Effect of increased compulsion on readmission to hospital or disengagement from community services for patients with psychosis: follow-up of a cohort from the OCTET trial

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Summary

Background Community treatment orders (CTOs) have not been shown in randomised trials to reduce readmission to hospital in patients with psychosis, but these trials have been short (11–12 months). We previously investigated the effect of CTOs on readmission rates over 12 months in a randomised trial (OCTET). Here, we present follow-up data for a cohort of individuals recruited to our original trial to examine the long-term effect of CTOs on readmissions and the risk of patients disengaging from mental health services temporarily or enduringly.

Methods For OCTET, an open-label, parallel, randomised controlled trial, we recruited patients aged 18–65 years involuntarily admitted to mental health hospitals in 32 trusts in England, with a diagnosis of psychosis and deemed suitable for CTOs by their clinicians. Between Nov 10, 2008, and Feb 22, 2011, we recruited and randomly assigned 336 eligible patients (1:1) to be discharged on either a CTO (n=167) or to voluntary status via Section 17 leave (control group; n=169). For the analysis presented in this report, we assessed data at 36 months for 330 of these patients. We tested rates of readmission to hospital, time to first readmission, number of readmissions, and duration of readmission in patients assigned to CTO versus those assigned to control, and in all patients with CTO experience at any time in the 36 months versus those without. We also tested whether duration of CTO affected readmission outcomes in patients with CTO experience. We examined discontinuation (≥60 days between clinical contacts) and disengagement from services (no clinical contact for ≥90 days with no return to contact) in the whole cohort. OCTET is registered with isrctn.com, number ISRCTN73110773.

Findings We obtained data for 330 patients in the relevant period between Nov 10, 2008 and Feb 22, 2014 (36 months after the last patient was randomly assigned to OCTET). We identified no difference between the randomised groups in the numbers of patients readmitted (100 [61%] of 165 CTOs *vs* 113 [68%] of 165 controls; relative risk 0·88 [95% CI 0·75–1·03]), number of readmissions (mean 2·4 readmissions [SD 1·91] *vs* 2·2 [1·43]; incident density ratio [IDR] 0·97 [95% CI 0·76–1·24]), duration of readmissions (median 117·5 days [IQR 63–303] *vs* 139·5 days [63·0–309·5]; IDR 0·84 [95% CI 0·51–1·38]), or time to first readmission (median 601·0 days [95% CI 387·0–777·0] *vs* 420·0 days [352·0–548·0]; hazard ratio [HR] 0·81 [95% CI 0·62–1·06]). The CTO experience group had significantly more readmissions than the group without (IDR 1·39 [95% CI 1·07–1·79]) and we noted no significant difference between groups in readmission rates, duration of readmission, or time to first readmission. We did not identify a linear relationship between readmission outcomes and duration of CTO. 19 (6%) patients disengaged from services (12 [7%] of 165 CTOs *vs* 7 [4%] of 165 controls). Longer duration of compulsion was associated with later disengagement (HR 0·946 [95% CI 0·90–0·99, p=0·023). 187 (57%) experienced no discontinuities, and we noted no significant difference between the CTO and control groups for time to disengagement or number of discontinuities. Levels of discontinuity were associated with compulsion (IDR 0·973 [95% CI 0·96–0·99, p<0·0001]. We identified no effect of baseline characteristics on the associations between compulsion and disengagement.

Interpretation We identified no evidence that increased compulsion leads to improved readmission outcomes or to disengagement from services in patients with psychosis over 36 months. The level of persisting clinical follow-up was much higher than expected, irrespective of CTO status, and could partly account for the absence of CTO effect. The findings from our 36-month follow-up support our original findings that CTOs do not provide patient benefits, and the continued high level of their use should be reviewed.

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Introduction

Community treatment orders (CTOs) exist in more than 75 jurisdictions in the USA, UK, Australasia, Canada, and Europe in different forms and with differing nomenclature. They authorise compulsory treatment for patients outside hospital and are aimed to reduce the so-called revolving-door syndrome of frequent readmissions for patients with severe, relapsing mental illness. In England and Wales, CTOs allow for the rapid and non-bureaucratic recall of patients for up to 72 h when needed

Research in context

Evidence before this study

Community treatment orders (CTOs) permit compulsory outpatient psychiatric treatment in more than 75 jurisdictions globally. Their effect on readmission to hospital, time to readmission, and length of stay has been investigated. We searched PsycINFO, MEDLINE, and Embase for English-language reports with the terms "community treatment orders", "CTO", "mandatory outpatient", "involuntary outpatient", "outpatient commitment", involuntary commitment", "IOT", and "assisted outpatient treatment", and identified systematic reviews of scientific literature published from 1967–2005 and 2006–13, including only three published randomised trials, and two meta-analyses. No trial showed that CTOs had any effect on readmission outcomes or service intensity. Non-randomised studies of CTOs varied in quality and in the outcome measures applied, and their findings were inconsistent. Studies up to now have been restricted to 12 months, which might be too short to detect effects. Serious concerns have been expressed that community compulsion might lead patients to disengage from mental health services but this has not been tested.

