A Methodology for Predicting the Effects of Changes in Civil Commitment Decision Making

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We review a three-step civil commitment model and formulas for calculating the probability of release from commitment and the relative importance of the three steps in determining the outcome. New formulas are developed which enable predictions to be made about the effects of changes on the outcome of the three steps on the release probability. With the use of data from Oregon's civil commitment process, we present an example of the application of the methodology and conclude with a discussion of its major administrative and research implications.

In previous articles we have described significant local variations in the effects of new civil commitment statutes[1] and how key decisions in the commitment process are made in both urban[2] and rural[3] areas. We have recommended that commitment procedures be divided into specific steps in order to identify the decisions made at each point, who makes these decisions, and the factors that determine the outcome of the process. We have also described the primary role played in civil commitment by community mental health program (CMHP)

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staff who screen people to determine whether or not they should formally enter the commitment process.[4] This research is part of a larger body of information concerning the roles played in civil commitment by important decision makers and the multiple factors that influence the individual steps in the process.[5-20] As a result of the marked variability in commitment procedures in different states,[21-24] it is very difficult to place this body of research in a proper perspective without some means of comparing the results across jurisdictions or examining the relative importance of the steps in the civil commitment process. If these issues could be clarified, then the real influence of various decision makers would become more apparent as would possible ways to affect their decisions and therefore the commitment process itself.

We have recently developed such a methodology for comparing civil commitment across jurisdictions and quantifying the relative importance of the steps in the process (L.R. Faulkner et al., manuscript submitted for publication). The basis of our methodology is a three-step civil commitment model that outlines the important decisions that must be made during the commitment process and serves as a framework to make meaningful comparisons despite specific procedural inconsistencies. Based on this model, we have developed formulas that use data from the three steps to calculate the probability of release from the commitment process (and therefore also the probability of commitment) and the relative importance of the three steps in determining the outcome. We have shown how our methodology can be used to summarize the status of civil commitment for an entire population; monitor a commitment process over time; study only the formal, legalistic steps in civil commitment; compare civil commitment processes in different populations; and examine the effects of changes in a mental health system on commitment processes (L.R. Faulkner et al., manuscript submitted for publication).

One of the main reasons to study civil commitment in this manner is to learn ways in which specific commitment procedures might be modified to affect the ultimate outcome in any jurisdiction. There may be significant public policy and fiscal ramifications of such changes, however, and it would be very useful to be able to predict in advance the effects

of any proposed changes in commitment procedures. The purpose of this report is to expand our civil commitment methodology by developing a method to predict the effects of changes in the outcome of individual commitment steps on the entire process. We begin with a review of our three-step commitment model and our formulas for calculating the release probability and the relative importance of the three steps in determining the outcome. We then develop new formulas which enable predictions to be made about the effects of changes in the outcome of the three steps on the release probability, present a practical example of the application of our methodology, and conclude with a discussion of its administrative and research implications.

A Three-step Civil Commitment Model

In Figure 1 we present our three-step model for civil commitment that outlines the important decisions that must be made during the commitment process. This level of analysis is applicable to most states and provides a rational means for comparing commitment processes. Figure 1 also lists potential important decision makers at each step which will vary with different commitment statutes and procedures. Our model includes not only the formal, legalistic processes in civil commitment (Steps 2 and 3), but also the more informal interface with the mental health and criminal justice systems (Step 1).

