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SUMMARY OVERVIEW
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Evaluating the Cost Effectiveness of the Elder Abuse Forensic Center Model

Abstract:

Elder abuse forensic centers (EAFCs) use a multidisciplinary team approach to address complex elder abuse cases. To date, no evaluation has assessed the cost for EAFCs to achieve their outcomes. This study evaluates the cost effectiveness of the Los Angeles County E AFC. We analyzed case files for 41 randomly selected cases seen at the Los Angeles County E AFC and 39 propensity-matched APS usual care cases from April 2007-December 2009 to obtain data on time spent processing cases and achieving outcomes. Salaries were obtained from publicly available sources and used to estimate case processing costs. Mean case processing costs are \$1,101.80 for the E AFC model and \$153.30 for usual care. The proportion of cases submitted to the public guardian is 39% for E AFC and 8% for usual care, which generates an ICOR of \$3,059.68. The ICOR indicates that an additional E AFC case submitted to the public guardian costs an additional \$3,059.68 over the cost of usual care. The proportion of cases that are granted conservatorship is 24% for E AFC and 3% for usual care, with an ICOR of \$4,516.67. The proportion of cases successfully prosecuted is 17% for E AFC and 0.2% for usual care, with an ICOR of \$5,645.83. There were no differences in recurrence rates within one year of case closure. These results indicate the E AFC model incurs greater case processing costs but yields large incremental differences in outcomes compared to usual care. This information can inform the sustainability of the model and the feasibility of replication across the U.S.

Introduction

Over the last several decades, there has been increasing recognition that elder abuse is a growing social problem that results in significant personal and societal costs. One model to address the most complex cases of abuse is the elder abuse forensic center (EAFC), four of which are currently operating in California. Using a multidisciplinary team approach, the EAFC model brings together diverse professionals from a variety of fields within the justice system, health care, protective services, and mental health. The team meets weekly to address the most complex cases of elder abuse. Costs for victims can include serious physical injuries, emotional pain and suffering, shame, depression, shattered trust, financial ruin, and increased risk of mortality. Social costs, which are largely unmeasured, potentially include increasing the burden on the delivery system, including health and social services and first responders, increasing the likelihood of spend down and dependency on public benefits, and increasing foreclosures.

A previous study evaluating the elder abuse forensic center model (referred to as the NIJ Outcomes Study) was funded by NIJ (Grant number: 2009-IJ-CX-0017) to use a rigorous research design: a propensity score matched comparison group to evaluate the effectiveness of the Los Angeles County EAFC in achieving important outcomes. The NIJ Outcomes Study has identified the key components, participants, and processes necessary to operate the Los Angeles EAFC. This allows the current research to identify costs required to process an elder abuse case and as well as the outcomes attained by the EAFC. The purpose of the project is twofold:

1) to examine the cost effectiveness of the Los Angeles County Elder Abuse Forensic Center (EAFC) model focusing on three of the center's outcomes, including: i) prosecuting elder abuse, ii) protecting vulnerable older adults through conservatorship, and, iii) reducing/preventing recurring cases of abuse; and

2) to design a cost effectiveness evaluation protocol including inputs and outcome measures that can be used to evaluate the cost effectiveness of EAFCs in the future.

For the first study purpose, we tested six hypotheses to address the cost effectiveness of the EAFC in three areas of the outcomes. As compared to a propensity matched adult protective service (APS) cases receiving usual and customary care, we hypothesized that:

To address the prosecution outcomes:

Hypothesis 1: Cases reviewed at the EAFC are more likely to be cost effective for submitting cases to the District Attorney's office (DA);

Hypothesis 2: Cases submitted for DA review from the EAFC are more likely to be cost effective in having criminal charges filed.

Hypothesis 3: Cases heard at the EAFC are more likely to be cost effective in successful prosecution, where guilt was established by plea or conviction.

To address the conservatorship outcomes:

Hypothesis 4: Cases reviewed at the EAFC are more likely to be cost effective in cases referred to the office of the Public Guardian (PG).

Hypothesis 5: Cases referred to the PG by the EAFC are more likely to be cost effective of attaining conservatorship.

To address recurrent case management outcome:

Hypothesis 6: Cases reviewed at the EAFC are more likely to be cost effective in reducing cases that are re-opened after final disposition.