Added value of this study

We followed up for 3 years patients with high rates of community compulsion who participated in our original 12-month OCTET trial. No differences were noted between patients assigned at discharge to CTO and patients assigned to voluntary status via Section 17 leave (control) on readmission outcomes, suggesting that delayed benefits are unlikely. For patients with CTO experience, irrespective of randomisation, CTO was associated with more readmissions. Compared with patients without CTO experience, those with longer duration of CTO had shorter hospital stays. CTO duration showed non-linear associations with both time to readmission and length of stay, but no consistent patterns could be detected. These findings underline the caution needed in the interpretation of non-randomised analyses in this area. The level of continuous clinical follow-up was surprisingly high, persisting at nearly three contacts per month in both groups with 94% still in contact at 36 months. These figures suggest that modern mental health care is highly successful in maintaining contact with patients with psychosis, with or without compulsion, and this high level of contact might account for why compulsion seems to add so little.

Implications of all the available evidence

The weight of the current evidence does not support the use of CTO to improve readmission outcomes for patients with psychotic disorders. The high rates of community follow-up for this patient group cannot be attributed to either the imposition or the duration of CTOs, and their continued high use should be reviewed. The concern that CTOs lead to disengagement from services is not supported by our findings.

for review or to give treatment, after which the patient returns to the community on the CTO or the CTO is revoked, reverting back to hospital detention under Section 3 of the Mental Health Act for England and Wales, or discharged.

CTOs were introduced in England and Wales in 2008 after two decades of debate,[1] without any clear evidence of their effectiveness in reducing relapse and re-admission to hospital.[2,3] Opposition continues to be expressed on two additional concerns. The first is the justice of restricting the liberty of individuals who are well enough to survive outside hospital.[4] The second is a pervasive concern among user advocacy groups that CTOs represent a level of social control that can undermine patients' confidence in community mental health services (referred to as services in the rest of this report) and lead them to avoid clinical contact or disengage from services.

Only three randomised controlled trials have tested CTO effectiveness.[5–7] None of the results showed that they had an effect on readmission rate[5] or duration of readmissions[6,7] over 12 months' follow-up. Using analyses of non-randomised subsamples, the investigators of the North Carolina trial[5] concluded that CTOs lasting more than 6 months in combination with clinical follow-up of three or more contacts per month might reduce readmissions. Several case-controlled studies have investigated the effect of CTOs on readmission outcomes with conflicting results.[3,8,9] No pattern emerges for readmission rates, length of stay, or time to readmission. Where reductions in readmission rates are reported, they are usually for patients who are on CTOs for more than 6 months[3,10] and the benefits are restricted to the second 6-month period and beyond.[11–13] These claims of benefits for long-term CTOs[5,14,15] have been criticised for being unable to distinguish a treatment effect from a selection effect; ie, clinically stable patients are more likely to be kept on a CTO because it was presumed to be responsible for the improvements.[3,10,16] The findings from published randomised trials and case-control studies are restricted to 12 months' follow-up, which might not be sufficient for changes in chronic mental illness to occur.

Little is known about associations between disengagement from services and coercion. A systematic review of the international literature showed that reported disengagement from community services varied from 4% to 46% (with an average of around 30%) depending on definitions of disengagement and service model. Those with more assertive follow-up have better outcomes.[17] In the handful of CTO studies with service use as an outcome, some findings show increased service contacts,[18] but others show reductions.[12]

Between Nov 10, 2008, and Feb 22, 2011, we recruited patients for a trial (OCTET)[7] in which we randomly assigned patients with psychosis who were involuntarily

admitted to hospital and proposed for CTOs to either CTO or voluntary outpatient care via Section 17 leave of absence (control), which allows patients to leave hospital for short periods to assess stability before discharge. As a group these patients had experienced long, but variable, durations of coercion.[7] Our findings suggested that CTOs did not reduce rates of readmission. In this follow-up study, we assessed the OCTET cohort for a further 24 months (therefore 36 months in total) for several outcomes. For readmission, our objectives were to test readmission outcomes (readmission rates, number of readmissions, time to first readmission, and duration of readmission) during the 36-month follow-up in (1) patients randomised to CTO compared with controls; (2) patients with CTO experience compared with patients without; and (3) readmission outcomes with the duration of CTO for patients with CTO experience. For disengagement, our objectives were (1) to describe the pattern of clinical contact over 36 months; and to test (2) the association of duration of compulsion with rates of temporary discontinuities and time to disengagement; (3) the effects of the original OCTET trial randomisation on disengagement and discontinuity; and (4) for an interaction of baseline characteristics on any relation between duration of compulsion and disengagement and discontinuity.

Methods

Study design and participants

For our 36-month follow-up of the OCTET open-label, parallel, randomised trial, eligible participants were the patients included in the intention-to-treat analysis at 12 months. Details about patients, randomisation, and masking are in the published report of the original 12-month trial;[7] briefly, at randomisation, all participants were aged 18–65 years and receiving involuntary inpatient treatment for diagnosed psychosis at 32 mental health hospitals in England, and were candidates for CTO on discharge. Stratification factors for randomisation were sex (male or female), diagnosis (schizophrenia spectrum or other psychotic illnesses), and duration of illness (<2 years or ≥2 years).[7] We assigned 336 eligible patients (1:1) to be discharged from hospital on either a CTO (n=167) or to voluntary status via Section 17 leave (control group; n=169). We applied no further inclusion or exclusion criteria for this follow-up study. The study was granted ethics approval by the Staffordshire National Health Service (NHS) Research Ethics Committee (reference 08/H1204/131). All patients gave informed consent in writing before randomisation.

