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Validation of the Detection of Elder abuse Through Emergency Care Technicians (DETECT) screening tool: A Study Protocol

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TITLE:

Validation of the Detection of Elder abuse Through Emergency Care Technicians (DETECT) screening tool: A Study Protocol

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ABSTRACT:

Introduction. Elder mistreatment (EM) is a high prevalence threat to the health and well-being of older adults in the United States. Medics are well-positioned to help with identification of older adults at risk for EM, however, field robust screening tools appropriate for efficient, observation-based screening are lacking. Prior work by this team focused on the development and initial pilot testing of an observation-based EM screening tool named DETECT (i.e., Detection of Elder Mistreatment Through Emergency Care Technicians, designed to be implemented by medics during the course of an emergency response (911) call. The objective of the present work is to validate and further refine this tool in preparation for clinical dissemination.

Methods and analysis. Approximately 59,400 community dwelling older adults who place 911 calls during the 36-month study observation period will be screened by medics responding to the call using the DETECT tool. Next, a random subsample of 2,520 of the 59,400 older adults screened will be selected to participate in a follow-up interview approximately two weeks following the completion of the screening. Follow-up interviews will consist of a medic-led semi-structured interview designed to assess the older adult's likelihood of abuse exposure, physical/mental health status, cognitive functioning, and to systematically evaluate the quality and condition of their physical and social living environment. The data from 25% (n = 648) of these follow-up interviews will be presented to a LEAD panel for a final determination of EM exposure status, representing the closest proxy to a 'gold standard' measure available.

Ethics and dissemination. This study has been reviewed and approved by the Committee for the Protection of Human Subjects at the University of Texas School of Public Health. The results will be disseminated through formal presentations at local, national and international conferences and through publication in peer reviewed scientific journals.

STRENGTHS AND LIMITATIONS:

- Elder mistreatment is an important and underreported public health issue. This study has the potential to fill a critical gap in science and in practice.
- This will be the first study conducted, to our knowledge, to validate and psychometrically test an elder mistreatment screening tool that uses systematic observation of the older adult and their environment.
- Medics will gather screening data on more than 50,000 emergency response calls among community-dwelling older adults, and follow-up data on 2,500 community-dwelling older adults. The size and scope of this study are such that it will represent one of the largest studies of EM screening ever conducted.
- The sheer volume of data gathered will facilitate secondary data analyses using techniques (i.e., machine learning, CARTE analyses) that require large amounts of data but are designed to detect subtle patterns and associations--in this case, potentially salient patterns (i.e., unusual combinations of factors) of risk factors that may otherwise go under appreciated.
- This study design permits for collection and inspection of visual data (e.g., photographs by medics during interviews) which may provide critical qualitative information to refine the DETECT tool and understand the contextual predictors of EM.

BACKGROUND:

Elder mistreatment (EM) is commonly defined as an intentional act, or failure to act, by a caregiver or another person in a relationship involving an expectation of trust that causes harm or creates a risk of harm to an older adult.^[1,2] population-based studies suggest that more than one-in-ten cognitively intact, community-dwelling older adults experience EM annually;^[3] older adults with disabilities face an even greater risk.^[4,5] EM may take many forms, including physical, emotional/psychological and sexual abuse, neglect, and financial exploitation. EM exposure is often chronic, and polyvictimization (i.e., exposure to multiple forms of EM concurrently) is common.^[1,2,6]

The public health impact of EM is considerable. EM is associated with depression,^[7] functional decline,^[8,9] emergency room visits,^[10] hospital admissions,^[11] and all-cause mortality compared to non-maltreated older adults.^[12–15] The costs associated with lost income, recovery from financial exploitation, and the medical, legal and social services interventions needed by maltreated older adults is estimated to be in the billions of dollars annually.^[2] Nevertheless, studies consistently find that as many as 80-90% of cases are never reported.^[3,16,17] Therefore, effective and efficient EM screening tools are urgently needed to improve detection.

Emergency medical technicians and paramedics, collectively referred to as medics, constitute an important and largely untapped EM surveillance force.^[18,19] Medics' access to older adults' residences allows them to observe the older adult's physical and social environment — access which is shared by few others.^[18,20] This access facilitates unique opportunities to identify indicators of EM that may otherwise go undetected.^[20] However, until recently existing EM screening tools were inappropriate for use in emergency medical settings because of their length and/or because of their reliance on direct questioning of the older adult or caregiver.^[20–31] The **Detection of Elder abuse Through Emergency Care Technicians (DETECT)** tool was developed in collaboration with medics specifically to address this gap, and to increase systematic surveillance and reporting of potential EM in the community.

Beginning in 2014, our research team partnered with MedStar Mobile Healthcare — the exclusive ambulance service provider to 15 Tarrant County (TX) cities — and Texas Adult Protective Services

(APS) to develop and pilot test the DETECT screening tool.[18,20,32] The DETECT tool was designed to (1) be brief, (2) based on the medic's direct *observations* of the older adult and his/her physical and social environment, (3) provide reporting guidance, and (4) be integrated into existing procedures and medical charting software.[18] The pilot test of the 26-item screening tool produced positive results. During the five-week pilot test, the DETECT screening tool was used 1,247 times by 251 medics – resulting in 209 positive screens (16.8%). Immediately following the introduction of the DETECT screening tool, there was an increase of 5.4 ($p = 0.0056$) validated reports of EM per month – a 226% improvement.[32] Results from these preliminary studies provide evidence of the feasibility of implementing the DETECT screening tool to enhance the detection of EM with EMS providers.

