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Determining reasonableness: identification of the non-restorable person adjudicated incompetent to stand trial

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ABSTRACT

Federal and state courts require forensic examiners to offer opinions concerning the likelihood of restorability of defendants. There is limited empirical guidance for determining restorability of defendants, and legislators have little data to support their decision-making regarding statutory changes to limit the period of attempted restoration for defendants. This study examined whether commonly available demographic and clinical information predicts non-restorability in hospitalized felony criminal defendants who are refractory to early interventions at restoration. Archival data from a quality assurance State Hospital, database such as demographic and clinical variables for 271 cases were analyzed using a logistic regression analysis. Lower likelihood of restoration was significantly associated with the presence of a developmental disorder, traumatic brain injury/neurological disorder, cognitive disorder, older age, and length of restoration effort. Among defendants who can attain competency to stand trial, 96% do so by the 60th treatment month. Findings indicate that restoration efforts are largely unsuccessful afterward, which suggests that readily available clinical and demographic variables can be used to reasonably predict restoration. These findings add empirical support and guidance to determining non-restorability among defendants.

Introduction

In the United States, it is estimated that nearly 60,000 people are referred annually for evaluation of competency to stand trial (Poythress, Bonnie, Monahan, Otto, & Hoge, 2002). In approximately 30% of cases referred for trial competency assessment, defendants are found incompetent to stand trial (IST) (Pirelli, Gottdiener, & Zapf, 2011) annually. In 1960, the United States Supreme Court set forth minimal criteria for determining whether a defendant is competent to stand trial through

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a ruling in Dusky v. United States (1960). These criteria, or a variant of, are used on the federal level, and in all jurisdictions across the United States. According to *Dusky*, for a person to be adjudicated IST, there must be a deficit in one or more of the following areas: the ability to consult with an attorney with a reasonable degree of rational certainty, a factual understanding of the proceedings against them, and/or a rational understanding of the proceedings against them (Dusky v. United States, 1960). Research indicates most individuals become competent to stand trial (CST) within 6 months to 1 year of treatment (Advokat, Guidry, Burnett, Manguno-Mire, & Thompson, 2012; Colwell & Gianesini, 2011; Morris & DeYoung, 2012; Morris & Parker, 2009). Among those that do not initially become CST, a few will become competent after years of treatment while others despite assertive treatment are unable to be restored to competence (Morris & DeYoung, 2014).

This subset of individuals creates unique challenges for both the criminal justice and mental health systems. For example, while an individual remains IST he or she cannot be adjudicated on the issue of guilt or innocence. In the landmark case *Jackson v*. Indiana (1972), the US Supreme Court clarified that individuals who are IST may not be committed indefinitely to hospitals for the sole purpose of competency restoration. This decision imposed a 'rule of reasonableness' (p. 733) which mandated that without a finding of dangerousness an individual cannot be held for more than the time necessary to determine whether the person has a 'substantial chance' (p. 733) to attain competency within the foreseeable future. However, *Jackson* did not establish what timeframe is needed to determine if an individual is able to attain competency. State jurisdictions have managed *Jackson* using one of three models. First, they apply simple term limits for competency restoration efforts thereby dismissing charges or judicially modifying persons to civil commitments after the time limit has expired. Secondly, the state may elect to pursue a mandatory and specific judicial review to determine appropriateness of continued commitment. The third option available is some combination of the first two. Out of the 50 states and the District of Columbia, 21 states report no effective time limits for competency restoration treatment, 18 states restrict hospitalization to 1 year or less, seven states limit treatment between 1 and 5 years, two states have civil commitments, and three states limit competency restoration treatment to the maximum sentence of the alleged offense (Miller, 2003). Further, Miller (2003) describes the impact of the deinstitutionalization movement of the 1960s and the unintended consequence of a reciprocal increase in trial competency inpatient commitments since then. In practice, it is now difficult to meet standards for civil commitment for those that do not restore to trial competence from an inpatient setting. In Texas, where the current study was conducted, the civil commitment criteria include a finding of dangerousness to self or others or a likelihood to deteriorate and become dangerous in the foreseeable future. Since non-restorable defendants are relatively stable but actively symptomatic, converting these individuals from forensic commitments to civil commitments can be difficult. Conversely, Levitt and

colleagues (2010) found that non-restorable defendants in Arizona were civilly committed at a higher rate than patients from the community despite meeting fewer commitment criteria. There does not appear to be sufficient clinical guidance and case law guiding practices for conversion of non-restorable defendants to civil commitments across jurisdictions.