Data management

Three patients were excluded during the original trial (one withdrew, two were identified as ineligible after randomisation), therefore 333 were included in the intention-to-treat analysis at 12 months. At 36 months we obtained data from these patients' NHS medical records for the relevant period between Nov 10, 2008, and Feb 22, 2014. The legal obligation on hospitals to report on use of the Mental Health Act ensures these records provide reliable data about CTO use and allows for tracking and collection of data across different services. When added to the trial data, the final dataset covered the entire 36 months' (1095 days) follow-up.

Data were censored at the relevant timepoint for patients who died, emigrated, were imprisoned and remained in prison until the end of the study, and for whom there was a clear record of being discharged from secondary services. Patients who had been admitted to a general hospital for long periods were removed from some analyses where appropriate.

Researchers entered data for all but the first 66 patients directly into a Microsoft Office Access (2010

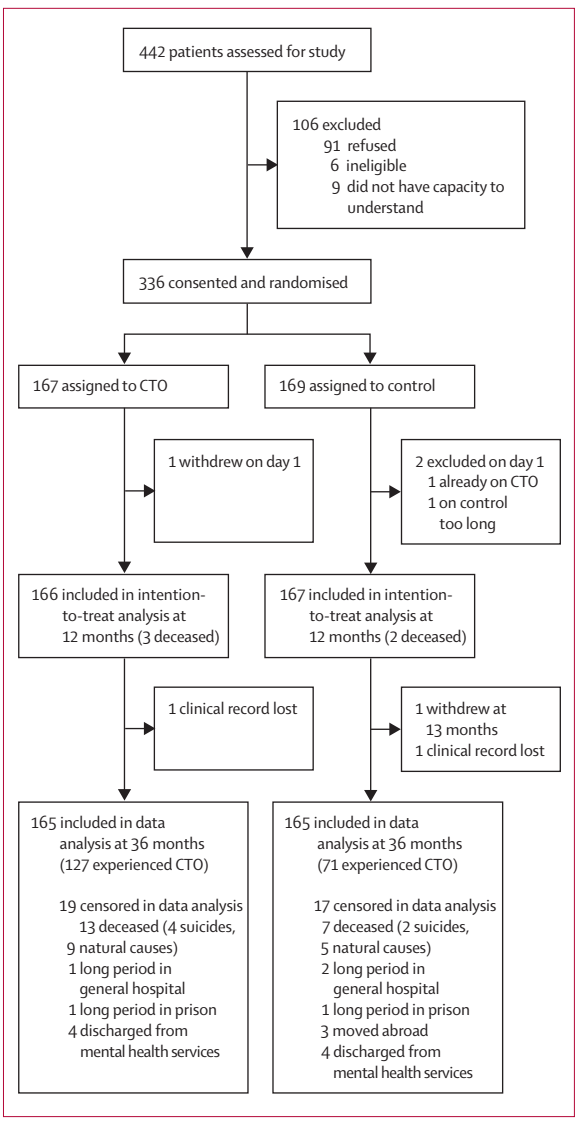

Figure 1: **Patient flow**
CTO=community treatment order.

	Missing data (n=330)	CTO (n=165)	Control (n=165)
Age (years)	0 (0%)	39·9 (11·2)	39·2 (11·5)
Sex			
Male	0 (0%)	110 (67%)	113 (68%)
Female	0 (0%)	55 (33%)	52 (32%)
Years of education	4 (1%)	11·7 (1·7)	12·0 (2·1)
Ethnic origin	0 (0%)		
White	..	100 (61%)	101 (61%)
Black	..	38 (23%)	39 (24%)
Asian	..	15 (9%)	14 (8%)
Mixed and other	..	12 (7%)	11 (7%)
Born in the UK	1 (<1%)	133 (81%)	120 (73%)
Married or cohabiting	2 (<1%)	11 (7%)	18 (11%)
Independent accomodation	2 (<1%)	116 (70%)	120 (73%)
Living alone or homeless	17 (5%)	122 (74%)	112 (68%)
Identified carer	28 (8%)	61 (37%)	49 (30%)
Schizophrenia	0 (0%)	139 (84%)	142 (86%)
BPRS	21 (6%)	38 (29·5–48·5)	38 (31–50)
GAF	24 (7%)	38·3 (9·4)	38·9 (9·9)
Duration of illness (years)	8 (2%)	12 (6–20)	12 (5–21)
Fewer than 2 years duration of illness	0 (0%)	7 (4%)	7 (4%)
Number of past admissions to psychiatric hospital	21 (6%)	6 (3–8)	5 (3–9)
Duration of past admissions to psychiatric hospital (months)	55 (17%)	14 (6–28)	15 (7–30)
Number of past involuntary admissions to hospital	32 (10%)	4 (2–7)	3 (2–7)
Criminal conviction	30 (9%)	65 (39%)	67 (41%)
Previous imprisonment	23 (7%)	41 (25%)	44 (27%)

Data are number (%), mean (SD), or median (IQR). CTO=community treatment order. ..=not applicable. BPRS=Brief Psychiatric Rating Scale. GAF=Global Assessment of Functioning.