While this preliminary work provides a strong foundation, further research is needed to examine concordance between DETECT screening results and validated EM. In the pilot study, positive DETECT results were compared to APS investigations, but this work did not permit validation of negative DETECT results. It was not possible to calculate any measure of diagnostic performance that required information about true exposure to EM in cases that screened negative (e.g., sensitivity and specificity) with the DETECT tool. Additionally, validation of the DETECT tool against a proper “gold standard” EM assessment is warranted.[33] Finally, the pilot study was not designed to gather contextual information about EM cases, eclipsing the opportunity to fully understand the social, psychological, health, behavioral and environmental risk factors that contribute to EM, are observable in the older adult's environment, and may serve as early EM warning signs.

Study aims

The overarching goal of this study is to evaluate the *validity* and *reliability* of the DETECT screening tool. Specifically, this study will examine three specific aims:

1. To validate DETECT for the screening and detection of EM. We will match DETECT screening results with an expert panel determination “gold standard” to calculate the tool's diagnostic performance.

2. To develop a valid and reliable reduced item version of the DETECT screening tool. We will use confirmatory factor analysis to determine the relative predictive value of each DETECT screening item. Results will inform systematic item reduction efforts — streamlining the tool for optimally efficient administration.
3. To identify potentially modifiable risk and protective factors for EM using follow-up in-person interviews which will provide rich contextual data that highlight modifiable personal and environmental factors.^[3,34,35] In this aim, we will mine that data for novel relationships and potential targets for future intervention.

METHODS

Study design

The DETECT validation study employs a prospective cohort design that includes 3 distinct data collection activities. These activities, and their relationship to each other, are shown in Figure 1 and described in detail below. Briefly, they include:

1. Initial DETECT screenings. MedStar medics have been using the DETECT screening tool in the context of all emergency responses (i.e., 911) for community-dwelling older adults since February 2017 (n = approximately 1,650 per month). The medics will continue to use the tool throughout the 36-month study observation period.
2. Follow-up interviews. Each month, a random subset of the 1,650 screenings completed in the previous month (n = approximately 70/month) will be selected for a more in-depth EM assessment. Older adults who consent to participate will receive an in-home interview conducted by a trained community paramedic. The medic will complete a 1-hour assessment that includes a structured clinical interview and survey instruments designed to characterize the older adult's physical and mental health, current/recent EM exposure, and functional status/disability. Additionally, the assessment will include a systematic (with photographs) evaluation of the older adult's home environment (interior and exterior).

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3 3. LEAD Panel case reviews. Each month a randomly selected subset of the 70 follow-up interviews
4 completed in the previous month (n = approximately 18/month) will receive a LEAD (“Longitudinal,
5 experts, all data”) panel case review — a method of determining whether EM is occurring when no
6 true “gold standard” exists. Data from the follow-up interview will be synthesized into a report that
7 will be discussed by all LEAD panel members. The determination of these reviews (EM vs. no EM)
8 will serve as the “gold standard” measure of true EM occurrence used to calculate the sensitivity and
9 specificity of the DETECT screening tool.
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18 **Sample and setting**

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20 All data collection activities will be carried out in Tarrant County, Texas (population 218,000
21 adults aged 65+)[36] in partnership with MedStar Mobile Healthcare. All older adults treated by MedStar
22 medics at their place of residence, and who reside in the community (e.g., private home, unlicensed adult
23 foster homes, unlicensed board and care homes, etc.) during the 36-month study observation period will
24 receive an initial DETECT screening (n = 59,400). Other residences (e.g., licensed skilled nursing
25 facilities) will be excluded because reports of EM in these settings are generally not investigated by Texas
26 APS.[37]
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35 A simple random sample of the older adults who received an initial screening and meet inclusion
36 criteria will receive a follow-up interview during the 36-month study observation period (n = 2,520). We
37 chose to sample 2,520 older adults for follow-up based on a balance between a desire to maximize study
38 power and available resources (see below for full details of the power analysis). Eligibility criteria for
39 follow-up interview selection include: 1) screened with the DETECT tool by MedStar medics during the
40 study observation period; 2) reachable by telephone; 3) fluent in English; 4) able to communicate by
41 telephone; 5) cognitively able to consent; and 6) provides written informed consent.
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50 Finally, a simple random sample of completed follow-up interviews will be selected for LEAD
51 panel review (n = 648). Based on our previous study, the anticipated average age of the older adults
52 screened will be 77 and will approximate the demographic composition of Tarrant County.[32]
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PROCEDURES

Initial DETECT screenings

Initial DETECT screening data will be gathered as part of the routine clinical care (emergency response) protocol delivered by MedStar. Screenings are based on the total number of response calls made during the study observation period and the study design allows for the same individual to be screened upon multiple occasions; for instance, if an older adult places multiple calls during the study observation period. As EM risk is dynamic, over time, re-administration of the screening is appropriate in the context of repeated or sequential calls placed on different dates (i.e., multiple screenings will not be administered within the same 24-hour period) by the same individual.