In Step 1 (Screening) the decision is
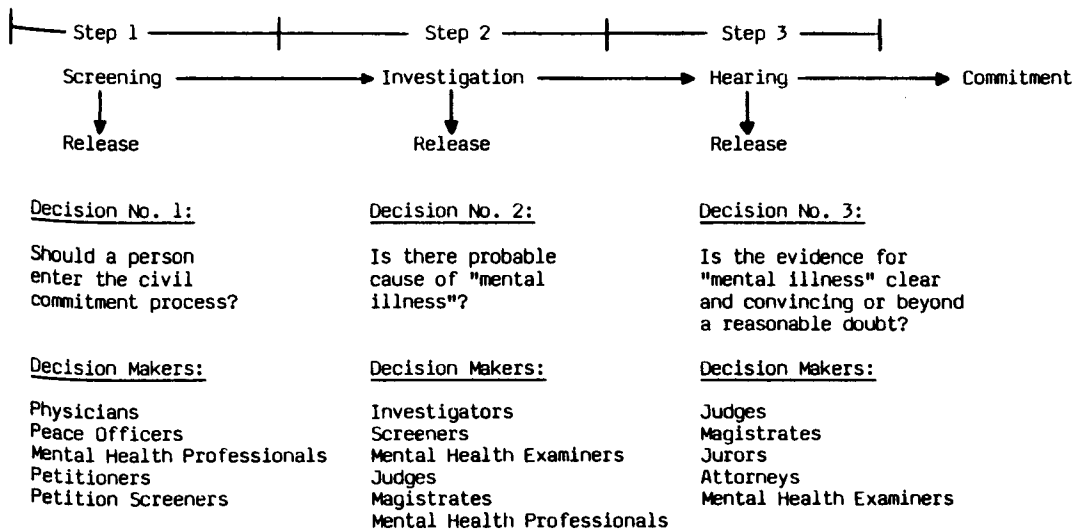
Civil Commitment Decision Making

Figure 1. A three-step civil commitment model.

whether a person should formally enter the civil commitment process. This decision can be made by a wide variety of individuals including peace officers (POs) who decide to take a person in custody to jail or to a hospital or clinic for an evaluation of his/her mental status; physicians (MDs), mental health professionals, or other designated officials who determine that a person should be hospitalized against his/her will or prevent a hospitalized patient from leaving; public and private mental health professionals who initiate commitment procedures for their patients; and individuals we call petition screeners who interact with citizens requesting to file a petition to have someone committed. Once the decision is made to enter a person into the commitment process, states have adopted a variety of procedures for taking legal custody of the person. There is also wide variation in the location and maximum time limit

for detention prior to a commitment hearing.

In Step 2 (Investigation) the decision concerns the certainty with which it can be shown that the person who has entered the commitment process is "mentally ill" as defined by state law and therefore fulfills acceptable criteria for detention until a formal commitment hearing can be held. The usual definition of "mental illness" requires that the person have a mental disorder *and* be either a danger to self or others or gravely disabled. "Probable cause" is the most common burden or proof at this stage. Procedures adopted by states to determine whether there is probable cause that the person is mentally ill frequently involve some type of an investigation of the facts of the case, the legal documents that have been filed, and perhaps an examination of the person as well. These duties may be carried out by one or more designated individuals, often mental

health professionals, who are commonly called investigators, screeners, and/or examiners. The information they collect is usually presented to a judge or magistrate who formally decides whether there is probable cause of mental illness. If so, a commitment hearing is scheduled within the time period allowed by state law. Since the decision here depends heavily upon the data collected by investigators, screeners, and/or examiners, they are key decision makers at this step. In addition, most states permit mental health professionals to divert a person to voluntary status prior to a commitment hearing or to discharge a person from detention if they believe involuntary treatment is unnecessary.

In Step 3 (Hearing) the decision is once again whether the person is mentally ill. At this step, however, the required burden of proof is more stringent, usually "clear and convincing" but occasionally "beyond a reasonable doubt." The conduct of hearings and the type of evidence presented varies from state to state but almost always includes the expert opinions of designated mental health examiners. The decision as to whether the burden of proof has been met is made by a judge, magistrate, or rarely a jury. Since the actions of prosecuting and defense attorneys greatly influence the hearing process, they also are considered to be important decision makers at this step.