Table 1: **Patient characteristics at baseline of the 36-month follow-up**

version) database. For those 66, data were recorded in clinical research forms. These data were double-entered and checked for discrepancies. We did range, logical, and consistency checks for all data. Composite variables were checked by automatic recalculations. We locked the final cleaned dataset before starting the analysis.

Outcomes

This study had seven outcomes: (1) Rate of readmission to a mental health hospital: a binary measure (readmitted *vs* not readmitted during the 36 months) that included voluntary and involuntary psychiatric readmissions. Patients who never left hospital were counted as readmitted. Recall to hospital under a CTO was not counted as a readmission unless the recall ended in revocation. (2) Duration of readmission: the combined number of days of all readmission episodes from the point of first discharge from hospital, excluding days on recall unless the recall ended in revocation. (3) Time to first readmission: the number of days from first discharge to first readmission, set to zero for patients who never left hospital. (4) Number of readmissions: the total number of readmissions from first discharge, set to one for patients who never left hospital. (5) Discontinuity: a period of 60 days or more between clinical contacts. (6) Disengagement: no clinical contact for 90 days or longer with no return to contact. Disengagement was counted as one discontinuity period. (7) Time to disengagement: the number of days from first discharge to the last contact when the last contact occurred 90 days or more before the end of follow-up. Time to disengagement was a continuous variable that was expected to be skewed.

Statistical analyses

A detailed statistical analytical plan (available on request) was written before we accessed the data. We analysed the readmission outcomes with multiple regression models with adjustment for the stratification factors. The regression model used depended on the data distribution. We assessed all model assumptions.

We analysed readmission rates using a binary outcome log-binomial regression adjusted for the trial group indicator and the stratification factors. The results are presented as the relative risk (RR) of readmission in the CTO group compared with the control group, with appropriate 95% CIs and two-sided p values. The number and duration of readmissions are count outcomes. We analysed these outcomes using negative-binomial regression models, adjusting for trial group indicator and the stratification factors. These results are presented as incidence density ratios (IDRs) which should be interpreted in the same manner as RRs. The time to first readmission is a time-to-event outcome. We calculated time to readmission from the day of first discharge, unlike the survival curve presented in our original OCTET report,[7] which we calculated from the randomisation date. We analysed this using a proportional hazards model, adjusted for the trial group indicator and the stratification factors. We present the results as hazard ratios (HRs) with 95% CIs and Kaplan-Meier plots. We calculated the median readmission time with 95% CIs.

We tested the associations between duration of CTO and readmission outcomes only for patients with CTO experience. Because of the non-linear relation of the explanatory variable (duration of CTO) with the outcomes, we split the duration of community compulsion into quartiles. We analysed the association with readmission with a Poisson regression with robust error variances,[19] as the log-binomial model was not possible because of model instability. The results are presented as RR with 95% CIs. We did the analysis for time to first readmission with the non-parametric Kruskal-Wallis test. The proportional hazards model was not used because of the violation of the proportional hazards assumption.

We analysed the duration of readmissions using a negative binomial regression model, adjusting for CTO quartiles and stratification factors. These results are presented as IDRs with 95% CIs. For the analysis of an

	N	CTO (n=165)		Control (n=165)		Total sample (n=330)	
		Mean (SD) or n/N (%)	Median (IQR)	Mean (SD) or n/N (%)	Median (IQR)	Mean (SD) or n/N (%)	Median (IQR)
Number of days in community	330	902·90 (249·20)	992·00 (859–1065)	870·20 (273·40)	976·00 (791–1062)	886·50 (261·78)	983·50 (824–1063)
Patients with CTO experience	330	127/165 (77%)	..	71/165 (43%)	..	198/330 (60%)	..
Number of days on CTO*	198	487·70 (347·23)	364·00 (181–828)	393·00 (287·42)	308·00 (173–661)	453·70 (329·45)	346·00 (180–724)
Number of days under any compulsion†	330	570·10 (387·98)	513·00 (230–1081)	408·60 (364·39)	309·00 (98–697)	489·40 (384·40)	399·50 (161–839)

CTO=community treatment order. ..=not applicable. *Combines all days on an order for those with ≥1 periods of CTO. †Includes all hospital and community compulsion during the 1095 days of follow-up.