When a call comes into MedStar's dispatch center, ambulances are routed to the scene of the call as usual. After arriving on scene and assessing the situation, medics will begin the process of creating a medical record for each patient in MedStar's Electronic Patient Care Reporting System (ePCR) — ImageTrend Elite. EMS services nationwide, and 36 statewide EMS systems, use the ImageTrend ePCR.^[38] The DETECT screening tool is built as an ImageTrend Elite module, which is incorporated directly into the ePCR, and could easily be incorporated into the ePCR of every EMS system that uses ImageTrend. The ePCR is programmed to automatically prompt medics to complete the DETECT tool while at a qualified 911 response. DETECT screens are automatically scored within the ePCR system, and positive screens will prompt the medic to file an APS report.

Recruitment for follow-up interviews

On the first day of each month, MedStar will generate a list of all older adults screened with the DETECT tool in the previous month. That list will be uploaded to Filemaker Pro, a powerful and secure program for designing and implementing data collection and data storage applications. Filemaker pro will randomize the patient list using a built-in pseudo-random number generator. Beginning at the top of the randomized patient list, a trained MedStar employee will attempt to schedule a 2 week post initial screening interview follow-up. Two weeks was selected to give patients time to be discharged from the hospital and/or to give APS time to conduct an investigation, where applicable.

The scheduler will attempt to reach each patient up to 5 times, occurring on 5 different calendar days. The scheduler will note the date and time of each unsuccessful contact attempt in the database. If the patient refuses to participate, the scheduler will note the date, time, and refusal reason in the database. If the patient agrees to participate, the scheduler will administer a version of the Montreal Cognitive Assessment that has been adapted for use over the telephone (T-MoCA).[39] The T-MoCA demonstrates excellent psychometric properties and is accurate in detecting dementia and significant cognitive impairment.[39] Patients who fall below a cutoff score of 17 on the T-MoCA will be considered ineligible to consent to participate. Finally, an in-home follow-up visit from a specially trained CP will be scheduled for patients with a T-MoCA score of 18 or higher who consent to participate.

Follow-up interviews

Follow-up interviews involve a community paramedic going to the older adult's home, obtaining written informed consent from the older adult, and administration of a structured clinical interview and validated survey instruments designed to characterize salient demographic characteristics, physical and mental health status, recent and lifelong EM exposure, the older adult's disability and functional status, and assessing and documenting (i.e., with photographs) the quality of the older adult's home environment (Table 1). Participants who complete the entire in-person interview will receive a \$25 gift card.

Table 1. Measures/instruments used during DETECT follow-up interviews.

Section/Measure/Questions
Sociodemographic information Household size Marital status Age Ethnicity Race Educational attainment Household income Military service history
General health Pain intensity and interference (PEG-3)[44] Medical Outcomes Study (SF-20)[45] Geriatric Depression Scale (GDS)[46]

<p>Alcohol use/misuse National Epidemiological Survey on Alcohol and Related Conditions - III (NESARC-III)[†][47] Alcohol Use (AUDIT-C)[48]</p>
<p>Self-report measures of current and past abuse, neglect, and exploitation National Elder Mistreatment Study[3] Self-Neglect Severity Scale (SNSS)[49]</p>
<p>Military sexual violence history (veterans only) “When you were in the military, did you ever receive unwanted, threatening or repeated sexual attention (for example, touching, cornering, pressure for sexual favors, or inappropriate verbal remarks, etc.)?” “When you were in the military, did you have contact against your will or when you were unable to say no (for example, after being forced or threatened or to avoid other consequences)?”</p>
<p>Self-reported Adult Protective Services Investigations History “Has anyone from Adult Protective Services (APS) ever attempted to investigate whether or not you were living with elder abuse or neglect?” “How many times has this happened in your life?” “When was the first time APS attempted to do an investigation?” “When was the most recent time APS attempted to do an investigation?”</p>
<p>Observational measures of older adult and environment Clutter Image Rating Scale[50] Elder Assessment Instrument (EAI)[51]</p>
<p>† We will use two questions from the NESARC-III as screen-in questions for the AUDIT-C. “In your entire life, have you had at least 1 drink of any kind of alcohol, not counting small tastes or sips?”, and “During the last 12 months, did you have at least 1 drink of any kind of alcohol?”</p>

In addition to assessing capacity prior to obtaining formal consent to participate in this study, older adults will be informed of all applicable local, state, and federal laws regarding mandated reporting of suspected or confirmed EM. We will inform older adults, of our responsibility to report any suspicions of EM to social services and/or law enforcement agencies. The community paramedic will be instructed to report any suspicion of EM to APS immediately following any follow-up interview where a suspicion arises. Further, if the community paramedic feels as though they, or the older adult, are at risk of serious immediate harm, they will be instructed to communicate that risk to MedStar dispatch via their two-way radio, and contact police if necessary. We anticipate that informing participants about mandatory reporting laws, and our intention to comply with them, will have minimal impact on participation. A recent study that conducted similar interviews in the community with older adults and their caregivers

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3 experienced only 1 out of 130 (< 1%) potential participants refused to participate based on the mandated
4 reporting requirement.[5]
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6 LEAD panel case reviews

