APPENDIX

THE UTILITY OF OUTPATIENT COMMITMENT: I. NEED FOR TREATMENT AND A LEAST RESTRICTIVE ALTERNATIVE TO PSYCHIATRIC HOSPITALIZATION

I. CHARACTERISTICS OF COMMUNITY TREATMENT ORDERS IN VICTORIA AUSTRALIA

Community treatment orders (CTOs) require individuals to comply with outpatient treatment. They are issued to individuals residing in the community and to inpatients upon early hospital release. This section relates to the characteristics of CTOs as they existed throughout the study under the Mental Health Act (1986). It does not the cover the changes made to CTOs in the current Mental Health Act of 2014).

A. Eligibility criteria: all of the following must be met

♦ The person appears to be mentally ill.

♦ The illness requires immediate treatment that can be obtained…

♦ For health or safety (whether to prevent a deterioration in physical or mental condition or otherwise) or for community protection.

♦ The person has refused treatment or is unable to consent to necessary treatment.

♦ No less restrictive option is available.

B. Implementation

♦ An authorized psychiatrist makes the order, and the authorized psychiatrist or his or her delegate must monitor the treatment.

♦ Treatment usually involves an assertive community treatment (ACT) team.

♦ Patients may be placed on a CTO as part of the hospital discharge process (94.1% of the study cohort) or directly from the community (5.9% of the cohort).

♦ As part of the hospital discharge process, the patient participates in a review board hearing to discuss whether he/she is ready for release. The patient is part of the discussion including the patient's clinician, the chair of the review board hearing (an attorney), a community representative, and a psychiatrist. Family members and legal counsel for the patient may also be present. After the inclusive discussion the patient is asked to leave while the hearing officers come to a decision. Then the patient comes back to the meeting and the review board's decision is explained to the patient.

♦ The decision to place a person on a CTO is driven by a determination of whether or not the patient continues to meet the standard for involuntary care. If the patient continues to meet the standard, then the question is: can their health and safety be guaranteed outside the hospital with CTO supervision.

♦ Patients have significant input into the decision process. Patients can present their case and address any comments made in the hearing, they can influence the determination of whether or not they are placed on a CTO and the duration of that placement. Also once out of hospital on a CTO the patient can ask for a hearing at any time to reconsider their CTO status.

♦ A CTO may vary in duration, though the duration must be specified and cannot exceed 12 months.

♦ If the patient does not agree with the Board's decision of CTO placement, fails to convince the Board of the validity of their disagreement, says they will not cooperate with a treatment plan on a CTO, and continues to meet the standard for involuntary care, they are retained in hospital. People do not leave the hospital who continue to need protection of health and safety unless they are on a CTO with a treatment plan to oversee them in the community. They do not have the right to reject the CTO status if it is deemed appropriate. The CTO is a form of involuntary outpatient commitment.

♦Patients may appeal the decision and obtain legal representation in the appeals process.

♦ The order can be revoked by an authorized psychiatrist for noncompliance—i.e. "If a person placed on a Community Treatment Order fails to comply with a condition of that order, regardless of all reasonable steps having been taken by the treating team to procure their compliance, and there is a significant risk that their mental health will deteriorate or has deteriorated as a result of their noncompliance, they can be taken into protective custody and detained in an approved hospital for up to 14 days." (1)

♦ Patients whose CTOs are revoked may be apprehended by the police and taken to an inpatient facility.

♦ Procedural safeguards for hospital admission are somewhat less involved than for a regular admission.

♦ Patients are informed of all their rights in the comprehensively detailed pamphlet, "Patients' rights: A self-help guide to Victoria's Mental Health Act." They can appeal the decision placing them on a CTO it at any time, request changes in their required treatment plan, and be given free legal representation.

♦ Study findings indicate that 39% of CTOs in the decade under study ended in re-hospitalization, thus the revocation of a CTO. Hospitalization marks the end of a CTO. An additional 10% of patients with "revoked" CTOs are discharged from involuntary status, rather than hospitalized, because they are individuals who are failing to show up for their treatment and are brought in for review and are found to no longer meet the criteria for hospital detention." (1). The remainder of CTOs time-out—i.e. according to the law the CTOs "expire" and the patient is notified of such expiration.