For our second study purpose, we have developed a toolkit that includes three major components:

- 1) setting up EAFCs, providing information about their development, membership, and daily functioning;
- 2) methods for evaluating the structure, process, functions, and—to the extent feasible outcomes of an EAFC;
- 3) methods for evaluating the cost-effectiveness of an EAFC.

This report provides an overview of the research methods and key findings from the cost-effectiveness evaluations of the Los Angeles County EAFC, and identifies implications for policy and practice.

Methods

Case Selection. This cost-effectiveness evaluation of the Los Angeles EAFC used a quasi-experimental design adapted from a partial data set that was previously collected in the first NIJ EAFC outcomes study. Briefly, the NIJ Outcome Study collected data on 296 elder abuse cases involving victims aged 65 or older reviewed at the Los Angeles EAFC between April 1, 2007 and December 31, 2009. These EAFC cases were compared to a 1 to 1 ratio of a propensity score matched sample of Los Angeles County Adult Protective Services (APS) cases. The cases were matched on the case characteristics of the victim's age, race/ethnicity, APS office (16 geographic categories), total number of abuse types reported (maximum of 9 types), and types of abuse including financial, neglect, self-neglect, isolation, physical, and financial-neglect interaction. The NIJ Outcomes Study also collected outcomes measures such as protection of victim's welfare and/or safety via 1) the court system in the form of criminal prosecution, 2) seeking appropriate conservatorship, and 3) decrease case recurrence over time.

For the current cost-effectiveness EAFC research, a sample of 65 EAFC cases was randomly drawn from the previous study of 179 EAFC cases which included the cases files available for further review. Then, we applied the same propensity matching algorithm with an additional variable matching the case recurrence to generate an analysis sample. During the propensity match, 24 cases did not match with any of the 220 APS cases, therefore they were excluded. Our final matched sample included 41 cases from the EAFC data set, and 39 from the APS files. Two outlier cases from the APS group were excluded for the final analysis due to a long case investigation period of 381 days, and a second case in which the client died after the case was reported to APS.

Estimation of Costs of Elder Abuse Case Processing. We identified key cost components in this study for APS cases and for EAFC cases. The first category is the basis for usual care, and includes the average resources used in the investigation and management of possible elder abuse cases. The major costs included time spent on the case investigation by APS social workers.

Case File Review. We reviewed the cases files for the analysis sample to capture all of the resources applied to each case by determining each point of contact and an estimate of the time necessary to complete the specific task. We recorded dates of case opening and closing, type of abuse, and APS time spent on the case process. We estimated the case process time according to the documented descriptions on the activities for investigating the case. These

processes and the consequent cost estimates were summed for time spent on all activities during the time that the case was open.

Validation of APS Time Spent on Case. Based on the type of case process identified from the case reviews, a survey was developed and administered to a total of 22 persons who participated the weekly EAFC meeting during the March 7, 2013 to May 23, 2013 period. Mean, minimum, and maximum time spent on different type of activities estimated in the survey were calculated and compared to the documented time spent on activities from the case file reviews to validate the reasonable estimation from the files review.

The second cost category is the marginal additional costs/resources expended to develop and maintain the EAFC. These include core staff, collaborative team participants, and site costs. The team members' weekly meeting attendance record from 2007 to 2011 was analyzed to identify the core team members and estimate their time spent on a case processing. Site costs of \$39,266.67 per year (including in-kind building and maintenance costs) were estimated from the original grants that supported the EAFC. All costs were attributed equally on a per case basis to generate a marginal cost profile.

Estimation of Staff and Team Members' Salary. Salary data was used for calculating a standard hourly cost multiplier applied to the time spent to process each case. Multiple data sources were used, including:

- 1) The personnel budget from the original EAFC grant for core team members, such as project manager, geriatrician and others;
- 2) The TCN/AACN 2010 "Salary Survey": Professional Practices, Beliefs, and Incomes of U.S. Neuropsychologists;
- 3) California government salary data 2012
(<http://publicpay.ca.gov/Reports/RawExport.aspx>)
- 4) Los Angeles city employee earnings data set 2012
(http://controller.lacity.org/Salary_Information/index.htm)

All salary data were converted to an hourly rate and multiplied by the individual time spent on the case. All cost data are reported in constant 2012 dollars. Total costs for a case processing were calculated and compared between the cases investigated at APS (usual care) and Los Angeles EAFC (forensic center).