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9 Using a LEAD panel framework similar to that used by Wiglesworth and colleagues,[5,40]
10 approximately 25% of all follow-up interviews will be randomly selected (n = 18 per month, 648 total)
11 each month for expert review. The LEAD panel includes a Texas based: a) board-certified geriatrician, b)
12 geriatric nurse practitioners, c) board-certified geriatric psychiatrist, d) geriatric social worker, and e)
13 special victims' prosecutor. This is consistent with the composition of LEAD panels used in the EM
14 literature. [1,5,40]
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22 Prior to the first case review LEAD panel session, the PI will convene a meeting of the LEAD
23 panel members to establish a systematic process for considering the data presented in each case review,
24 operational definitions of each type of EM, and a priori thresholds for making a determination of any type
25 of EM. For example, kicking an older adult once may be considered EM, but perhaps, given no other
26 evidence of psychological abuse, insulting and swearing at an older adult must occur six to 10 times over
27 a year to be considered EM.[5] The established process, definitions, and criteria will be included in
28 a manual that all LEAD panel members will review each month.
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37 On the first day of each month, we will create a summary report of all of the information gathered
38 by the CP during the follow-up interview for each of the 18 randomly selected cases. We will securely
39 transmit that report to all LEAD panel members who will then review each case prior to the monthly
40 meeting. Qualtrics survey software will be used to gather an initial independent determination of EM for
41 each case reviewed from each LEAD panel member. For each case, the panel member will select "yes" or
42 "no" for each of the following EM categories: physical abuse, emotional/psychological abuse, sexual
43 abuse, financial exploitation, and neglect.
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51 Finally, the LEAD panel will meet in-person for approximately 3 hours one day per month to
52 discuss each case and make a final consensus-based EM determination after considering all the evidence
53 presented. Aggregate deidentified results from this initial survey will be presented with each case at the
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3 monthly LEAD panel meeting. After up to 10 minutes of discussion, each LEAD panel member will vote
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5 for a second time in Qualtrics. If voting is not unanimous for each form of EM, then the determination
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7 will be made by a simple majority. Other LEAD panels used to determine EM found that more than 96%
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9 of cases reviewed resulted in a unanimous decision. In the 5 cases that were not unanimous, only one
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11 LEAD panel member disagreed with the majority.[5] Any case that the LEAD panel determines to be
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13 positive for any single form of EM will be considered a true positive instance of “any EM” for our
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15 analysis. Conversely, any case receiving a negative vote for all forms of EM will be considered a true
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17 negative instance of EM for our analysis.
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20 Administration of study measures.
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22 All community paramedics will undergo training that equips them to properly administer study
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24 measures, and properly obtain written informed consent from participants. Training for the administration
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26 of the DETECT tool and the follow-up interview will involve a multi-hour in person training prior to data
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28 collection. A web-based training module on the DETECT tool and the follow-up interview instruments
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30 will be available to medics throughout the study, and in-person refresher trainings will be offered
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32 quarterly. New medics that join the team after the onset of the study will undergo the training prior to
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34 administering any measures.
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36 37 **Planned Analyses**

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39 Aim 1. Validation of DETECT for the screening and detection of EM
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41 The sensitivity and specificity of the DETECT tool will be estimated relative to the LEAD panel
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43 standard. Ideally, the LEAD panel review would be performed on all subjects. However, the LEAD panel
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45 reviews are time intensive and therefore not feasible for all participants. Therefore, we will adopt a
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47 planned missingness strategy for our Aim 1 analysis. Specifically, we will randomly sample 25% of
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49 follow-up investigations to receive LEAD assessment. The results of this sample will be used to estimate
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51 the sensitivity and specificity of the DETECT tool with high statistical efficiency and without bias by
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53 treating the LEAD sample as a validation study and employing modern missing data techniques. We will
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55 use multiple imputation for measurement error correction (MIME) to impute the expected LEAD panel
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3 review result from the same measures the LEAD panel will use to make their determinations.[41] This
4 imputed gold standard measure will then be compared against DETECT to estimate the sensitivity and
5 specificity of the screening tool. All imputations will be done using a fully conditional specification in
6 PROC MI in SAS v9.4. This approach has been successfully used with validation subsamples in chronic
7 disease studies including studies of older adults entering hospice care.[42] Sensitivity and specificity will
8 be calculated directly from the collected data using PROC FREQ in SAS v9.4. Exact confidence intervals
9 will be estimated based on a binomial test using PROC FREQ. Multiple imputations will be combined
10 using PROC MIANALYZE in SAS V9.4. The use of a validation sample will allow for efficient
11 estimates of the sensitivity and specificity of DETECT, while still allowing a large sample size for
12 etiological analyses not using the LEAD outcome.

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14 To characterize the expected precision of our validation analysis accounting for the sampling
15 error introduced by the MIME procedure, we performed Monte Carlo simulations estimating the marginal
16 error of our sensitivity estimate - varying the baseline EM prevalence and sensitivity. Prevalence was
17 varied between 11% (estimated population baseline rate) and 16% (the estimated rate in the DETECT
18 pilot studies). Sensitivity was varied from 0.7 to 0.9. Type-1 error was fixed at 0.05. Based on expected
19 monthly screenings from the pilot study and budgetary constraints, sample size was fixed at 2,500 follow-
20 up interviews. The marginal error of our estimated sensitivity decreased with increased sensitivity and
21 increased prevalence (Figure 2).