♦ A break in care extending beyond the CTO end date would require a new CTO as would a discharge from a hospital episode.

C. Obligations of the patient and oversight requirements

♦ Compliance with the order can require an individual to live in a particular apartment, to take prescribed medications, and to attend counselling sessions.

♦ Patients are required to receive a medical examination of their physical health.

♦ The residence provision under the act is rarely used. When used, it just requires people to live at a particular address (usually a supported accommodation facility).

♦ The person may be required to be at home at particular times of the day to receive supervision of medication.

♦ Daily home visits would only be for those patients being treated by mobile support teams or under very temporary crisis team treatment--i.e. a small percentage of the total number of people on CTO.

♦ A CTO itself does not enable continuous supervision and restriction of movement - generally people requiring those things would be subject to other orders - perhaps a guardianship or community corrections order.

♦ The Mental Health Review Board is obligated to review placement, continuance, and exit from a CTO, to supervise the process.

♦ The Mental Health Review Board is a statutorily created body, headed by an attorney, and a part of the legal system. The Board is notified of patient placement on a CTO, as is the patient, significant others and treatment team. Since patients are not retained on hospital patient roles, are not the responsibility of a hospital superintendent, can be placed on a CTO from the community without hospitalization, and are overseen by a part of the legal system, the procedure is viewed as outpatient commitment as opposed to the more traditional procedure of conditional release.

♦ A Mental Health Review Board hearing is conducted by three Board sessional employees: an attorney, a psychiatrist, and a community member within eight weeks of placement. Attendees include the patient, patient's psychiatrist and/or case manager, significant others, and patient's counsel (should one be requested).

♦ A review by the Mental Health Review Board is again held within 12 months.

♦ A review by the Mental Health Review Board may be held at any time upon request of the patient, the psychiatrist, an attorney, or staff of the Mental Health Review Board.

II. STUDY METHODS

A. Procedure for Selecting Matched Cohorts of Hospitalized Psychiatric Patients from the Victoria Psychiatric Case Register/RAPID System for 2000 -2010

The following are the analytic procedures used to develop the code to select the Community Treatment Order (CTO) cohort and a matched cohort of hospitalized patients who were not placed on a CTO during the course of the study.

The total number of patients hospitalized (acute inpatient admission) during the study period was 69,186.

1. Selection of Community Treatment Order Cohort (First CTO after 1 Jul, 2000)

    a. Take base set of all mental health clients who had been on a CTO from 1 Jul, 2000 - 30 Jun 2010.

    b. Exclude any clients that had been on a CTO prior to 1 Jul, 2000.

    c. Create an indicator for all clients who had been in a cohort of the original (pre 2000) project.

    d. Exclude any clients that were in cohort of the original project (i.e. who had an earlier CTO)

2. Creation of base client pool of hospitalized patients.

    a. Create base set of all mental health clients in current Mental Health information system (covers all activity from 2000 onwards).

    b. Exclude clients with no recorded service activity post Jul 1, 2000 (must have had a MH admission > 24 hrs).

    c. Get the AN-DRG diagnostic category for every diagnosis recorded against each client (excluding non-Mental Health and Mental Retardation categories).

    d. Find the most severe hierarchical diagnostic category (AN-DRG) recorded for each client.

    e. Calculate the clients' age at date of data extraction, sex. Use these to create an 'age-ANDRG-sex' group for each client. Also add these 'age-ANDRG-sex' groups to Cohort 1-- the CTO cohort.

    f. Get the first acute admission date post 1 Jul, 2000 for each client - indicates whether they have been hospitalised or not.

g. Create indicator showing if client appears in CTO cohort (cohort 1).

h. Create indicator showing if client appeared in any cohort of the original (pre 2000) project.

i. Create indicator showing if client appeared in cohort 1 of the original (pre 2000) project.

j. Attach a random number (0-99,999) to each record.

