18-34 years	-22.7 (-5.2 to -40.2)	0.015
35-64 years	-30.6 (-16.5 to -44.8)	<0.001
Men		
18-34 years	-16.4 (6.8 to -39.7)	0.149
35-64 years	-25.5 (-8.1 to -43.0)	0.007
Bed days		
All people	-11.6 (5.1 to -28.2)	0.157
Women		
18-34 years	-16.5 (6.7 to -39.7)	0.148
35-64 years	-23.7 (-2.4 to -45.0)	0.031
Men		
18-34 years	6.4 (42.1 to -29.4)	0.705
35-64 years	-21.2 (-3.3 to -39.1)	0.023

Hence this observation alone in any single area is insufficient to establish the effectiveness of a crisis resolution team. We were able to demonstrate that areas which implemented crisis resolution teams showed greater reductions in admissions for older working age adults than areas which did not, and that where these were always on call, reductions were more marked and were also seen for younger adults. The scale of the reduction in admissions (20% with teams always on call) was much smaller than that reported by early authors (Hoult

*et al*, 1984), but close to the two recent English reports (Harrison *et al*, 2001; Johnson *et al*, 2005a). Occupied-bed days also fell in areas with teams always on call, although the difference was smaller (10% overall) and statistically significant only for older working age adults.

Implementation of assertive outreach teams was not associated with any additional reduction in admissions. This was not surprising since the evidence that they reduce admissions in a modern English context is more equivocal (Burns *et al*, 1999;

Marshall & Lockwood, 2000; Killaspy *et al*, 2006). The effectiveness observed in the Cochrane review (Marshall & Lockwood, 2000) arose entirely from two American studies of the 1980s – the only English study included showed no difference. Moreover, assertive outreach teams only care for a small proportion of those who are admitted to hospital, so their impact on total admission rates could only be limited.

The questions raised by the study fall into two broad areas: the reliability and scope of the data and their interpretation.

Our admission data source was deficient in scope in two ways. First, it excluded NHS patients admitted to the independent hospitals sometimes used for overspill provision. Second, the government target number of crisis resolution teams (335) indicated about one for each primary care trust, but the alignment of boundaries was not always exact. Routinely collected data might also be of poorer quality than those collected for research. The period studied was characterised by an unusually large amount of administrative reorganisation which may have had additional adverse effects on the data we used. We have described the data cleaning process we undertook before joining the admission and team data for individual areas. However, these types of weaknesses would be expected to obscure, not produce the type of detailed patterns seen.

Other factors may have had a confounding influence if they were introduced in parallel in the same areas as crisis resolution teams. We attempted to study three such factors. The number of in-patient beds in England was fairly stable in the first half of the period studied, reflecting government sensitivity about possible shortages (Department of Health, 1997). In the second half it fell by about 5%. We attempted a systematic analysis to establish whether primary care trusts with crisis teams were served by hospital trusts which had reduced beds more than others. However, this proved unworkable, since most hospital trusts cover several primary care trusts and the allocation of beds is seldom firmly fixed.

We also explored whether data on crisis accommodation and day hospital provision were sufficiently clear to be brought into the model. In both cases the difficulty was the heterogeneity of these types of service (Briscoe *et al*, 2004). Whereas some appeared to offer realistic alternatives to

admission, others did not; for most our data were unclear. Crisis accommodation showed limited growth (from 160 to 220 beds nationally) and day hospital capacity appeared to reduce.

### Interpreting the data

The study showed an association between crisis team implementation and reduction in admissions far beyond what is plausible as a chance finding. However, the range of trends in areas both with and without crisis resolution teams underlined the fact that other influences must have been at work.

One possible explanation of our findings is that rapid implementation of policy on crisis resolution teams might have been serving as a marker of generally efficient, well-run services. Such areas might also be expected to be active in other ways that could reduce admissions without the crisis resolution teams being the mechanism. The best argument against this explanation for the present findings was the difference between the apparent effects of early introduction of the two different sorts of team. Crisis resolution teams were associated with reduced admissions, assertive outreach teams were not.

The disparity between the effect on admissions and bed use was an important finding. Our study could not indicate whether this was because short hospital admissions of less severely ill people were the most preventable, because the people who did still get admitted stayed longer, perhaps because the pressure to discharge them had been reduced or possibly for other reasons. This is an important issue, as the implications for ward and bed management are different.

The reasons underlying the importance of 24 h, 7-day on-call provision cannot be directly determined from the study. The specific relevance of this to effectiveness with younger clients could reflect their greater volatility. However, it could equally be a proxy marker for teams that are better led, designed and resourced.

The additional reductions in hospital admissions were seen most clearly in the

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teams implemented earliest. One reason for this may simply be that they had longer to show the effect. Unfortunately, this means that the study can still be criticised as demonstrating only the success of crisis resolution teams when implemented by its protagonists, but it cannot be dismissed as anecdotal. The groups of primary care trusts with restrictively defined crisis resolution teams in place by 2002 covered 12% of the population of England, and in the last year for which we have data they recorded 9658 hospital admissions. Our estimate that crisis resolution teams prevented 20% of admissions suggests they averted a further two and a half thousand.

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