***Table 2*: Community care over 36 months and legal status by randomised groups**

	CTO (n=165)			Control (n=165)			Treatment effect (95% CI)
	N	n/N (%) or mean (SD)	Median [IQR] or (95% CI)	N	n/N (%) or mean (SD)	Median [IQR] or (95% CI)	
Readmission to a psychiatric hospital							
Patients readmitted	165	100/165 (61%)	..	165	113/165 (68%)	..	RR 0·88 (0·75–1·03); p=0·103
Patients not readmitted	165	65/165 (39%)	..	165	52/165 (32%)	..	..
Patients with more than one readmission	100	60/100 (60%)	..	113	66/113 (58%)	..	..
Duration of readmission (days)	100	237·1 (269·09)	117·5 [63–303]	112*	252·1 (282·48)	139·5 [63·0–309·5]	IDR 0·84 (0·51–1·38); p=0·466
Number of readmissions	100	2·4 (1·91)	2·0 [1–3]	113	2·2 (1·43)	2·0 [1·0–3·0]	IDR 0·97 (0·76–1·24); p=0·819
Time to first readmission (days)	165	571·5 (410·80)	601·0† (387–777)	165	511·4 (401·66)	420·0† (352·0–548·0)	HR 0·81 (0·62–1·06); p=0·118
Average duration of readmission (days)*,‡,§	100	100·5	..	112	116·2	..	..
Number of periods of discontinuity	162	1 (1·48)	0 [0–2]	165	0·85 (1·36)	0 [0·1]	IDR 1·12 (0·78–1·59); p=0·537
Time to disengagement (months)	164	32·5 (6·26)	35·2 [31·9–36·0]	165	32·3 (6·76)	35·0 [32·8–35·9]	p=0·274¶

CTO=community treatment order. ..=not applicable. RR=relative risk. IDR=incident density ratio. HR=hazard ratio. *One patient was readmitted on the last day of study period and had no days in hospital. †Median readmission time with 95% CI. ‡479 readmissions in total. §Calculation based on the total number of readmissions in each group. ¶Wilcoxon rank-sum p value.

***Table 3*: Outcomes at 36 months' follow-up of randomised groups**

association between readmission and CTO experience, we used log-binomial regression adjusted for stratification factors and present the results as RR of readmission, with appropriate 95% CIs. We analysed the association between days to first readmission and CTO experience using a Wilcoxon rank-sum test because of the violation of the proportional hazards. We present the results as HRs with 95% CIs and the median days of readmission with 95% CIs. We analysed duration and number of readmissions with duration of CTO experience with negative binomial regression, adjusted for stratification factors and presented as IDRs with 95% CIs.

Time to disengagement is a time-to-event outcome. We therefore analysed this outcome using a proportional hazards model, adjusting for duration of compulsion and the trial stratification factors. We also measured duration of compulsion—defined as the number of days under any legal compulsion during the 36 months. This included time detained in hospital between randomisation and first discharge, and all subsequent days under inpatient and outpatient compulsion. We present the results as HRs with 95% CIs. Discontinuity of clinical contact over time is a count outcome that we analysed using a negative-binomial regression model adjusting for duration of compulsion and stratification factors, and presented as IDRs. We excluded patients for whom data were missing on contacts for the entire period.

We compared the trial groups for time to disengagement with the non-parametric Wilcoxon rank-sum test because of the violation of the proportional hazards assumption of the proportional hazards model. We analysed discontinuities in the two groups using a negative-binomial regression model and adjusted them for trial group indicator and stratification factors. The results are presented as IDRs (with 95% CIs and two-sided p values).

We did a sensitivity analysis for the association between duration of compulsion and both disengagement and discontinuity by repeating the analyses without adjusting for stratification factors. To identify patients' baseline characteristics associated with a differential effect of

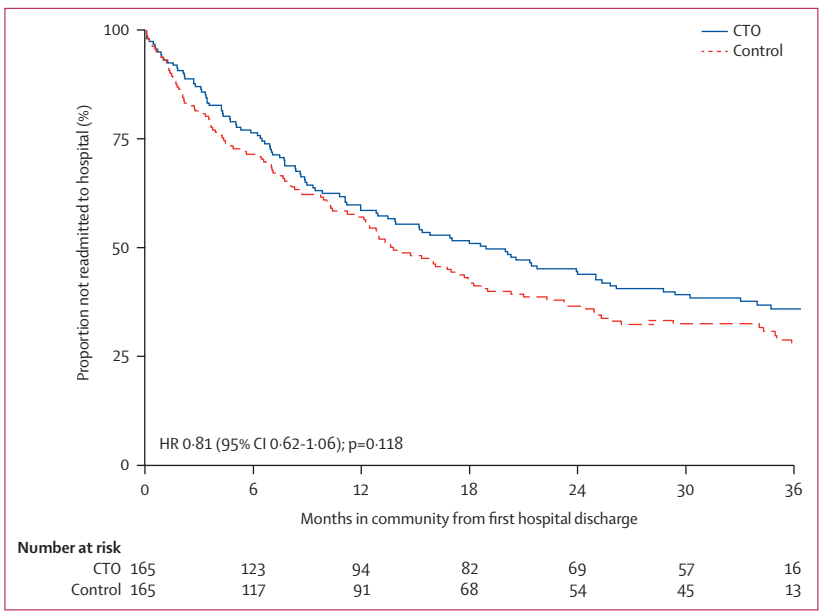

Figure 2: **Time to first readmission to psychiatric hospital**
CTO=community treatment order. HR=hazard ratio.

duration of compulsion on discontinuity and disengagement, we fitted the relevant model with the inclusion of an additional interaction effect for the duration of compulsion and the relevant subgroup variable. The subgroups were those defined a priori for the OCTET trial,[20] plus a centre effect for London versus other sites. For the description of patterns of care we counted clinical contacts. The count of professional contacts were of each relationship, so if the same psychiatrist was recorded as responsible for two patients, that psychiatrist was counted twice, and if two psychiatrists met the same patient, both were recorded. We used Stata version 12.1 for all analyses. OCTET is registered with isrctn.com, number ISRCTN73110773.