3. Selection of Cohort 2 (No CTO, Hospitalised, Matched)

When we remove the clients in the CTO sample and clients who appeared in the original project (pre 2000), we have 48,316 patients remaining who were all potential matches with the CTO sample.

a. Take set of rows from base client pool who had a first acute admission date post 1 Jul, 2000, did not appear in the CTO cohort (cohort 1), and did not appear in any cohort of the original (pre 2000) project – this is the Cohort 2 pool—i.e. non-CTO and Hospitalized.

b. Create a master frequency table, based on Cohort 1, of the numbers of clients in each ‘age-ANDRG-sex’ grouping.

c. For each ‘age-ANDRG-sex’ group in the master frequency table, randomly select the same number of rows (clients) from the Cohort 2 pool as occur in the master frequency table, that match that particular ‘age-ANDRG-sex group’.

d. For each ‘age-ANDRG-sex’ group where there was a shortfall in matched clients compared to the master frequency table, use the remaining unmatched clients in the Cohort 2 pool to randomly select the shortfall in matched rows, this time with client age up to 5 years either side of the original client age.

4. Diagnostic history procedure

a. Take every registered client record in the VPCR.

b. Get every recorded diagnosis (and date) for each client and map them to an AN-DRG diagnostic category code.

AN-DRG	Hierarchical Diagnostic Category
54	Other Disorders of the Nervous System
56	Dementia and Global Disturbances of Cerebral Function
841	Schizophrenia Disorders
842	Paranoia and Acute Psychotic Disorders
843	Major Affective Disorders
844	Other Affective and Somatoform Disorders
845	Anxiety Disorders
846	Eating & Obsessive-Compulsive Disorders
848	Childhood Mental Disorders
850	Personality Disorders (Part AN-DRG 847)
851	Acute Stress Reactions (Part AN-DRG 847)
852	Conduct Disorders (Part AN-DRG 847)
854	Sexual Disorders (Part AN-DRG 847)
860	Alcohol Intoxication and Withdrawal
861	Drug Intoxication and Withdrawal
862	Alcohol Use Disorder & Dependence
863	Other Drug Use Disorder & Dependence
Other	Non-psychiatric Diagnosis
Missing	No Discharge Diagnosis Recorded

B. Creating A Propensity Score: Methods and Theoretical Basis for Variable Selection

Since we were unable to completely match the universe of CTO patients (i.e. all patients placed on a CTO during the decade) with a non-CTO hospitalized sample on age, gender and diagnosis with the above procedures in the first round of sampling (see Table 1 in manuscript), we chose covariate adjustment using propensity scores (CAUPS) for a second round of control to account for potential confounders of the effects of CTOs. We chose CAUPS over propensity score matching (PSM) as a method of adjustment for confounding effects because PSM, as King & Nielsen (2) demonstrate, "as it is most commonly used in practice (or with many of the refinements that have been proposed), increases imbalance, inefficiency, model dependence, research discretion, and statistical bias at some point in both real data and in data generated to meet the requirements of PSM theory. In fact, the more balanced the data, or the more balanced it becomes by pruning some observations through matching, the more likely PSM will degrade inferences — a problem [they] refer to as the PSM paradox (2, p. 1)." Pruning of unmatched sample members, the basis for PSM, discards information relevant to both samples. Therefore, in this the second and in the third phases of control procedures (see Section C) described herein we do not seek to match the samples but accord confounders **explanatory priority** in the interpretation of the results indicated by the multiple-partial slopes. The results indicate the outcomes after the regression derived propensity score and the regression covariates have explained all they can in a variable's relationship to the outcome criterion.

Logistic regression was used to create a score that would take account of the relative importance of factors contributing to a patient's propensity to be selected into the CTO cohort from the total group of hospitalized patients. The score is a predicted probability of membership derived from the Logistic model. The score's purpose was to enable adjustment for between group differences in comparisons with hospitalized patients not given the CTO experience. The propensity score was first created based on mental health system administrative data used in the first study. We first thought to replicate the findings of a normative function in the system associated with selecting people for a CTO so that this could be accounted for in evaluating the effects of the CTO experience. Having been able to replicate the score from the initial decade (3) we chose to add information obtained in additional data linkages to create a more comprehensive score used in the evaluation of the result obtained in this second decade of research, 2000-2010.