22 Aim 2. DETECT item reduction

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24 DETECT is a priori hypothesized to assess a single underlying latent construct, EM. As such,
25 confirmatory factor analysis (CFA) will be used to reduce the number of DETECT screening tool items.
26 The CFA model will estimate factor loadings of all DETECT screening items on a single latent construct
27 while allowing for covariance between the items. Any items with negative factor loadings will be
28 trimmed from the model. Further items will be considered for removal based on their factor loadings
29 (loading <0.3), positive covariance with other items, and overall model fit. Appropriate model fit will be

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3 assessed using the comparative fit index (CFI>0.9) and the root mean square error of approximation
4 (RMSEA<0.08). Internal consistency will be estimated for the reduced tool using Cronbach's alpha.
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7 To verify that item reduction has not negatively impacted the validity of the DETECT tool, we
8 will reassess the validity of the shortened tool using the methods described in the aim 1 analysis. If
9 substantive reductions in sensitivity or specificity are seen in comparison to the full tool, we will
10 iteratively replace removed items until sensitivity and specificity are restored.
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15 Aim 3. Explore potentially modifiable risk and protective factors

16 The association of modifiable risk and protective factors with EM will be estimated using logistic
17 regression with PROC GENMOD in SAS v9.4. Information from our follow-up measures and the LEAD
18 panel's determination will be pooled using the multiple imputation techniques previously discussed.
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24 Patient and Public Involvement:

25 Medics at MedStar and Texas APS caseworkers previously identified barriers to the detection and
26 reporting of EM experienced by medics providing emergency medical services in the field.^[20] MedStar
27 medics were also involved in creating and pilot testing the DETECT tool.^[18,32] In the current study, our
28 data collection software includes a link that community paramedics can use to provide the PI with
29 feedback at any time. There is also a plan to elicit feedback from medics during all training sessions, and
30 the PI will elicit feedback from older adults in the community during "ride-alongs".
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39 DISCUSSION:

40 In our experience, hospital environments are highly complex, and changing screening practices
41 can be a slow process with many barriers. By comparison, EMS services organizations are nimble,
42 adaptive, and eager to find new ways to contribute to the public's health. DETECT represents the first
43 observation-based EM screening tool designed for emergency medical providers. The primary purpose of
44 the current study is to test the validity and reliability of the DETECT screening tool using a gold-standard
45 LEAD panel. In addition, we will attempt to develop a reduced item version of the DETECT screening
46 tool that maintains high levels of reliability and validity. Finally, we plan to identify potentially
47 modifiable risk and protective factors for EM using MedStar's ePCR, photographs, and questionnaires.
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3 Given that there are more than 800,000 medics providing services in every county nationwide,[43] a valid
4 and reliable screening tool that is easy for EMS providers to use could dramatically increase sentinel
5 surveillance of EM in a very short time. Therefore, successful completion of this project has the potential
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8 to make a significant, immediate public health impact.
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11 **ETHICS AND DISSEMINATION:**

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13 Ethical and safety considerations for this work include consideration of matters of capacity (i.e.,
14 to consent), personal safety (i.e., safe to participate in an interview about maltreatment), the reality that
15 disclosure of maltreatment may be unpleasant and uncomfortable for older adults even in circumstances
16 where it is not physically unsafe, and participants may experience embarrassment about EM, the
17 condition of their health, home environment, etc. However, the study protocol ensures that all participants
18 are well informed about the scope of the study and the topics included in the interview prior to obtaining
19 consent. Participants are informed that their participation is voluntary, they may choose to skip any
20 question they like, and may withdraw from the study at any time without consequence.
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30 Ethical and safety considerations regarding breach of privacy and the social, economic and safety
31 consequences such a breach may introduce also warrant comment. As with any research, the risk of
32 breach of confidentiality, particularly the inadvertent transmission of health information, personal
33 identifiers, contextual factors associated with the quality of environment in one's home, the status of
34 one's physical and/or mental health and the health of one's relationship with a primary caregiver, is a
35 serious ethical consideration. Our study protocol ensures that data are collected, stored, analyzed and
36 ultimately discarded in a manner consistent with the highest ethical standards.
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45 It is our intention to disseminate study findings to the scientific community through formal
46 presentations at local, national and international conferences and through publication in peer reviewed
47 scientific journals. Given the large number of Tarrant County older adults who will participate in this
48 study, we will also work with local agencies that serve this population, local churches, and community
49 centers to hold town hall meetings where our findings are discussed. Finally, if successful, we intend to
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BC, JMRG, MDL, and JCW conceived the study protocol and obtained funding for the study. All authors made substantial contributions to translating the study's funding proposal into the current manuscript.

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FIGURE LEGEND

Figure 1. Data collection activities and timeline.

Figure 2. Marginal error around estimates of sensitivity at varying levels of sensitivity and baseline EM prevalence.