The US Supreme Court Ruling in *Jackson* was important because it highlighted the dangers of depriving individuals of their Fourteenth Amendment rights to due process and equal protection requiring a reasonable period of restoration effort. Those hospitalized for competency restoration are pre-trial defendants who have not yet had culpability tried in a court of law. The issue of equal protection is highlighted in the idea that committing an individual for inpatient competency restoration services follows a different standard for mental health commitment than required for others not charged with an offense. Additionally, the standard of release is more stringent than for individuals without pending charges, especially when the individual does not have the ability to become CST (*Jackson v. Indiana*, 1972). As it stands, there is limited empirical research and case law guidance as to what is a 'reasonable' period of restoration.

Texas, where the current study was conducted, is one of the three states that limit competency restoration treatment to the maximum sentence allowable if the individual had been convicted of the alleged offense (Texas Code of Criminal Procedure, Art. 46.B.003). This means that defendants can be IST in state hospital facilities for varying lengths of time. Some individuals may be held for up to 10 years if accused of a third degree felony, while others could be held up to 99 years if accused of the more serious first degree felony and are unable to attain competency. Lengthy hospital stays result in increased wait times to be committed to a state hospital from county jails. According to the Hogg Foundation for Mental Health (2016), 414 people in Texas were awaiting hospitalization for competency restoration services in February 2016. Estimates from the fiscal year 2012 indicate an average cost per day for inpatient state psychiatric hospitalization as $421 with an average length of stay of 120 days. Assuming a typical length of stay of 120 days, the resultant total cost on average per individual served is $50,520 with a 75% restoration rate (Hogg Foundation for Mental Health, 2016). Despite the high costs associated with hospitalization, and the extensive waiting lists, there is limited empirical guidance to support which individuals are likely to be classified as not being able to attain competency to stand trial due to their deficits.

Factors associated with restorablity and nonrestorability

Identification of persons lacking capacity to attain competence aids evaluators, courts, and legislators in determining match for restoration services as well as plans for disposition. Studies have focused on cognitive, criminological and clinical diagnostic factors, disorder severity, psychological test results, and

demographic variables (Colwell & Gianesini, 2011; Hubbard, Zapf, & Ronan, 2003; Morris & DeYoung, 2012; Nicholson & McNully, 1992; Pirelli et al., 2011; Reich & Wells, 1985; Ross, Padula, Nitch, & Kinney, 2015). Factors listed as being related to positive predictions of restorability include a lack of prior mental health history, presence of a prior criminal history, or having charges associated with a violent crime (Hubbard et al., 2003).In a survey of expert evaluator opinions, Wolber (2008) found that persons who lack capacity to attain competence commonly had significant cognitive impairment (i.e. developmentally disabled, brain injured, or diagnosed with dementia) or refractory psychosis. Similarly, other studies have shown an association between non-restorability and cognitive impairment, length of stay, demographic factors, and diagnosis (Morris & DeYoung, 2014; Pirelli et al., 2011). While 75% of persons become competent within about 6 months, those that are unable to attain competence, representing only 25% of the population of interest, are a disproportionate burden on the system due to their lengthy hospitalizations (Zapf & Roesch, 2011).

A study by Morris and DeYoung (2014), focused on refractory, long-term competency restoration defendants, defined as a defendant who failed to become competent within a period of 6 months. The authors assessed the impact of demographic and diagnostic variables on CST within the refractory population. This information was used to determine whether it could predict an individual's likelihood of attaining competency and successfully being adjudicated on the issue of guilt or innocence. Morris and DeYoung (2014) found that for each year an individual's age increased, their chances for attaining competency decreased. Conversely, they found that as charge severity increased, the chances of an individual becoming CST also increased (Morris & DeYoung, 2014). Importantly, clinicians conducting CST evaluations rely upon readily attainable clinical information to aid in their decision-making regarding competence as it relates to Dusky v. United States (1960), especially since the information available to clinicians is often significantly limited.

The present study is focused on defendants who remain forensically committed and receive services for competency restoration after failing to restore to competence within a six-month period. The study hypothesis is that non-restorability among defendants with greater than 6 months of restoration services is predictable with commonly available clinical (diagnosis) and demographic variables (age at time of offense, length of restoration (LOR), gender, race, crime severity, and education).