The variables that were chosen for inclusion in the Logistic model used to create our propensity score were those that had been most predictive of poor outcomes for people with severe mental illness during the last half century of research, the particular variables that had characterized CTO patients in the administrative data in Victoria in the decade previous to this research, evaluations of the patients' psychosocial situations that mimic the "need for treatment" criterion used to justify placement on a CTO, as well as indicators of potential bias resulting from cultural misunderstanding. These variables are proxies for factors discussed related to hospitalization history and risk in mental health team meetings and mental health board hearings associated with CTO placement decisions. The model included:

1. Indicators of inpatient hospitalization episode experience:

    a. The number of inpatient episodes a patient had experienced

    b. Whether the patient had experienced an inpatient episode longer than the 34-day average inpatient episode for the entire population.

    c. The interaction between having an inpatient episode of longer than the 34-day average and the number of episodes.

    d. The amount of time that elapsed from the first date known to the mental health system and the last face-to-face contact with the mental health system. (included in the original model but later deleted in constructing the final score due to being collinear with patient age)

2. Indicators of poor premorbid adjustment:

    a. Never having been married.

    b. Earlier age of entry into the mental health system.

    c. Less than an 11th grade education

3. Indicators of good premorbid adjustment, expected to be associated with earlier release to the community given greater likelihood of having a functional support system.

a. Current marriage

b. Current employment

4. Indicators related to the course of illness and potential involvements in dangerous behaviour.

a. Age (generally younger)

b. Gender (expected of males)

5. Diagnoses (i.e., schizophrenia, major affective disorder, dementia, and paranoia or other psychoses), as those with schizophrenia have consistently dominated the CTO group.

6. Socioeconomic Disadvantage: SEIFA neighbourhood rank of the poorest neighbourhood of residence.

7. Psychosocial profile: Twelve HoNOS scores assessed at admission to inpatient and again assessed at release. The individual HoNOS items were rated 0–4 (0 = no problem, 4 = an extremely problematic situation). Clinicians completing the assessment determine the degree to which patients evidenced problems with: aggression; non-accidental self-injury; drinking or drug-taking; cognition; physical illness or disability; hallucinations and delusions; depressed mood; other mental and behavioural disorder; relationships; activities of daily living; living conditions; and occupation and/or activities.

8. Indicators of potential bias resulting from cultural misunderstanding.

a. Aboriginal or Torres Strait Islander Status

b. Required an interpreter in their Mental Health Review Tribunal hearing.

c. Was not born in Australia (in original model and deleted because of collinearity with “Required Interpreter”)

d. Preferred to communicate in a language other than English (in original model and deleted because of collinearity with “Required Interpreter”)

The propensity score derived from this Logistic model was used for all models tested in subsequent analyses of the impact of CTO selection on the protection of health and safety. Since the analysis in this paper involved the use of the individual’s “average inpatient episode duration” as a criterion for testing the impact of the CTO experience as a less restrictive alternative to hospitalization, a second propensity score was created including all variables in the first with the exception of the indicators of inpatient hospitalization episode experience. The regressions reported in Table 4 were rerun with this second score to ensure that they remained significant and were not a function of over-control.