Role of the funding source

The funder of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication.

Results

At 36 months, of the 333 patients available at 12 months in the original trial, one withdrew consent for further use of their data and all clinical records had been lost for two. (figure 1). We therefore present data throughout for a sample of 330 patients. Baseline characteristics did not differ between the randomised groups (table 1). The size and characteristics of our sample closely matches those in other CTO studies from the UK[21–23] and internationally.[3]

See Online for appendix

Overall, patients spent a median of 983·5 (IQR 824·0–1063·0; 89·8%) of the possible 1095 days in the community (992·0 [859·0–1065·0; 90·6%] in the CTO group *vs* 976·0 [791·0–1062·0; 89·1%] in the control group; table 2).

When we compared readmission outcomes for the randomised groups, the CTO group showed slightly better outcomes, but none of the differences were significant (table 3). The control group had a median of 8 days more between randomisation and discharge compared with the CTO group. Although the overall HR for time to first readmission is non-significant (figure 2), the two curves differ between 12 months (directly after the end of the RCT) and 18 months, when patients in the control group seemed to be more likely to be readmitted. After 18 months the two curves again run roughly in parallel. More than half of the first readmissions (117 [55%] of 213 patients occurred in the 12 months' follow-up of the original trial),[7] and we noted no significant change in the pattern of readmissions over the 36 months.

When we compared readmission outcomes for patients with any CTO experience during the 36 months (irrespective of their original random assignment) versus those without, we noted that 198 patients (60%) had CTO experience and 132 (40%) did not. 213 patients (65%) were readmitted to hospital at some point, more with CTO experience than without (table 4). The mean duration of readmissions and time to first readmission were shorter for patients with CTO experience, but none of these differences were significant. However, the CTO experience group had significantly more readmissions than the group without CTO experience (table 4).

The association between duration of all periods of CTO for the 198 patients with CTO experience and readmission rates was not significant. Duration of CTO was significantly associated with the duration of readmissions (p=0·019) and the time to first readmission (p=0·007); however, neither of these relations were linear. For readmission rates, duration of readmission, and time to first readmission, patients with 6 to 12 months on CTO did better than patients with either shorter or longer CTOs. We identified non-linear relationships between duration of CTO and relative risks of readmission, mean days in the community until first readmission, and mean numbers of inpatient days.

We assessed patterns of clinical contact in the whole cohort. The clinical teams that collaborated in OCTET were encouraged to aim for similar rates of community contacts during the 12 months' follow-up, irrespective of trial group. They achieved this, with a median of 2·1 contacts [IQR 0·8–4·4] per month in the CTO group versus 2·2 [0·8–4·7] in the control group.[7] During the 36-month follow-up, the rate of contact was slightly higher but the two groups did not differ (CTO median 2·50 [IQR 1·70–4·40] *vs* control 2·90 [1·70–4·98]). The median number of recorded attempted but failed contacts per month was 0·3 (IQR 0·1–0·7) for both groups (appendix). During the 36 months, patients were under the care of a

	N	CTO experience (n=198)		No CTO experience (n=132)		Treatment effect (95% CI)
		n/N (%) or mean (SD)	Median (IQR)	n/N (%) or mean (SD)	Median (IQR)	
Readmission to psychiatric hospital						
Patients readmitted	330	132/198 (67%)	..	81/132 (61%)	..	RR 1·07 (0·91–1·27); p=0·419
Patients not readmitted	330	66/198 (33%)	..	51/132 (39%)	..	..
Time to first readmission	330	537·7 (410·64)	416·5 (161·00–1096·25)	581·1 (437·86)	526·5 (126·50–1096·25)	p=0·686*
Duration of readmission (days)	212†	225·5 (232·1)	135 (74·0–287·5)	277·10 (334·71)	118·5 (53–412)	IDR 0·88 (0·53–1·47); p=0·655
Number of readmissions	213	2·5 (1·73)	2 (1–3)	1·91 (1·53)	1 (1–2)	IDR 1·39 (1·07–1·79); p=0·012
Patients with more than one readmissions	213	89/132 (67%)	..	37/81 (46%)	..	
Average duration of readmission (days)†‡§	212	91·88	..	143·0	..	..

CTO=community treatment order. RR=relative risk. HR= hazard ratio. IDR= incident density ratio. ..=not applicable. *Wilcoxon rank-sum p value. †One patient was readmitted on the last day of the study and had zero nights in hospital. ‡479 readmissions in total. §Calculations were based on the total number of readmissions in each group.