As an example of how this model actually works, we will briefly describe Oregon's civil commitment process.[25] In Oregon, a person may enter the commitment process in three ways (Step 1). Any two people may file a petition with a CMHP director or emergency hospitalization and treatment is possible under either a PO or MD "hold." CMHP staff screen most requests by citizens to have someone committed and greatly influence whether a petition will be filed or the person will be diverted from the commitment process. In some counties they also screen potential PO or MD holds and may influence those procedures as well. After a citizen petition or an emergency hold has occurred, an investigation (Step 2) is conducted by a local mental health professional who makes recommendations to the circuit judge concerning whether probable cause of mental illness exists. (The Oregon statute defines a mentally ill person as "a person who, because of a mental disorder, is either (a) dangerous to himself or others; or, (b) unable to provide for his basic personal needs and is not receiving such care as is necessary for his health or safety."[26]) Though technically decided by the judge, in practice, judges almost always follow the recommendations of the mental health investigator. If the judge believes probable cause is present, a commitment hearing (Step 3) is held to determine whether clear and convincing evidence of mental illness exists. Two court-appointed examiners (at least one must be a physician) conduct an in-court interview of the allegedly mentally ill person during the actual commitment hearing. Based on the results of this interview, examiners submit their opinions to the judge as to whether

the person is mentally ill. Although the opinions of the court examiners are important, as are the actions of attorneys during the hearing, the decision as to whether the required burden of proof has been met rests with the judge.

A Dynamic Analysis of Civil Commitment Processes

We have previously described how it is possible to use our three-step commitment model as a basis to estimate the probability of being released (or committed) from the commitment process and to calculate the relative importance of the three steps in determining the outcome (L.R. Faulkner et al., manuscript submitted for publication). We have shown that the probability of release is determined by the rates at which people are released from the three separate steps. These three release rates are defined by the following formulas:

ds = Screening Release Rate
$$= \frac{\text{No. of People Released at Screenings}}{\text{No. of Screenings}},$$
di = Investigation Release Rate
$$= \frac{\text{No. of People Released at Investigations}}{\text{No. of Investigations}},$$
and
dh = Hearing Release Rate
$$= \frac{\text{No. of People Released at Hearings}}{\text{No. of Hearings}}.$$

While the probability of release at a screening is ds, the probability of release at an investigation is $(1 - ds)(di)$, and the probability of release at a hearing is $(1 - ds)(1 - di)(dh)$. Therefore, the overall probability of release from the civil commitment process is:

$$p = ds + (1 - ds)(di) + (1 - ds)(1 - di)(dh)$$
$$= \frac{\text{No. of Screening} - \text{No. of Commitments}}{\text{No. of Screenings}}.$$

By using an approach analogous to the definition of "attributable risk" in epidemiology,[27,28] we have also been able to estimate the influence of the individual steps in the civil commitment process by calculating the fraction of releases attributable to each step. These "release fractions" are:

fs = Fraction Released at Screening
$$= ds/p$$
$$= \frac{\text{No. Released at Screenings}}{\text{Total No. Released}},$$
fi = Fraction Released at Investigation
$$= (1 - ds)(di)/p$$
$$= \frac{\text{No. Released at Investigations}}{\text{Total No. Released}},$$
and
fh = Fraction Released at Hearing
$$= (1 - ds)(1 - di)(dh)/p$$
$$= \frac{\text{No. Released at Hearings}}{\text{Total No. Released}}.$$

These formulas for release fractions tell us the relative influence of the commitment steps in the present system as it exists now. In other words, they might be called "static" measurements. By using a method known to economists as "marginal analysis,"[29] we would now like to go a step further and devise a "dynamic" approach to examining the civil commitment process. This technique will reveal the effects of changes in the three steps on the release probability. For example, suppose the release rate at commitment hearings (dh) was cut in half. How would this affect the release probability? The effects of changes in the release rates at each step

can be determined by using the mathematical method of calculating "partial derivatives" of the release probability.[30] A partial derivative measures the change in a function (e.g., the release probability) expected when one of that function's arguments (e.g., one release rate) is altered while the other arguments (e.g., the other two release rates) are held constant. These partial derivatives can be summarized as follows:

$$\partial p/\partial ds = (1 - di)(1 - dh),$$
$$\partial p/\partial di = (1 - ds)(1 - dh),$$
and
$$\partial p/\partial dh = (1 - ds)(1 - di).$$

All three partial derivatives depend on factors of the form $(1 - d)$, where d is a release rate. Actually, these factors are the rates of referral from one commitment step to another. If we call these factors R, then in our model we have:

Rs = Referral Rate from Screenings = $1 - ds$,
Ri = Referral Rate from Investigations = $1 - di$,
and
Rh = Referral Rate from Hearings = $1 - dh$.