C. The Community Treatment Order Outcome Model: Theory and Specification

People with severe mental illness, throughout their lives may experience episodes of acute illness, and consequently during such episodes may find themselves in situations that imminently threaten their health and safety. Little is certain about the origins, timing, and frequency of such episodic occurrences during the life course of the individual. At the time such acute episodes do occur, however, individuals often are civilly committed to an inpatient psychiatric facility. Outpatient commitment, the community treatment order (CTO) in Australia, generally follows an inpatient civil commitment as a means of reducing the duration of that particular confinement period. Thus, the CTO accomplishes the objective of providing least restrictive care by reducing the duration of the inpatient confinement preceding its initiation. To help protect health and safety, the CTO functions in coordination with inpatient commitment by providing a legal framework for involuntary supervision via case managers during an exacerbated episode of illness. This compulsory supervision functions in two ways: it provides advocacy for needed treatment or service that is urgently required to protect health and safety, and it provides a means of removing a person from a context or social circumstance that has potentially dangerous consequences. CTOs achieve these objectives during their tenure. Often these achievements are not recorded as an affirmative act; rather, the benefit is in the reduction in the probability of involvement in a dangerous act or the avoidance of an early death. The CTO is not a vaccine that prevents recurrences of illness.

Patients who are civilly committed are involuntarily retained in hospital as long as they continue to meet the standard for retention, i.e. they are refusing treatment due to their mental illness and remain dangerous or in need of treatment to protect health and safety. The CTO, when assigned at release from a period of involuntary hospitalization is an analogue parole, a law that allows for early release from a hospital episode. Without the CTO the patient would be retained in the hospital for a longer period of time as he continues to meet the standard for commitment excepting the fact that in accepting assignment to a CTO he is pledged to cooperate with a treatment plan. In fact, when a patient fails to conform to the treatment plan he is brought back to hospital and due process is accorded to him in that the continuation of his hospitalization is validated by a determination that he meets the civil commitment standard for continuing his hospitalization.

In an ideal world, one might argue that if the CTO were carried out according to its intent and rules all days on a given CTO are days saved in the hospitalization that precedes the date of CTO assignment, the one that the CTO has shortened. We, however, do not have an ideal situation and other factors (bureaucratic, legal, social, etc.) may contribute to the duration of the CTO. Thus, we need to estimate the number of in hospital days saved against an approximation of what the index hospitalization duration would have been without CTO assignment. This study is designed to do this estimation.

Having described the CTO, what is the consequence of applying the prevalent thinking of pre/post design logic employed by other studies in this area. First we ask: What is the “pre”? It would be the period before the CTO assignment date or the period before the

hospitalization that the patient is released early from. In the case of the former any subsequent hospitalization without assignment to a CTO would in likelihood be too long and one would conclude that the CTO was a failure even though it had shortened the index hospitalization. If the ”pre” is the latter, then there are patients who would have had no previous hospitalization and any hospitalization without a CTO is likely to be longer than the CTO-associated-hospitalization and produce a conclusion again that the CTO was a failure even though it shortened the duration of the CTO-associated-hospitalization. Next, we ask: What would be the “post”? If the “post” is a return to hospital following revocation of the ongoing CTO treatment contract—a termination of the CTO--then the effort to get the patient the treatment the patient needs by returning him to hospital to prevent deterioration (the active ingredient of the CTO) is conflated with the outcome. In addition, the days saved in the early release are ignored. If the “post” is measured as the prevention of a hospitalization resulting from a new episode of illness and not immediately following the termination of a CTO because the patient no longer meets the criteria for remaining on a CTO, then the “post” is treating the CTO as something it is not. The CTO is not a medication or a vaccine, it has no carryover inoculation after its expiration and it has no active ingredient that prevents new episodes of illness. It provides enforced protective oversight and access while it is in force. The CTO does not follow the pre/post logic of an active treatment or vaccine.

Thus, the pre/post design often used in evaluating the effectiveness of CTOs is inappropriate because most of the effects of the CTO either precede its implementation date or occur during its implementation. Further, while preventing future episodes of hospitalization is the outcome criterion selected by several studies, it is not an objective stated in the law and the CTO itself does not accomplish this; rather, it is more likely that effective support services, perhaps facilitated by the CTO, may enable the success of the patient’s early release from hospital. Absent of support for such service, re-hospitalization facilitated by the CTO supervision removes the patient from a potentially dangerous circumstance, and thus may be the primary preventative action of the CTO.

The design of this study evaluates the cumulative consequences of the use of CTOs over a decade in reducing the probability of adverse threats to health and safety, increasing the probability of access to urgent medical care for physical illness, and doing so with reduced psychiatric inpatient episode duration.