Table 4: **Associations between readmission outcomes and CTO experience at 36 months**

	Whole cohort (n=330)			Treatment effect* (95%CI), p value
	N	n/N (%) or mean (SD)	Median (IQR)	
Patients with discontinuity (≥60 days break in contact)	327	140/327 (43%)	..	..
Number of patients with periods of discontinuity				
No discontinuity	327	187/327 (57%)	..	..
One period of discontinuity	..	66/327 (20%)	..	..
Two periods of discontinuity	..	27/327 (8%)	..	..
Three periods of discontinuity	..	19/327 (6%)	..	..
Four periods of discontinuity	..	19/327 (6%)	..	..
Five or more periods of discontinuity	..	9/327 (3%)	..	..
Number of periods of discontinuity	327	0·9 (1·42)	0 (0–1)	IDR 0·973 (0·96–0·99), <0·0001
Patients with disengagement (≥90 days of no contact and no return)	329†	19/329 (6%)	..	..
Time to disengagement (months)‡	329	..	..	HR 0·946 (0·90–0·99), 0·023

CTO=community treatment order. IDR=incidence density ratio. HR=hazard ratio. ..=not applicable. *Association with duration of compulsion (months). †Two additional patients were included in this analysis because, although they had missing data on community contacts, they were receiving inpatient care during the last 90 days of the study. ‡Median disengagement time with 95% CI could not be estimated because of the few disengaged patients (n=19).

Table 5: **Levels of discontinuity and disengagement from service and associations with duration of compulsion**

mean of 2·3 (SD 1·25) care coordinators (2·2 [1·19] for the CTO group and 2·4 [1·31] for the control group) and a mean of 3·7 (SD 2·74) consultant psychiatrists (3·6 [2·66] for the CTO group and 3·7 [2·83] for the control group). More than two-thirds of the contacts with care coordinators were with community psychiatric nurses. Few (182 [16%]) of the psychiatrist contacts were with integrated psychiatrists responsible for both inpatient and outpatient care; most were with either inpatient (492 [42%]) or outpatient (484 [41%]) psychiatrists (appendix).

Finally, we assessed discontinuities and disengagements in the whole patient cohort. 140 (43%) of 327 patients had at least one period of discontinuity during the 36-month follow-up (table 5). Longer compulsion was significantly associated with fewer periods of discontinuity (IDR 0·97, 95% CI 0·96–0·99; p<0·0001; table 5). The number of periods of discontinuities did not differ significantly between the randomised groups (IDR 1·12, 95% CI 0·78–1·59, p=0·537; table 3). The results were unaltered after we adjusted the model for variables used in the subgroup analysis, and after we did the sensitivity analysis.

At 36 months or time of death, emigration, or discharge from secondary care, only 19 patients (6%) had disengaged from services (table 5). These patients (12 [7%] of 165 patients in the CTO group, seven [4%] of 165 in the control group) thus had their final contact with the mental health teams 3 months or more before the end of the study or their censor point. We noted no significant differences between the randomised groups in time to disengagement. Longer duration of compulsion was significantly associated with a longer time to disengagement (HR 0·946 [95% CI 0·90–0·99], p=0·023). The sensitivity analysis did not alter the results.

When the effects of predetermined subgroups on discontinuity and disengagement were analysed, none of the subgroup interactions were significant apart from

disengagement with age more than 40 years (appendix; interaction HR 1·18 [95% CI 1·01–1·38], p=0·042).

Discussion

This is the first long-term follow-up of a randomised trial of CTOs. Our findings lend support to the evidence from non-randomised studies[14,15] that CTOs, once imposed, often remain in place for long periods. Despite longer follow-up we identified no evidence that increased compulsion leads to improved readmission outcomes or to increased discontinuity or disengagement from services in patients with psychosis.

Our most striking finding is the high rate of sustained clinical contact with this patient group. Whether or not they had CTOs, a highly assertive approach was maintained throughout the 3 years with a median of nearly three contacts monthly and one failed contact every other month. Staff clearly take their clinical obligations to these patients seriously. This is unlikely to be a halo effect from the original trial, because no ongoing contact was maintained between the research team and the many clinicians involved in the patients' care. Most of these services had experienced reorganisations and disruptions, with patients passing between teams. The rate of discontinuities was also lower than we had expected. Overall, 57% of patients did not have a break in care of 60 days or more, and a further 20% had only one such period. Two months without clinical contact over a period of 3 years could easily be attributed to holiday or physical illness in either patient or clinician. About a quarter of the patients (74 [23%]) did have significant disruptions with two or more periods of discontinuity.

As would be expected, very few patients (eight [2%]) were discharged by their clinical teams during the 36 months, and only a handful (19 [6%]) disengaged from services (12 [7% CTO and 7 [4%] control). The time to disengagement was associated with the duration of compulsion (p<0·0001) but in view of the low number of patients who disengaged, this association should be interpreted conservatively. No difference was shown for time to disengagement, which suggests no differences between the randomised groups. These levels of disengagement are lower than those reported elsewhere. A systematic review of the international literature showed disengagement rates ranging from 4% to 46%, with the average around 30%.[17] This range reflects the different service approaches and varying ways of measuring disengagement, including wide variation in lengths of study follow-up. Several of the reviewed studies only measured contacts with no attempt to distinguish patient disengagement from clinician discharge. We deliberately used two clearly defined measures of disengagement and juxtaposed them with patterns of clinical contacts to provide a broad picture of disengagement in our sample, and we excluded the few patients who were discharged from services from those analyses.