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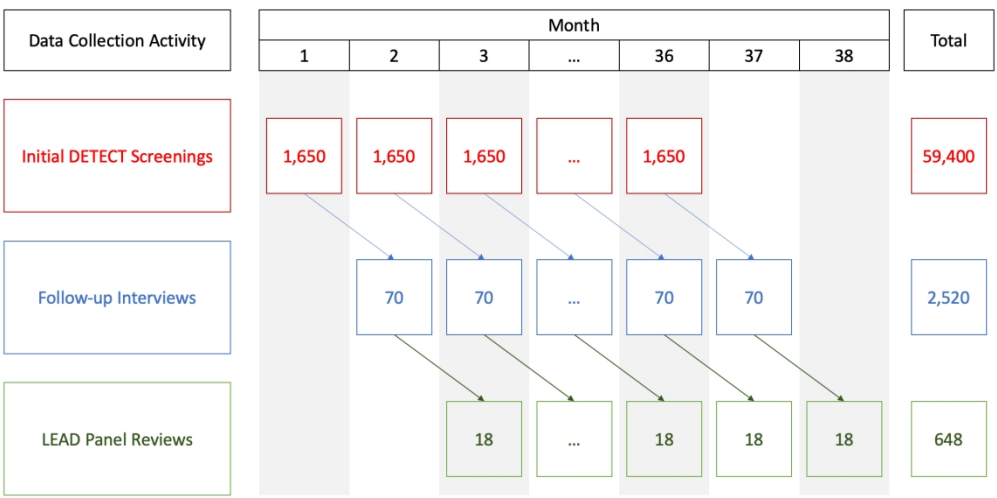


Figure 1. Data collection activities and timeline.

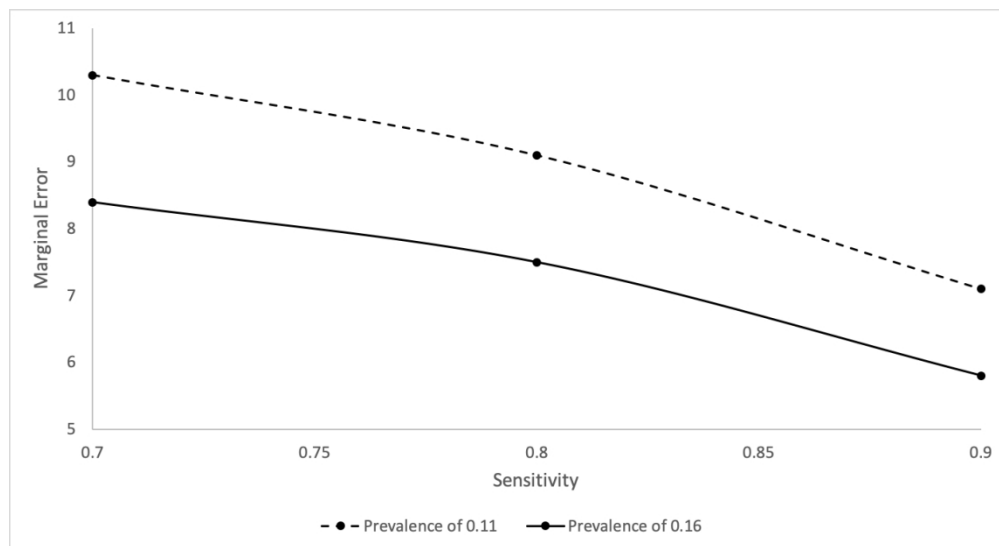


Figure 2. Marginal error around estimates of sensitivity at varying levels of sensitivity and baseline EM prevalence.

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Validation of the Detection of Elder abuse Through Emergency Care Technicians (DETECT) screening tool: A Study Protocol

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Title

Validation of the Detection of Elder abuse Through Emergency Care Technicians (DETECT) screening tool: A Study Protocol

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Abstract

Introduction. Elder mistreatment (EM) is a high prevalence threat to the health and well-being of older adults in the United States. Medics are well-positioned to help with identification of older adults at risk for EM, however, field robust screening tools appropriate for efficient, observation-based screening are lacking. Prior work by this team focused on the development and initial pilot testing of an observation-based EM screening tool named DETECT (i.e., Detection of Elder Mistreatment Through Emergency Care Technicians), designed to be implemented by medics during the course of an emergency response (911) call. The objective of the present work is to validate and further refine this tool in preparation for clinical dissemination.

Methods and analysis. Approximately 59,400 community dwelling older adults who place 911 calls during the 36-month study observation period will be screened by medics responding to the call using the DETECT tool. Next, a random subsample of 2,520 of the 59,400 older adults screened will be selected to participate in a follow-up interview approximately two weeks following the completion of the screening. Follow-up interviews will consist of a medic-led semi-structured interview designed to assess the older adult's likelihood of abuse exposure, physical/mental health status, cognitive functioning, and to systematically evaluate the quality and condition of their physical and social living environment. The data from 25% (n = 648) of these follow-up interviews will be presented to a LEAD panel for a final determination of EM exposure status, representing the closest proxy to a 'gold standard' measure available.

Ethics and dissemination. This study has been reviewed and approved by the Committee for the Protection of Human Subjects at the University of Texas School of Public Health. The results will be disseminated through formal presentations at local, national and international conferences and through publication in peer-reviewed scientific journals.