The study evaluates the effect of community treatment order (CTO) exposure and each CTO on a selected objective specified in the outpatient commitment law—herein reduced use of psychiatric hospitalization.

The unit of analysis is the individual. During the decade of study patients in both hospitalized cohorts experienced multiple episodes of inpatient care. Those in the community treatment order (CTO) cohort experienced inpatient episodes: some were associated with placement on a CTO, and some not. Most CTOs are experienced in association with early release from an inpatient episode. Thus, as previously noted, the saving in hospital days is likely to be associated with the inpatient episode that precedes the CTO placement date.

Criterion variable:

In testing the utility of the least restrictive alternative requirement of the CTO legislation, i.e. the component that seeks to minimize the use of the psychiatric hospital, the criterion variable selected is the individual's "mean average inpatient episode duration," measured in days. Since the primary objective of the CTO is to allow for early release while protecting against possible untoward health and safety outcomes, the primary effect of the CTO is on hospitalization duration in the episode that precedes the CTO. The use of a CTO may also have an influence on the behaviour of the patient and the thinking of a clinician who has the option of making use of the CTO process in a treatment delivery plan throughout the decade. Therefore, we are interested not only in the effect of the CTO on the inpatient episode it is associated with, but on *all* hospitalization episodes. The average inpatient episode was chosen as a criterion because it enabled the estimation of the CTO effect averaged across all hospitalization episodes in the decade as well as the effect of an individual CTO on average episode duration.

The oft-selected criterion of return to the hospital was not chosen because it is not clear whether this outcome is a positive or a negative one. Given that the role of the CTO is to prevent untoward effects on health and safety, return to the hospital resulting from enhanced supervision provided in association with placement on an order may be a clear positive outcome, not a failure of the CTO. It could also be a failure of the CTO to get the person to the needed treatment that they are refusing. If we assume both are accurate portrayals of the CTO outcomes, then positive and negative should cancel each other out leaving no effect. Further, if the model is miss-specified—that is, some alternative obstacle prevents return to the hospital, such as being taken into police custody and or sent to prison (a factor commonly unaccounted for in most mental health outcome studies using this criterion)—then there is a false positive in the failure to return to the hospital.

The model addresses the following hypotheses:

1. The experience of a CTO within the decade will be associated with reduced average inpatient episode duration, because each CTO will impact the inpatient episode duration of the episode preceding it and thus reduce the average episode duration of all episodes in the decade.

2. Each CTO episode will be associated with a greater reduction in the average inpatient episode duration, because the impact of the exposure to a CTO is spread over all inpatient episodes while that of a single CTO episode will be on a single associated inpatient episode.

3. Average number of community treatment days per outpatient episode will be associated with reduced average inpatient episode duration, because clinicians are likely to let people go earlier if the supervision is available in the community.

4. The combination of CTO status and community treatment days per outpatient episode of care will be associated with reduced average inpatient episode duration.

Independent variables:

In each case the partial slope associated with the selected independent variable will be the estimate of the extent of reduction in average inpatient episode duration associated with CTO status, community treatment days, or a combination of the two factors.

Effect measures as independent variables:

- Membership in the CTO cohort (CTO cohort member=1; non-CTO cohort indicator=0)
  OR

- Number of CTO episodes a patient experienced, enabling the assessment of the effect attributable to each episode.

  AND

- The intensity of service contacts, i.e. the average number of service days per community care episode the patient experienced.
- The interaction between being a member of the CTO cohort and the number of days of community service per community care episode

The model was run twice, once with the CTO cohort membership indicator as the primary independent variable and once with the number of CTOs as the primary independent variable. All other factors were the same in each regression.

Confounding influences as independent variables: Since Tables 1 and 2 in the paper indicate that considerable differences remain between groups on several characteristics after matching procedures described in Section A above, the following indicators of potentially confounding variables are all included in the outcome models as a means of ensuring that all such influences have explanatory priority in the interpretation of the effect of the CTO.

a. The propensity score describing the propensity of a patient to be selected by staff for a CTO (c.f. Sections B above).

b. Adjustments for any remaining demographic and diagnostic between-group differences.