Methods

Participants

Participants include 271 persons committed to attain trial competence during the study period as illustrated in Figure 1. A staff member, who is not part of
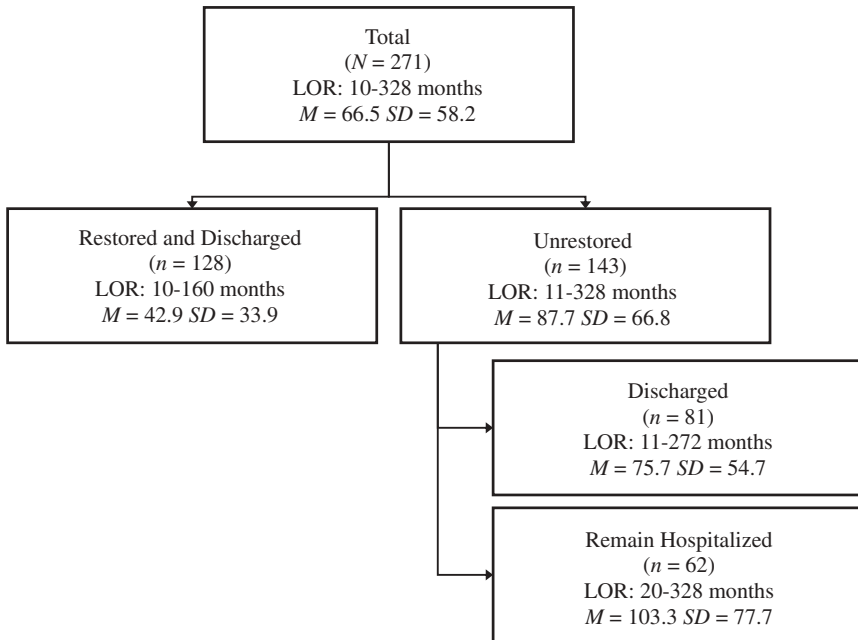
Figure 1. Number of participants and dispositions.

the current research study, de-identified the quality assurance database and extracted the data for analysis; providing for a confidential data set. Participants include all adults, both male and female, with a complete set of data. Relevant characteristics of the sample are described in Table 1. Kerrville State Hospital (KSH) does not admit adolescents and does not have a primary mission of treating persons with intellectual disability.

Procedures

This study was approved by the state of Texas Department of State Health Services Institutional Review Board. The Psychology Department maintains a quality assurance database utilized for the purposes of this study. Patients complete a standard intake psychological assessment consisting of an intelligence screening tool, a personality assessment, clinical interview, and record review to include prior forensic examinations among other clinical records. Data are input into the quality assurance database utilizing a current edition of SPSS. Participants for this study include persons committed to the facility from 1 September 2012 to 31 October 2016 for competency restoration. The study period corresponds to the implementation of the quality assurance database allowing extraction of relevant data for the purposes of this study.

Table 1. Participant characteristics.

Characteristic	Restored to trial competence (n = 128)		Not restored to trial competence (n = 143)		Test statistic	Effect size
	n	%	n	%		
Gender					x^2 = .003	Φ = .003
Male	108	84	121	85		
Female	20	16	22	15		
Ethnicity					x^2 = 4.54	Φ = .129
Black	45	35	42	29		
White	40	31	38	27		
Latino	42	33	63	44		
Asian	1	1	0	0		
Malingering	4	3	0	0		
Diagnosis (some participants had multiple diagnoses)						
Psychotic	106	83	117	82		
Personality	19	15	13	9		
Cognitive	13	10	49	34		
Developmental	10	8	24	17		
TBI	12	10	30	21		
Crime severity					x^2 = 2.99	Φ = .105
1st degree	30	23	33	23		
2nd degree	67	52	66	46		
3rd degree	31	24	42	29		
State jail	0	0	2	1		
	M (SD)	Range	M (SD)	Range		
Education	11 (2.4)	2–16	10 (3)	0–16	t (255) = −1.99*	d =.37
Age at admission	43.2 (12.5)	19–84	49.6 (13.8)	24 – 87	t (269) = 3.95*	d =.48

*p < .05

The quality assurance database provides defendant demographic information such as sex, race, admission date, alleged crime type, date of alleged offense, age, among other variables. Additionally, the database includes length of stay in the participant's current hospitalization, psychiatric and medical diagnoses, substance abuse history, and relevant medical histories such as closed head injuries or other neurological insults. All demographic and clinical information was acquired through electronic medical records or official court documents included in the hospital files. Licensed psychiatrists entered diagnoses for all defendants based on 1) thorough record review from prior hospitalizations/court records and an intake psychological evaluation with intellectual testing, Minnesota Multiphasic Personality Testing 2 Restructured Form (MMPI 2 RF) or Personality Assessment Inventory (PAI), psychosocial history and mental status examination. A licensed psychologist reviewed the electronic medical record and coded the data for the database.