STRENGTHS AND LIMITATIONS:

1. The size and scope of this study (i.e., screening data on more than 50,000 emergency response calls among community-dwelling older adults and follow-up data on 2,500 community-dwelling older adults) will represent one of the largest studies of EM screening ever conducted.
2. The use of a planned missingness study design and rigorously documented LEAD panel “gold standard” will provide valuable information for the design and conduct of future elder mistreatment studies.
3. Practical considerations require us to screen out participants with probable dementia, which will limit the generalizability of our results to older adults who are not living with dementia.
4. There are many salient aspects of the physical and social environment that act as indicators of elder mistreatment, and the current study cannot capture them all perfectly.
5. The current study does not attempt to address or prevent the occurrence of elder mistreatment — including patient-important outcomes — beyond reporting potential mistreatment to Adult Protective Services.

BACKGROUND

Elder mistreatment (EM) is commonly defined as an intentional act, or failure to act, by a caregiver or another person in a relationship involving an expectation of trust that causes harm or creates a risk of harm to an older adult.[1,2] population-based studies suggest that more than one-in-ten cognitively intact, community-dwelling older adults experience EM annually;[3] older adults with disabilities face an even greater risk.[4,5] EM may take many forms, including physical, emotional/psychological and sexual abuse, neglect, and financial exploitation. EM exposure is often chronic, and polyvictimization (i.e., exposure to multiple forms of EM concurrently) is common.[1,2,6]

The public health impact of EM is considerable. EM is associated with depression,[7] functional decline,[8,9] emergency room visits,[10] hospital admissions,[11] and all-cause mortality compared to non-maltreated older adults.[12–15] The costs associated with lost income, recovery from financial exploitation, and the medical, legal and social services interventions needed by maltreated older adults is estimated to be in the billions of dollars annually.[2] Nevertheless, studies consistently find that as many as 80-90% of cases are never reported.[3,16,17] Therefore, effective and efficient EM screening tools are urgently needed to improve detection.

Emergency medical technicians and paramedics, collectively referred to as medics, constitute an important and largely untapped EM surveillance force.[18,19] Medics' access to older adults' residences allows them to observe the older adult's physical and social environment — access which is shared by few others.[18,20] This access facilitates unique opportunities to identify indicators of EM that may otherwise go undetected.[20] However, until recently existing EM screening tools were inappropriate for use in emergency medical settings because of their length and/or because of their reliance on direct questioning of the older adult or caregiver.[20–31] The **Detection of Elder abuse Through Emergency Care Technicians (DETECT)** tool was developed in collaboration with medics specifically to address this gap, and to increase systematic surveillance and reporting of potential EM in the community.

Beginning in 2014, our research team partnered with MedStar Mobile Healthcare — the exclusive ambulance service provider to 15 Tarrant County (TX) cities — and Texas Adult Protective Services

(APS) to develop and pilot test the DETECT screening tool.[18,20,32] The DETECT tool was designed to (1) be brief, (2) based on the medic's direct *observations* of the older adult and his/her physical and social environment, (3) provide reporting guidance, and (4) be integrated into existing procedures and medical charting software.[18] The pilot test of the 26-item screening tool produced positive results. During the five-week pilot test, the DETECT screening tool was used 1,247 times by 251 medics – resulting in 209 positive screens (16.8%). Immediately following the introduction of the DETECT screening tool, there was an increase of 5.4 ($p = 0.0056$) validated reports of EM per month – a 226% improvement.[32] Results from these preliminary studies provide evidence of the feasibility of implementing the DETECT screening tool to enhance the detection of EM with EMS providers.

While this preliminary work provides a strong foundation, further research is needed to examine concordance between DETECT screening results and validated EM. In the pilot study, positive DETECT results were compared to APS investigations, but this work did not permit validation of negative DETECT results. It was not possible to calculate any measure of diagnostic performance that required information about true exposure to EM in cases that screened negative (e.g., sensitivity and specificity) with the DETECT tool. Additionally, validation of the DETECT tool against a proper “gold standard” EM assessment is warranted.[33] Finally, the pilot study was not designed to gather contextual information about EM cases, eclipsing the opportunity to fully understand the social, psychological, health, behavioral and environmental risk factors that contribute to EM, are observable in the older adult's environment, and may serve as early EM warning signs.

Study aims

The overarching goal of this study is to evaluate the *validity* and *reliability* of the DETECT screening tool. Specifically, this study will examine three specific aims:

1. To validate DETECT for the screening and detection of EM. We will match DETECT screening results with an expert panel determination “gold standard” to calculate the tool's diagnostic performance.

2. To develop an abbreviated version of the DETECT screening tool. We will use confirmatory factor analysis to determine the relative predictive value of each DETECT screening item. Results will inform systematic item reduction efforts — streamlining the tool for optimally efficient administration.
3. To identify potentially modifiable risk and protective factors for EM using follow-up in-person interviews which will provide rich contextual data that highlight modifiable personal and environmental factors.[3,34,35] In this aim, we will mine that data for novel relationships and potential targets for future intervention.

METHODS

Study design

The DETECT validation study employs a prospective cohort design that includes 3 distinct data collection activities. These activities, and their relationship to each other, are shown in Figure 1 and described in detail below. Briefly, they include:

1. *Initial DETECT screenings.* MedStar medics have been using the DETECT screening tool in the context of all emergency responses (i.e., 911) for community-dwelling older adults since February 2017 (n = approximately 1,650 per month). The medics will continue to use the tool throughout the 36-month study observation period.
2. *Follow-up interviews.* Each month, a random subset of the 1,650 screenings completed in the previous month (n = approximately 70/month) will be selected for a more in-depth EM assessment. Older adults who consent to participate will receive an in-home interview conducted by a trained community paramedic. The medic will complete a 1-hour assessment that includes a structured clinical interview and survey instruments designed to characterize the older adult's physical and mental health, current/recent EM exposure, and functional status/disability. Additionally, the assessment will include a systematic (with photographs) evaluation of the older adult's home environment (interior and exterior).