Intermediate Outcomes Analysis. Health care cost-effectiveness evaluations commonly use

quality of life and utility measures reported by each subject to derive quality-adjusted life years. In this evaluation it is not possible to administer such measures both before and after the investigation to derive a marginal effectiveness. Instead, we focused on three intermediate outcomes (prosecution, conservatorship, and case recurrence after close) collected from the NIJ Outcomes Study. Rates of prosecution and conservatorship were calculated and compared between the APS usual care and EAFC cases. Changes in case recurrence were calculated as the difference of the number of recurrence cases before 365 days of the studied case was reported and post 365 days after the studied case was closed. Incremental cost to outcome ratio (ICOR) was calculated as the ratio of different costs between APS usual care and EAFC to different outcome measurement between APS usual care the EAFC. The ICOR represents the incremental cost of an additional unit of outcome if the EAFC intervention is adopted.

Statistical Analysis and Bootstrap Sampling Due to a small sample available for the analysis, a bootstrap resampling method was used to construct the 95% confidence interval for cost-effectiveness outcome ratio. From the sample of 41 EAFC vs. 39 APS usual care cases, we randomly drew 10,000 samples with replacement. The incremental cost-effectiveness outcome ratio was calculated from each re-sample. We also report mean and 95% confidence interval of the cost-effectiveness outcome ratio from the bootstrap re-samples.

MAJOR FINDINGS

Appropriate Data Set for Analysis.

- This study evaluating the cost effectiveness of the elder abuse forensic center model has generated a propensity matched data set that meets accepted criteria for appropriateness through matching client age, abuse type, the case duration, and prior case recurrence (Table 1).

Assess the EAFC Efficiency from the Survey of APS Time Spent on the Case Processing.

- A total 22 persons (including APS social workers, district attorneys, detectives, police, and victim service representatives) who participated a weekly EAFC meeting completed the survey. Approximately 68% of respondents were social workers.
- When the time spent on case process activities were compared between the data collected from an APS time spent survey and the data from case file review, most case process activity time differences were not significantly different, except for the activities of communication with the client by phone (median 30 minutes from survey vs. 10

minutes from file reviews), communication with a doctor or hospital social worker by phone (median 20 minutes from survey vs. 15 minutes from file reviews), and communication with reporter by phone (median 20 minutes from survey vs. 10 minutes from file reviews). The sensitivity analysis addressed these variations.

- The survey analysis indicated that more than half of the respondents who worked with the EAFC cases perceive better overall EAFC outcomes. Of the eleven persons who responded to the question, 91% indicated that they spend additional time on a case if they present it to the EAFC. In addition, 91% of survey respondents indicated that the EAFC cases are more complex than the usual APS cases. 52% of all survey respondents indicated that EAFC cases are closed much more slowly than usual APS cases, 29% said that the cases are closed about the same, and 15% said that the cases are closed much more quickly. Respondents also indicated that EAFC cases have better outcomes, and that cases are less likely to be referred again to APS after case closure.

Cost-effectiveness of EAFC.

- Cases heard at EAFC had longer mean time spent on case processes (mean 10.36 hours, ranging from 3.33 to 39.17 hours) than the cases heard at APS usual care (mean 3.72 hours, ranging from 1.17 to 11.08 hours). Therefore, the mean case process and management costs were higher in the EAFC cases (\$427.56) than those in usual care (\$153.52, $P < 0.0001$). On average, each case heard at the EAFC incurred mean additional costs of \$674.25 for EAFC staff and team members' costs, and \$306.77 for facility cost. Overall, mean per case processing costs are significantly higher for the EAFC model (\$1,101.80) than for the APS usual care (\$153.30, $P < 0.0001$).

Prosecution outcomes:

- Hypothesis 1: Cases reviewed at the center are more likely to be cost effective for submitting cases to the District Attorney's office (DA). Hypothesis 2: Cases submitted for DA review from the EAFC are more likely to be cost effective in having criminal charges filed. The outcome rates are the same for these two hypotheses. Cases heard at the EAFC are significantly more likely to be submitted to district attorney for prosecution review and result in criminal charges filed than those heard at the APS usual care (20% vs. 0%, $P=0.005$). The base case ICOR was \$4,742.50 for each EAFC case resulting in DA prosecution review or criminal charges filed (Table 2). The bootstrap 95% confidence interval for the ICOR was \$7,277.70 to \$7,414.52 (Table 3), with 100% of the re-samples had higher costs and higher outcome rates for the EAFC cases than the APS usual care cases. If society is willing to pay at least \$7,414.52 for these suspected cases to be submitted to DA or further with criminal charges filed, the EAFC will be deemed cost-effective.
- Hypothesis 3: Cases heard at the EAFC are more likely to be cost effective in successful prosecution, where guilt was established by plea or conviction. Cases heard at the EAFC had significantly higher rates of successful prosecution than those heard at the APS usual care (17% vs. 0%), $P=0.01$). The base case ICOR was \$5,579.41 (Table 2). The bootstrap 95% confidence interval for the ICOR was \$8,552.18 to \$8,731.40 (Table 2), with 99.97% re-samples having higher cost and higher outcome rates for the EAFC cases than the APS usual care cases. If society is willing to pay at least \$8,731.40 for the EAFC to have a successful prosecution, the EAFC will be deemed cost-effective.

Conservatorship outcomes:

- Hypothesis 4: Cases reviewed at the EAFC are more likely to be cost effective in cases to be referred to the office of the Public Guardian (PG). Cases heard at the EAFC had significantly higher rates of referral to the office of the PG than those conducted with APS usual care (39% vs. 8%, $P=0.001$). The base case ICOR was \$3,059.68 (Table 2). The bootstrap 95% confidence interval for the ICOR was \$4,380.05 to \$4,485.97 (Table 2), with 99.98% of the re-samples having higher cost and higher outcome rates for the EAFC cases than the APS usual care cases. If society is willing to pay at least \$4,485.97 for the EAFC to have a case submitted to the office of the PG, the EAFC will be deemed cost-effective.
- Hypothesis 5: Cases referred to PG by the EAFC are more likely to be cost effective resulting in conservatorship. Cases heard at the EAFC have significantly higher rates of referral to the office of the PG and resulting in conservatorship than those heard at the APS usual care (24% vs. 3%), $P=0.007$). The base case ICOR was \$4,516.67 (Table 2). The bootstrap 95% confidence interval for the ICOR was \$6,409.45 to \$6,691.93 (Table 2), with 99.94% of the re-samples having higher costs and higher outcome rates for the EAFC cases than the APS usual care cases. If society is willing to pay at least \$6,691.93 for the EAFC to have a case submitted to the office of the PG and result in conservatorship, the EAFC will be deemed cost-effective.

Recurrence outcome:

- Hypothesis 6: Cases reviewed at the EAFC are more likely to be cost effective in reducing recurrence cases. Cases heard at the EAFC were not significantly different in reduction of recurrence than those heard at the APS usual care (mean 0.34 vs. 0), $P=0.07$). The base case ICOR was \$2,789.77 (Table 2). The bootstrap 95% confidence interval for the ICOR was \$1,800.15 to \$3,347.07 (Table 3), with 97.13% re-samples had higher cost but similar outcome when compared the EAFC cases to the APS usual care cases. This hypothesis was not supported, indicating that the EAFC may not be cost effective in reducing recurrence cases.

Conclusions and Implications for Policy and Practice

This research provides the first results on the cost-effectiveness of an elder abuse forensic center model. The results indicate the EAFC model incurs greater case processing costs, but yields large incremental differences in intermediate outcomes compared to usual care. This information can inform the sustainability of the model and the feasibility of replication across the U.S.

It is important to note several points regarding these conclusions. First, all of the EAFC cases originated at the APS and were identified by APS staff as difficult to resolve. Thus, these conclusions should not be interpreted dichotomously (“either the case should be managed by APS or EAFC”). In fact, the initial assessment by APS is a critical part of this expanded elder abuse model and their role should not be underestimated. Second, while we were not able to assess the incremental quality adjusted life years generated by the EAFC outcomes, these marginal gains in elder protection appear to be substantial. Third, the incremental costs associated with the EAFC intervention appear modest when compared to health intervention costs. For example, it is not unusual for new prescription drugs to incur annual costs far exceeding the incremental case costs of the EAFC. These represent important contexts in the evaluation of the cost-effectiveness of the EAFC model.