Initial predictors were identified from the literature review and data availability and included 1) defendant age at the time of the alleged offense, 2) presence of a cognitive or dementia disorder, 3) presence of a traumatic brain injury/neurological disorder, 4) presence of a developmental disorder, 5) current defendant age, 6) length of restoration (elapsed time since arrest date), 7) gender, 8) race, 9) severity of felony offense (degree), 10) presence of

a mood disorder diagnosis, 11) presence of a psychotic disorder diagnosis, and 12) highest level of educational achievement. Preliminary data analysis indicated nonsignificant predictors that were not included in the final model. After consulting with a statistician, a final model was conceptualized and tested. Missing data were not included in the analysis. The final model used the remaining factors as described in the results section.

Setting

Participants for this study were selected from archival data maintained in a quality assurance database from Kerrville State Hospital (KSH) in central Texas. KSH is a forensic hospital with two missions, which are restoration of trial competency and treatment of persons acquitted not guilty by reason of insanity. The facility is staffed with six licensed forensic psychologists, and two forensic psychiatrists who conduct evaluations for the court.

Defendants committed to KSH are alleged to have committed a violent felony offense, and therefore, there are no misdemeanor crime types represented in the current research study. Patients committed to KSH have been refractory to initial restoration attempts at one of the state's maximum-security facilities. Commitments to this facility occur after initial restoration attempts have failed, and this generally consists of at least a three-month hospitalization at a maximum-security facility, and more commonly 6 months of initial attempts at restoration. After failure of initial restoration attempts, defendants must successfully pass review by a formal Dangerousness Review Board appointed by the commissioner, and empowered by Texas Administrative Code, to determine appropriateness of commitment of a defendant to Kerrville State Hospital, an intermediate security facility.

Variable coding

The dependent variable was coded as follows: competent = 0, incompetent = 1. The predictor variables were (a) neurocognitive or neurologic disorders (ND): 0 = No; 1 = Yes (this is a cluster of disorders and includes traumatic brain injury, head injury unspecified, epilepsy, cerebrovascular incident, concussion); (b) Developmental Disorders: 0 = No; 1 = Yes (this is a cluster of disorders derived from DSM-IV-TR developmental disorders, e.g., intellectual disabilities, borderline intellectual functioning (recorded as a v-code), communication disorders, autism, attention-deficit/hyperactivity disorder, specific learning disorder motor disorder (tic)); (c) Cognitive Disorder: 0 = No; 1 = Yes (this is a cluster derived from DSM-IV-TR cognitive disorders, e.g., delirium, dementia, amnestic disorder). Further details regarding particular diagnoses that were included in each predictor variable category can be found in the Appendix. In addition to clinical variables, two demographic variables were also included: (a) Length of Restoration: continuous variable coded as the

number of months between the date of arrest (best estimate of when psychotropic medications may have been initiated) and the date of discharge (for those that restored to competence) or 19 April 2017 (for those who were not discharged at that time), (b) Age: continuous variable calculated as age in years at the time the alleged offense occurred.

Statistical analyses

The logistic regression equation is expressed as: $P(Y) = 1/(1 + e^{(-b_0 + b_1 x_1 + \cdots b_n x_n)})$. The logistic regression equation expresses the predictor variables in logarithmic terms and overcomes the problem of violating the assumptions in ordinary least squares regression. The dependent variable is the probability of Y occurring, so the resulting value from the logistic regression equation is a probability value that varies between 0 and 1. When a predicted value is close to 0, Y is unlikely to have occurred; whereas a predicted value close to 1 implies that Y has a higher probability of occurrence. The order of entry for the predictor variables will impact the logistic regression results (Schumacker, Anderson, & Ashby, 1999), so our approach yielded a final logistic regression equation following a specific model-building approach. Moreover, we did not use forward, backward, or stepwise selection methods in logistic regression because these approaches are not recommended (Field, 2017; Schumacker, Mount, & Monahan, 2002).