Naturally, Rh is also the judges commitment rate.

Substituting for $1 - d$ in the formulas for the partial derivatives yields:

$$\partial p/\partial ds = RiRh,$$
$$\partial p/\partial di = RsRh,$$
and
$$\partial p/\partial dh = RsRi.$$

In other words, the effect on release probability of making a change in the release rate at any step in civil commitment is related to the product of the referral rates at the other two steps. It also follows that any change in the release rate of the step with the lowest referral rate (i.e., the highest release rate) will have the greatest influence on the release probability.

The partial derivatives we have just examined give us information about the effects of incremental, linear changes in commitment step release rates. It could be argued that a more appropriate measure is the effect of proportional changes in the release rates. This approach is analogous to examining the data on a logarithmic (rather than a linear) scale and is similar to computing the "elasticity" in economics.[31] With the use of this technique, the partial derivatives for release probability become:

$$\partial p/\partial ds/ds = dsRiRh,$$
$$\partial p/\partial di/di = diRsRh,$$
and
$$\partial p/\partial dh/dh = dhRsRi$$

While the formulas in this section may at first appear rather imposing, they can be readily solved from data collected on each step in the commitment model. As will be shown in the example below, they can be of considerable value in analyses of commitment processes.

Method of Study

Oregon's CMHPs are organized along county lines. Since 1977, each CMHP has been required to compile certain civil commitment statistics and submit quarterly reports to the State Mental Health Division. The forms used for reporting are uniform from county to county and include detailed definitions of all information requested. The data reported here were obtained from these forms for the fiscal years (July 1 to June 30) 1977–1978 (FY77) to 1980–1981

(FY80). From these data it is possible to calculate the number of screenings by CMHP staff, investigations, hearings, and commitments that took place in each step in our commitment model. It then also becomes possible to solve the above formulas for release probability, release fractions, referral rates, and partial derivatives.

In general, the data on the steps in Oregon's commitment process are very reliable. The exception, however, is in the total number of screenings (Step 1). Data is only available on the number of screenings performed by CMHP staff. Recall that people may enter Oregon's commitment process by way of a citizen petition, MD hold, or PO hold. CMHP staff screen most potential citizen petitions. In some counties they also screen potential MD or PO holds, while in others they may not. Therefore, values reported by CMHPs for the number of screenings and the number of people released as a result of screenings may be smaller than the true numbers. To illustrate our methodology in the following example, we use the numbers reported by CMHPs. This results in conservative estimates for the release probability and for the relative influence of the screening step in the overall commitment process.

Results

To illustrate the practical applicability of our methodology, we will present an example using data from Oregon's civil commitment process. In the state of Oregon during FY77–FY80, there were 27,601 screenings, 14,273 investigations, 7,248 hearings, and 4,514 commit-

ments. Substituting these values in our formulas for release probability, release fractions, and referral rates yields: $ds = .48$, $di = .49$, $dh = .38$, p = .84, $fs = .58$, $fi = .30$, $fh = .12$, $Rs = .52$, $Ri = .51$, and $Rh = .62$. Therefore, during the time period of this example, 84% of the people who were screened by CMHP staff for possible entrance into the commitment process were ultimately released (not committed). The screening step accounted for 58% of the releases, the investigation step for 30%, and the hearing step for only 12%. In other words, most of the decision making occurred very early in Oregon's commitment process.