Table 1. Comparison of Major Case Characteristics Before and After Propensity Match

Variable	Before Propensity Match				After Propensity Match			
	EAFC	APS	D	P Value*	EAFC	APS	D	P Value*
N (%)	65 (22.81)	220 (77.19)		NA	41 (51.25)	39 (48.75)		NA
Mean (SD) age	82.45 (6.10)	82.31 (7.26)	2.09	0.89	83.29 (5.70)	83.15 (7.16)	2.16	0.67
Recurrent cases prior 180 days baseline (%)	18 (27.69)	22 (10.00)	46.44	0.0003	9 (21.95)	5 (12.82)	24.27	0.28
Mean (SD) Case duration (days)	155.40 (88.64)	63.28 (55.21)	124.75	<0.0001	118.88 (63.10)	122.87 (77.67)	5.64	0.80
Mean (SD) Number of abuse	1.86 (1.16)	1.77 (0.96)	8.45	0.51	1.78 (1.15)	1.90 (1.05)	10.90	0.64
RS: Other public agency entity	18 (27.69)	29 (13.18)	36.58	<0.01	8 (19.51)	9 (23.08)	8.73	0.70
RS: Law enforcement	12 (18.46)	9 (4.09)	46.65	<0.0001	8 (19.51)	5 (12.82)	18.25	0.42

Abbreviations: EAFC=elder abuse forensic center; APS=adult protective service; N=number; SD=standard deviation; RS=referral resource; NA=not applicable, D=standardized difference, presented as percentage.

* P values were calculated from Student T-tests for continuous variables, and Chi-square tests for categorical variables.

Table 2. Base Case Cost-effectiveness Results for Different Outcomes Measurement

Treatment	Cost (\$) ^a	Outcome Measure ^b	Incremental Cost	Incremental Outcome	ICOR ^c
Cases submitted to DA for prosecution review					
APS control	\$153.30	0%			
LAEAFC	\$1,101.80	20%	-\$948.50	-20%	\$4,742.50
Cases have criminal charges filed					
APS control	\$153.30	0%			
LAEAFC	\$1,101.80	20%	-\$948.50	-20%	\$4,742.50
Cases have successful prosecution					
APS control	\$153.30	0%			
LAEAFC	\$1,101.80	17%	-\$948.50	-17%	\$5,579.41
Cases referred to the office of PG					
APS control	\$153.30	8%			
LAEAFC	\$1,101.80	39%	-\$948.50	-31%	\$3,059.68
Cases result in any conservatorship					
APS control (N=39)	\$153.30	3%			
LAEAFC (N=41)	\$1,101.80	24%	-\$948.50	-21%	\$4,516.67
Difference in # of recurrent cases between 365 days prior case reported and post 365 days case closed					
APS control	\$153.30	0			
LAEAFC	\$1,101.80	0.34	-\$948.50	-0.34	\$2,789.71

Abbreviations: ICOR=incremental cost-outcome ratio; APS=adult protective service; LAEAFC=Los Angeles elder abuse forensic center; DA=district attorney, PG=public guardian.

Note: ^aThe costs presented in the table were the mean cost for processing an elder abuse case. ^bThe prosecution and conservatorship outcome were presented as proportion of each outcome measurement. The recurrent outcome was presented as mean change in number of recurrent cases prior 365 days case was reported and post 365 days case was closed. ^cThe ICOR represents the cost of an additional unit of outcome if the EAFC model is adopted over the APS usual care.

Table 3. Summary of Bootstrap Mean of Incremental Cost Outcome Ratio from 10,000 Random Samples

Outcome variable	N	Bootstrap Mean of ICOR			
		Mean	SD	Lower 95% CI	Upper 95% CI
Cases submitted for district attorney review	10000	\$7,346.11	\$3,489.76	\$7,277.70	\$7,414.52
Cases have criminal charges filed	10000	\$7,346.11	\$3,489.76	\$7,277.70	\$7,414.52
Cases have successful prosecution	9997	\$8,641.79	\$4,570.83	\$8,552.18	\$8,731.40
Cases referred for public conservatorship	10000	\$4,433.01	\$2,701.78	\$4,380.05	\$4,485.97
Cases result in any conservatorship	10000	\$6,550.69	\$7,205.54	\$6,409.45	\$6,691.93
Difference in case recurrence between prior and post 365 days base line	9999	\$2,573.61	\$39,456.39	\$1,800.15	\$3,347.07

Abbreviations: N=Number of bootstrap samples which the difference of outcomes between usual care of adult protective service (APS) and forensic center (FC) was not equal to 0; ICOR=incremental cost to outcome ratio, which represents the cost of an additional unit of outcome if the EAFC model is adopted over the APS usual care; SD=standard deviation; CI=confidence interval.