   The first logistic regression equation yields a baseline model that only includes the intercept (constant) value, which is based on the frequency of Y. The improvement in model fit was determined by larger chi-square statistical values with one degree of freedom when subtracting successive models: [χ^2 = Loglikelihood(Null Model) − Loglikelihood(Model A)]. In addition, the Nagelkerke R_N^2 was computed to indicate how much prediction improved as a result of the inclusion of additional predictor variables (Nagelkerke, 1991):

$$R^2{}_N = \frac{R^2_{CS}}{1 - e(-\frac{-2LL\,(baseline)}{n})} \tag{1}$$

The individual contribution based on the statistical significance of independent predictor variables in the logistic regression equation was determined by computing a Wald statistic: Wald = B/SE_B, where B = regression coefficient and SE_B = standard error. The other approach we used was to compare successive models, adding unique parameters each time and determining the reduction in − 2LL and increase in R^2 and χ^2 values, which indicates better model fit, thus better classification and prediction of the probability of Y. Interpretation of the logistic regression coefficients, or e^B(Exp(B)) indicates the change in odds resulting in a unit change in the predictor variable. For a value greater than 1, the proportionate change in odds indicates that as the predictor increases, the odds of the Y outcome increases. For a value less than

1, the proportionate change in odds indicates that as the predictor increases, the odds of Y outcome decreases. Finally, an examination of the efficient score statistic for variables not in the equation indicated which variables could potentially contribute to predicting the probability of Y (Field, 2017). The efficient score statistic was therefore used to evaluate the statistical significance of parameter estimates. It is one of several preferred methods for evaluating the statistical significance of parameter estimates in best-subset model building methods (Schumacker et al., 1999).

Results

When reviewing the subset of the sample that ultimately restored to trial competency ($n = 128$), additional information can be gathered about typical length of Competency restoration efforts. Out of participants that restored to competence, most participants restored within 12 months (58%). Seventy-seven percent of persons who ultimately attained competence did so within 2 years. As presented in Table 2, successful timely restoration largely stopped after 60 months with approximately 96% of the participants restored. The remaining five participants required 3.5 years to attain trial competence. The rate of restoration for persons ultimately restored to trial competence is graphically represented in Figure 2.

The dependent variable was classified into either competent (0) or incompetent (1). Predictor variables included in the final model were neurocognitive or neurologic disorders (ND), Developmental Disorders, Cognitive Disorder, Length of Restoration (defined as elapsed since arrest date), and Age when the alleged offense occurred. Type of offense was excluded from the final model due to non-significance (state jail felony, third degree felony, second

Table 2. Trial restoration rates with cumulative percentage.

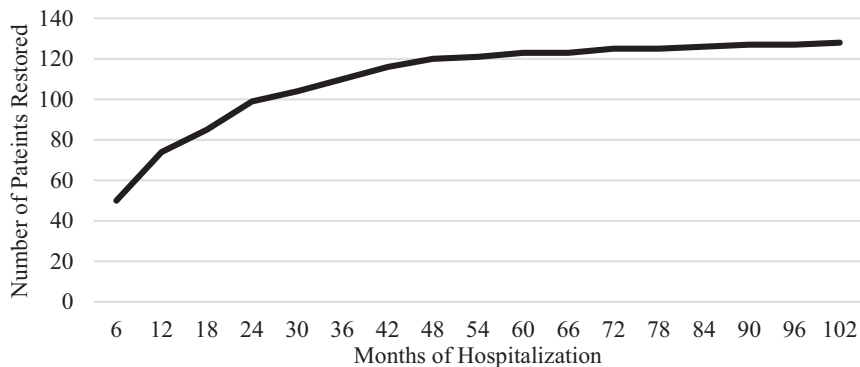| Months	Restored	Slope	Cumulative %
6	50	8.3	39
12	74	6.2	58
18	85	4.7	66
24	99	4.1	77
30	104	3.5	81
36	110	3.1	86
42	116	2.8	91
48	120	2.5	94
54	121	2.2	95
60	123	2.1	96
66	123	1.9	96
72	125	1.7	98
78	125	1.6	98
84	126	1.5	98
90	127	1.4	99
96	127	1.3	99
102	128	1.3	100

Figure 2. Number of participants restored to trial competency over months of.

degree felony, first degree felony, capital felony). Collinearity diagnostics indicated no severe multicollinearity among the predictor variables, which included examining the variance inflation factor ($1.00 < VIF < 1.26$).

Table 3 reports the efficient score statistics for the predictor variables. The variables were entered in order into the logistic regression equation based on these efficient score statistical values, i.e., length of restoration, developmental disorder, age at time of arrest, etc.