We can predict the effects of changes in the release rates of the individual commitment steps on the overall release probability by substituting the data from FY77–FY80 in the formulas for the partial derivatives for the release probability. This produces: $\partial p/\partial ds = .32$, $\partial p/\partial di = .32$, and $\partial p/\partial dh = .27$. These partial derivatives are significantly different by the minimum chi-square test[32] ($\chi^2 = 279.72$, $df = 2$, p < .001). Since $\partial p/\partial ds$ and $\partial p/\partial di$ are identical, the difference is due to $\partial p/\partial dh$ being lower than the other two partial derivatives. Hence, during this time period, a change in the release rate at the screening or investigation step would have had a greater effect on the release probability than an identical change in the release rate at the hearing step. In other words, if one had wished to cause a change in the release probability, it would have made sense to direct those efforts at the screening or investigation steps. For example, sup-

pose ds increased by .10 units from .48 to .58 while di and dh remained constant. Then p would be .867. Now suppose that dh increased by the same amount (.10) to .48 while ds and di stayed at their baseline levels. Then p would be .862. The difference between p of .867 and .862 may seem trivial at first glance. However, since we are dealing with 27,601 screenings during this time period, the difference actually represents an additional 138 commitments. In Oregon, the average length of hospital stay for committed patients is about 80 days at a cost of at least $120 per day.[33] Therefore, the difference of 138 commitments translates into about $1.3 million over the 4-year period of the example.

By using our formulas to predict the effects of proportional (rather than equal) changes in the release rates of the commitment steps results in the following partial derivatives for release probability: $\partial p/\partial ds/ds = .15$, $\partial p/\partial di/di = .16$, and $\partial p/\partial dh/dh = .10$. These partial derivatives are also significantly different by the minimum chi-square test[32] ($\chi^2 = 279.72$, $df = 2$, $p < .001$). Therefore, even if changes of equal proportion would have been made in the commitment step release rates, changes at the screening and investigation steps still would have had more effect on release probability than changes at the hearing step. For example, suppose ds increased by 20% to .58 while di and dh stayed at baseline. Then p would be .867. Now consider increasing dh by 20% to .46 while leaving ds and di at baseline. Then p would be .856. Again, due to the large

numbers of screenings, these differences in p now result in an extra 304 commitments which would cost about $2.9 million over the 4-year period of the example.

Discussion

We believe there are several important administrative and research implications of our methodology. First, the practical applicability of our expanded methodology underscores the importance for mental health administrators to collect meaningful data pertaining to their mental health systems. Without it appropriate administrative decisions and empirical studies are not possible. We have found that the collection of data pertinent to the important decisions in our three-step model is feasible and that it can be used very effectively to monitor and study civil commitment processes.

Second, our methodology can become an important tool for mental health administrators in the current era of fiscal restraint and concern about inappropriate hospitalization and/or release of the mentally ill. Being able to determine objectively the relative impact of changes in various civil commitment steps enables administrators to direct their limited resources toward modifying procedures at the most influential step in an attempt to change the number of commitments. We have previously documented that civil commitment processes are indeed responsive to changes in local mental health system procedures.[4] As we have discussed elsewhere (L.R. Faulkner et al., manuscript

submitted for publication), it is important to emphasize that the decision to intervene in commitment processes for the purpose of changing the outcome (either increasing or decreasing the number of people committed) is inherently a political decision usually based upon social, ethical, or economic factors. No one actually knows what the "correct" number of commitments is in any jurisdiction. If administrators do choose to intervene in civil commitment processes, our methodology will enable them to estimate beforehand the effects of altering decision making at each step. As shown in our example, intervening at different steps can also have significant financial implications.

Third, the development of our methodology points to several aspects of civil commitment that require further research. A closer analysis is needed of the factors that influence decision makers at the early steps in the commitment process since they appear to be so influential in determining the ultimate outcome. We also need a methodology to compare different jurisdictions with respect to the time people are detained in the commitment process both before and after their formal commitment hearing. If really meaningful comparisons of civil commitment processes across jurisdictions are to be made, we must develop methods to eliminate the biases that result from studying service delivery systems that are vastly different and that deal with different types of people. Finally, we need to be able to characterize the ability of mental health service systems to manage potentially committable peo-

ple and we need to be able to estimate objectively the number of these individuals in a given jurisdiction. Empirical studies that focus on resolving these problems will significantly advance our understanding of civil commitment processes and outcomes.

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