- Gender: male=1; female=0
- Age at the middle of the study.
- Schizophrenic disorder diagnosis across career (dummy variable)
- Major affective disorder diagnosis across career (dummy variable)
- Dementia diagnosis across career (dummy variable)
- Paranoid or psychotic disorder diagnosis across career (dummy variable)

c. Adjustments for potential stereotype and communication effects

- Non-English speaker
- Aboriginal and/or Torres Strait Islander status
- Imprisonment or held in custody during the study period

d. Adjustments for risk-period associated with the study and institutional involvements:

- Age at mental health system entry: A chronicity indicator
- Mean mental health episode start year: A control for the deinstitutionalization/trend effect (given the trending down in hospital episode duration and potential service availability across the years.)
- Summed duration of all inpatient episodes: A chronicity indicator control
- Total time in the mental health system: Overall exposure time.

e. Adjustment for socio-economic status contributions beyond between-group differences

- Less than 11th grade education,
- Unemployed (dummy variable),
- Lowest Victorian Socio-Economic Index Area (SEIFA) ranking (not raw score) at mental health episode beginning: An indicator of social disadvantage reflecting research indicating that neighbourhood has an impact in the potential for an individual to be involved with higher risk behaviours that could be a threat to safety and areas where health needs would be less likely to be addressed. The model included the SEIFA ranking describing the social disadvantage of the most disadvantaged neighbourhood in which the patient lived. If a patient lived in more than one area the score indicating the greatest disadvantage was selected.

In summary, the study uses a three stage process to control for potential selection bias/confounding influences in its outcome models. First it employs a sampling process that matches on age, sex and diagnosis. Second it uses a propensity score generated via logistic regression based on forty-four factors that is included in the outcome regressions herein described. Third, it statistically adjusts for potential confounders within the outcome regressions.

Analytic Model issues:

The outcome model is evaluated using both OLS and Poisson regression. Both are used in that the OLS regression enables interpretation in days saved/lost in an episode of psychiatric hospitalization while the Poisson regression approach is limited to assessing the impact of the CTO in terms of percent increase or decrease in use. Finding agreement in using both procedures was also an objective in assuring the validity of the results.

Collinearity: The objective was to adjust for between-group differences likely to distinguish between those hospitalized patients selected for a CTO vs. those who were not, differences that might not have been adjusted for with the sample matching procedures or with the propensity to selection score. This needed to be done without creating issues of collinearity that would affect the outcome estimates that derive from the effect measure variable associations with average inpatient episode duration. Collinearities were observed related to diagnoses, and age at mental health system entry. The models were then rerun without these

theoretically included adjustments. The reduced models were significant ($p<.001$) and collinearities were eliminated—i.e. no tolerance statistic was lower than .55, no variance inflation factor (VIF) higher than 1.8, excepting the community treatment days and the interaction of community treatment days with being on a CTO, these had a tolerance of .35 and a VIF of 3.6. Most importantly, the models including the collinear variables had little effect on the resulting estimates of savings of inpatient days per inpatient episode across the decade. The models with the collinearities had yielded reduced estimates of 4.3 days compared to 4.7 days saved due to cohort membership in the model without collinearity, and the effect due to each CTO episode was 10.3 days in the models with the collinearity and 10.7 days without.

REFERENCES

1. Rigby D Mental Health Tribunal: Annual Report, 2009-2010. Melbourne, AU: Mental Health Tribunal. 30 September 2010. Downloaded 13/04/2017. https://stors.tas.gov.au/store/exlibris1/storage/STORS/2012/06/14/file_10/au-7-0023-00291_1.pdf

2. King G Nielsenz R (2016). Why Propensity Scores Should Not Be Used for Matching. www. gking.harvard.edu/files/gking/files/psnot.pdf Downloaded December 21, 2016.

3. Segal SP, Burgess PM. Conditional release: A less restrictive alternative to hospitalization? Psychiatric services. 2006;57(11):1600-6.