The logistic regression analysis proceeded by adding each predictor variable into the equation, thus assessing model fit and improvement in classification and prediction. Table 4 indicates the results of this model building process. The null model or baseline model, which included only the constant, yielded a log-likelihood statistic ($-2LL$) of 374.86 and percent classification of 53%. Model A added the predictor, neurocognitive or neurologic disorder, which improved results (percent classification = 54% and Nagelkerke R^2 = .035). Model B added having a development disorder with a 3% change in classification, and a higher Nagelkerke R^2 value (percent classification = 57% and R-squared = .051). Model C, which added cognitive disorder yielded another better fitting model (percent classification = 65% and Nagelkerke R^2 = .148). Model D, when adding length of restoration, resulted in increased percent classification and R^2 values with a further reduction in

Table 3. Efficient score statistic.

Variable	Efficient score	df	p
Neurocognitive or neurologic disorder	4.88	1	.027
Developmental disorder	14.72	1	.0001
Cognitive disorder	5.02	1	.025
Length of restoration	23.52	1	.0001
Age at time of arrest	9.63	1	.002

Type of offense not significant at $p < .05$, so they are not included in the logistic regression analysis. Source: (IBM, 2017).

Table 4. Logistic regression models (N = 271 participants).

Logistic models	B	SE	Exp(B)	95%CI	−2LL	Classified	Nagelkerke R2	Model χ2
Null model	1.11	.12	1.12	n/a	374.86	53%	n/a	n/a
constant								
Model A								
Constant	−.03	.13	.97					
Neurocognitive or neurologic disorder	.94	.37	2.57	(1.25–.5.26)	367.67	54%	.035	7.178
Model B								
Constant	−.09	.14	.91					
Neurocognitive or neurologic disorder	.85	.37	2.32	(1.13–4.83)	364.22	57%	.051	10.626
Development disorder	.73	.41	2.08	(.94–4.62)				
Model C								
Constant	−.38	.15	.68					
Neurocognitive or neurologic disorder	.58	.39	1.79	(.83–3.85)	343.05	65%	.148	31.804
Development disorder	.85	.42	2.35	(1.03–5.31)				
Cognitive disorder	1.49	.35	4.44	(2.24–8.78)				
Model D								
Constant	−2.20	.31	.11					
Neurocognitive or neurologic disorder	1.08	.47	2.96	(1.18–7.34)	199.48	78%	.430	79.597
Development disorder	1.61	.49	4.99	(1.92–12.97)				
Cognitive risorder	1.64	.42	5.15	(2.26–11.75)				
Length of restoration	.03	.01	1.04	(1.02–1.05)				
Model E								
Constant	−4.54	.86	.01					
Neurocognitive or Neurologic disorder	1.06	.48	2.87	(1.12–7.33)	188.77	79%	.476	90.305
Development disorder	2.08	.54	7.98	(2.76–23.04)				
Cognitive disorder	1.03	.46	2.79	(1.14–6.83)				
Length of restoration	.04	.01	1.04	(1.02–1.05)				
Age at time of crime	.05	.02	.05	(1.01–1.09)				

The presence of substance use disorder, felony degree, gender, race, and mood disorder were not included in the final model because they were not significant. Variables were retained at $p<.05$ level of significance.

the − 2LL value (percent classification = 78%, Nagelkerke R^2 = .430). Model E added age at time of offense with all the other predictor variables (excluding the 'type of offense' variable), yielding a final logistic regression equation (percent classification = 79%, Nagelkerke R^2 = .476). Model E (79%) had similar classification to Model D (78%), but indicated further reduction in the − 2LL value and corresponding larger chi-square value ($\chi2$ = Loglikelihood (Null Model) − Loglikelihood (Model E)). Model E was therefore the final logistic regression model yielding the best prediction from the set of variables selected for the study. The final logistic regression equation to predict the probability of Y, P(Y), was as follows (Kleinbaum & Klein, 2010):

$$P(Y) = \frac{1}{1 + e^{-(-4.54+(2.08*DEV)+(1.06*TBIneuro)+(1.03*DemCog)+(0.05*AGE)+(0.04*LOR)}}$$

(2)

The P(Y) for different types of defendant characteristics can now be predicted. For example, a defendant who has a neurocognitive or neurologic disorder = 1, Development Disorder = 1, Cognitive Disorder = 1, and has been treated for 60 months (length of restoration = 60), and is 43 years old (age at time of crime = 43), would have a 98.50% chance of being nonrestorable to trial competence (Equation 2).

In contrast, a defendant who does not have a neurocognitive or neurologic disorder = 0, Development Disorder = 0, Cognitive Disorder = 0, and has been treated for only 6 months (length of restoration = 6), and is 43 years old (age at time of crime = 43), would have a 10.43% chance of being nonrestorable to trial competence (Equation 2). The logistic regression equation, therefore, yields probability values between 0 and 1, and is predicting the probability of being nonrestorable to trial competence given the set of predictor variables.