Services that use community outreach to follow up patients assertively have lower rates of disengagement.[17] Although such services are often reported as the experimental group in trials, they are routinely provided to patients in the UK.[24] We could not find an exact comparator population to ours in the literature. However, Tyrer and colleagues'[25] reported 32% disengagement among patients with schizophrenia who were offered high intensity follow-up in London in 1995. This finding suggests that practice might have changed with much greater emphasis on sustaining contact and care today. A central argument for introducing CTOs in the UK was a perception, following the Ritchie report into the care of Christopher Clunis, a psychiatric patient who murdered Jonathan Zito after being discharged from services,[26] that many patients with psychosis were being lost to follow-up. Our figures starkly contradict this—follow-up is persistent and most of these patients remain in regular contact over long periods. This might not have been the case in the 1990s; could perhaps the problems confronted 20 years ago, that CTOs were designed to fix, no longer exist?

To examine the long-term effect of CTOs on readmission we did the explorative survival analysis of time to first readmission. The survival curve shows a difference between the groups from 12 to 18 months that is difficult to interpret. In months 0–12 and 19–36, the admission rates are exactly equal for the two randomised groups (this result might, of course, merely be random variation as no significant difference overall is evident). We wondered if the collaborating teams had abandoned their commitment to equal support for control patients once the trial was finished and examined this by calculating clinical contact frequencies for the two groups between 12 and 18 months, but noted no difference (median monthly contacts 2·5 for CTO, 2·8 for control). The same pattern of contact during and after the trial period suggests that participation in the trial did not change clinicians' behaviour.

Findings from other studies have suggested that CTOs need at least 6 months to affect outcomes.[5,12,13] We therefore did the exploratory comparison between all patients who had had a CTO during the 36 months and those who had not. Because this comparison contained non-randomised groups, any conclusions drawn must be tentative. The non-randomised analyses present a complex picture which is difficult to interpret, and underline the need for caution in interpreting such data. Patients on CTO were marginally more likely to be readmitted than patients in the control group (67% compared with 61%) and to be readmitted more than once, but they spent shorter times in hospital (mean of 225·5 days compared with 277·1). These findings do not support the view of improved readmission outcomes for patients with CTO experience for several reasons. Patients in the control group of the trial could only be placed on a CTO during follow-up if they had been

readmitted involuntarily so there is an inherent bias in the nature of these data. Similarly, the time available for inpatient days is inevitably reduced for patients with longer recorded community compulsion thereby driving an association. Most importantly, we identified no straightforward relationship of readmission outcomes either steadily falling or rising with increasing duration of CTO. Patients on CTOs for 6–12 months did better than patients with other durations of CTOs (<6 months, 12–24 months, and 24–36 months).

More than half of the first readmissions occurred in the 12 months' follow-up of the original trial and we showed no significant change in the pattern of readmissions over the 36 months. Although face-validity for trials would be improved by a longer follow-up (indeed, we have proposed the need for longer follow-ups ourselves)[7] these data, and the enormous practical difficulties of doing randomised trials of CTOs, strengthen the case for further trials with a 1-year follow-up.

Our findings are limited to patients with psychosis who are already in secondary care, and cannot delineate any potential of increased compulsion to dissuade individuals from seeking treatment. The effect of the randomisation is substantially diluted by the 36-month follow-up point, therefore conclusions about long-term effect have diminished power. The comparisons of the non-randomised samples (experience of CTO *vs* not) can only describe associations, not imply causation. Additional issues with these analyses exist (outlined above) that complicate their interpretation. Because only 19 patients disengaged, findings for the association of duration of compulsion with time to disengagement should be treated with caution. Our analysis of subgroups, which showed no significant interaction apart from disengagement and age, should also be interpreted cautiously in view of the multiple comparisons.

We did not find any evidence of patient benefit from CTO. Nor did we find evidence that high levels of compulsion increase discontinuity or disengagement from services. The group assigned to CTO did not have better readmission outcomes than the group assigned to control. Our 36-month follow-up therefore broadly supports the findings of the three published trials of 11–12 months that CTOs do not affect readmission rates.[5–7] It also supports the findings from several cohort studies that CTOs tend to be imposed for substantial periods. The high levels of assertive follow-up might clarify why CTOs did not affect readmission outcomes. The analyses of non-randomised groups (ie, patients who received CTO *vs* those who did not) generated complex data that are difficult to interpret, especially to distinguish selection effects from treatment effects. This result strengthens our conviction that randomised studies are essential for determining whether CTOs affect re-admission rates. That more than half of the first re-admissions occurred in the first 12 months suggests that 12-month trials are valuable.

The continuing spread of CTO legislation and their increased use, despite no evidence of benefit in all three published trials, is surely contrary to psychiatry's declared commitment to evidence-based practice. Further trials or modifications of the policy and practice are urgently needed.

Contributors

TB designed the study with input from JR. TB, KY, and JR managed the study. SP, FV, AF, AM and KB contributed to data collection and data management. MV-M and CK designed the statistical analysis plan. CK led the data management and did the statistical analysis. The report was drafted by TB, KY, CK, and JR. All authors did the study, interpreted the results, read, revised and corrected the report, and approved the final version.

Declaration of interests

We declare no competing interests.

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