When we divide the probability of an incompetent defendant by that of a competent defendant we obtain the risk ratio, RR = .98/.10, which indicates that defendants are 9.8 times more likely to be incompetent with the variable characteristics in the logistic regression model (Cohen, 2000). The final logistic regression model with Exp(B), which indicates the odds ratio for each of the predictor variables, is shown in Model E of Table 4. For each predictor variable in the model, the odds ratio is higher for participants coded a one, which indicates they would have a higher probability of being incompetent. The 95% confidence intervals (CI) for the predictor variables, neurocognitive or neurologic disorder, Development Disorder, Cognitive Disorder do not contain 1.0; therefore, the true odds between the groups coded 1 versus 0 would differ (Schumacker, 2005). *P(Y)* when all variables coded as 1 or *P(Y)* when all variables are coded as 0 provide the upper and lower estimates, respectively. It is possible to obtain *P(Y)* for other combinations of the variables, which would fall somewhere between *P(Y)* = .01 to .99.

Discussion

This study sought to identify factors predictive of non-restorability among refractory, long-term inpatients, receiving treatment aimed at restoring competency to stand trial. Results indicate that, as found in other research, the majority (58%) of defendants attain trial competence within a period of 1 year. Additionally, after a 2-year period, a little over three-fourths of the defendants in this study were deemed to be restored to competence. Therefore, from a statistical perspective, most defendants restore to competence within 2 years (77%) serving as a marker for clinical decision-making when offering opinions on future restorability in the absence of other information (i.e. most defendants restore within 2 years). Some proportion of restorable defendants will not restore within the timeframe of 2 years. Questions regarding limiting restoration efforts involve an intersection of legal, clinical, and values issues. For example, the case of a defendant with dementia who is charged with capital murder may raise concerns regarding disposition in light of an inability to restore to competence.

From the current analysis, a binary logistic regression equation predicted that defendants are more likely to remain IST if they have a neurocognitive or neurologic disorder, Developmental Disorder, Cognitive Disorder, long treatment periods (i.e. length of restoration efforts greater than 60 months), and are older in age at the time of the alleged criminal offense. Although a psychotic disorder is commonly associated with opinions of incompetence (Pirelli et al., 2011), this factor was not included in the current model due to nearly all defendants admitted to KSH being diagnosed with a psychotic disorder resulting in this variable as a non-significant contributor to the model.

In this study, the presence of a developmental disorder was most predictive of an individual being unable to attain competence. The presence of a neurocognitive or neurologic disorder was the second most predictive variable for non-restorability followed by the presence of cognitive disorder. These three diagnostic categories are characterized by deficits with sustained attention, cognitive disorganization, and learning new information (i.e. basic legal knowledge), as well as the expression of behavioral problems that may impact their ability to demonstrate appropriate courtroom behavior. These difficulties are presumed to map onto a person's competency functioning as they may have trouble testifying relevantly in court (cognitive disorganization) or incorporating legal counsel for decision-making (memory and attention deficits) as an example. The final variables in the model were older age at the time of offense and longer lengths of restoration effort (i.e. greater than 60 months). Older age likely serves as a marker for those persons at greater risk for serious cognitive disorders in this sample. Among the older defendants in the sample, there

were no cases of persons without a cognitive disorder. It is important to not assume that older age is equivalent to lower likelihood of restoration when considered independent of other, namely cognitive disease burden, factors. Similarly, LOR is thought by the authors to be a proxy for disease severity/burden among the study participants. While self-evident, the more severe the disorder is, the longer time it will take to restore to competence, if at all.

Results from prior research vary with regard to identification of relevant predictive factors (Colwell & Gianesini, 2011; Hubbard et al., 2003; Morris & DeYoung, 2014; Pirelli et al., 2011). The reasons for these sometimes inconsistent findings among researchers may reflect differences between the populations studied. For example, the current study modeled predictors of non-restorability among long-term refractory defendants, and this is different from other researchers who examined factors that predict incompetency. The reader should guard against conflating incompetency with non-restorability as they are not the same construct.

Following the ruling in *Jackson v*. Indiana (1972) clinicians have often been asked to opine whether or not an individual will be able to be restored to competence within the foreseeable future. However, this ruling did not provide any guidance as to what a reasonable period of time is, and there is little empirical data to support clinicians when they are tasked with determining whether or not an individual will attain competence. Findings here suggest that within 60 months of treatment, the vast majority (96%) of people will attain competence, if able. This could be used as a marker for clinicians, policymakers, hospital administrators, and forensic evaluators as a 'reasonable' period of time for competency restoration. As it stands now, 25 states limit treatment to 5 years or less, but the remaining half do not. These findings support that a maximum treatment period for competency restoration of 5 years could be used across states, which could reduce the amount of beds in forensic hospital settings that are occupied by those who will never become competent to stand trial. Additionally, these findings provide clinicians with a formula that can be used to aid in prediction of whether or not an examinee will be restored to competence in the future.

Future research

Future research might examine the impact of charge dismissal or other legal mechanism to transfer non-restorable individuals into the community. Efforts to examine the safety and associated costs may be needed to further understand feasibility of management in a community based less restrictive setting. Additionally, since competency to stand trial is strongly correlated with an individual's level of functioning, research should focus on specific symptoms,

and severity of symptoms, within the diagnostic categories that directly impact and individual's ability to become CST. It may be that the predictors are best analyzed using interaction effects given the modest correlations found among extant literature.

Limitations

While findings from this study are robust, generalizability of the results should proceed cautiously because the data utilized is a convenience sample from a quality assurance database, and is not matched to incompetent persons from other regions of the United States or who have committed misdemeanor offenses. This study used arrest date as a proxy for the start of restoration services, and that may impact the actual duration of restoration efforts that a defendant received. Importantly, while diagnosis contributes to the determination of non-restorability in our model it is not the diagnosis per se that renders a defendant incompetent, but the functional limitations that are related to the diagnosis. Additionally, this study used evaluator opinion as the primary criterion variable and did not consider final court adjudication on the issue as that data was incomplete. Finally, the evaluators at the facility are licensed psychiatrists or psychologists, but we did not assess the rate of agreement or disagreement among evaluators; therefore, there is potential evaluator bias in competency opinions that was not controlled for.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Appendix

The following diagnostic categories were coded as variables in a logistic regression by absence or presence (0 or 1, respectively) in a defendant's diagnostic record. Categories were defined by DSM-IV-TR categorizations.

Developmental Disorders
- Intellectual disabilities
- Borderline intellectual functioning
- Communication disorders
- Autism spectrum disorder
- Attention-deficit/hyperactivity disorder
- Specific learning disorder
- Motor disorder (e.g. tic)

Psychotic Disorders
- Delusional disorder
- Brief psychotic disorder
- Schizophrenic form disorder
- schizophrenia
- Schizoaffective disorder
- Substance/medication-induced psychotic disorder
- Psychotic disorder due to another medical condition
- Catatonia
- Psychotic disorder NOS

Mood Related Disorders
- Bipolar I/II disorder
- Cyclothymic disorder
- Disruptive mood dysregulation disorder
- Unspecified bipolar disorder/bipolar disorder NOS
- Major depressive disorder
- Persistent depressive disorder (dysthymia)
- Premenstrual dysphoric disorder
- Depressive disorder due to another medical condition
- Unspecified depressive disorder/depressive disorder NOS

Anxiety Disorders
- Separation anxiety disorder
- Selective mutism
- Specific phobia
- Social anxiety disorder
- Panic disorder

- Panic attack
- agoraphobia
- Generalized anxiety disorder
- Anxiety disorder due to another medical condition
- Unspecified anxiety disorder/anxiety disorder NOS
- Reactive attachment disorder
- Disinhibited social engagement disorder
- Posttraumatic stress disorder
- Acute stress disorder
- Adjustment disorders
- Unspecified trauma- and stressor-related disorder

Substance-Abuse Disorders
- Polysubstance abuse
- Alcohol-related disorders
- Caffeine-related disorders
- Cannabis-related disorders
- Hallucinogen related disorders
- Inhalant-related disorders
- Opioid-related disorders
- Sedative-, hypnotic-, or anxiolytic-related disorders
- Stimulant-related disorders
- Tobacco-related disorders
- Other or unknown substance-related disorders
- Gambling disorders

Cognitive Disorders
- Delirium
- Unspecified delirium/delirium NOS
- Major and mild neurocognitive disorders
- Dementia
- Amnestic disorder

Neurocognitive or neurologic disorders
- Traumatic brain injury
- Head injury, unspecified
- Epilepsy
- Cerebrovascular incident
- Concussion

Personality Disorders
- Cluster A personality disorders
- Cluster B personality disorders
- Cluster C personality disorders
- Personality disorder due to another medical condition
- Unspecified personality disorder/personality disorder NOS