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3 3. *LEAD Panel case reviews*. Each month a randomly selected subset of the 70 follow-up interviews
4 completed in the previous month (n = approximately 18/month) will receive a LEAD (“Longitudinal,
5 experts, all data”) panel case review — a method of determining whether EM is occurring when no
6 true “gold standard” exists. Data from the follow-up interview will be synthesized into a report that
7 will be discussed by all LEAD panel members. The determination of these reviews (EM vs. no EM)
8 will serve as the “gold standard” measure of true EM occurrence used to calculate the sensitivity and
9 specificity of the DETECT screening tool.
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18 **Sample and setting**

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20 All data collection activities will be carried out in Tarrant County, Texas (population 218,000
21 adults aged 65+)[36] in partnership with MedStar Mobile Healthcare. All older adults treated by MedStar
22 medics at their place of residence, and who reside in the community (e.g., private home, unlicensed adult
23 foster homes, unlicensed board and care homes, etc.) during the 36-month study observation period will
24 receive an initial DETECT screening (n = 59,400). Other residences (e.g., licensed skilled nursing
25 facilities) will be excluded because reports of EM in these settings are generally not investigated by Texas
26 APS.[37]
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35 A simple random sample of the older adults who received an initial screening and meet inclusion
36 criteria will receive a follow-up interview during the 36-month study observation period (n = 2,520). We
37 chose to sample 2,520 older adults for follow-up based on a balance between a desire to maximize study
38 power and available resources (see below for full details of the power analysis). Eligibility criteria for
39 follow-up interview selection include: 1) screened with the DETECT tool by MedStar medics during the
40 study observation period; 2) reachable by telephone; 3) fluent in English; 4) able to communicate by
41 telephone; 5) cognitively able to consent; and 6) provides written informed consent.
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50 As part of a planned missingness design, a simple random sample of completed follow-up
51 interviews will be selected for LEAD panel review (n = 648). Based on our previous study, the
52 anticipated average age of the older adults screened will be 77 and will approximate the demographic
53 composition of Tarrant County.[32]
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Procedures

Initial DETECT screenings

Initial DETECT screening data will be gathered as part of the routine clinical care (emergency response) protocol delivered by MedStar. Screenings are based on the total number of response calls made during the study observation period and the study design allows for the same individual to be screened upon multiple occasions; for instance, if an older adult places multiple calls during the study observation period. As EM risk is dynamic, over time, re-administration of the screening is appropriate in the context of repeated or sequential calls placed on different dates (i.e., multiple screenings will not be administered within the same 24-hour period) by the same individual.

When a call comes into MedStar's dispatch center, ambulances are routed to the scene of the call as usual. After arriving on scene and assessing the situation, medics will begin the process of creating a medical record for each patient in MedStar's Electronic Patient Care Reporting System (ePCR) — ImageTrend Elite. EMS services nationwide, and 36 statewide EMS systems, use the ImageTrend ePCR.[38] The DETECT screening tool is built as an ImageTrend Elite module, which is incorporated directly into the ePCR, and could easily be incorporated into the ePCR of every EMS system that uses ImageTrend. The ePCR is programmed to automatically prompt medics to complete the DETECT tool while at a qualified 911 response. DETECT screens are automatically scored within the ePCR system, and positive screens will prompt the medic to file an APS report.

Recruitment for follow-up interviews

On the first day of each month, MedStar will generate a list of all older adults screened with the DETECT tool in the previous month. That list will be uploaded to Filemaker Pro, a program for designing and implementing data collection and data storage applications. Filemaker pro will randomize the patient list using a built-in pseudo-random number generator. Beginning at the top of the randomized patient list, a trained MedStar employee will attempt to schedule a 2 week post initial screening interview follow-up. Two weeks was selected to give patients time to be discharged from the hospital and/or to give APS time to conduct an investigation, where applicable.

The scheduler will attempt to reach each patient up to 5 times, occurring on 5 different calendar days. The scheduler will note the date and time of each unsuccessful contact attempt in the database. If the patient refuses to participate, the scheduler will note the date, time, and refusal reason in the database. If the patient agrees to participate, the scheduler will administer a version of the Montreal Cognitive Assessment that has been adapted for use over the telephone (T-MoCA).[39] The T-MoCA demonstrates excellent psychometric properties and is accurate in detecting dementia and significant cognitive impairment.[39] Patients who fall below a cutoff score of 17 on the T-MoCA will be considered ineligible to consent to participate. Finally, an in-home follow-up visit from a specially trained CP will be scheduled for patients with a T-MoCA score of 18 or higher who consent to participate.

Follow-up interviews

Follow-up interviews involve a community paramedic going to the older adult's home, obtaining written informed consent from the older adult, and administration of a structured clinical interview and validated survey instruments designed to characterize salient demographic characteristics, physical and mental health status, recent and lifelong EM exposure, the older adult's disability and functional status, and assessing and documenting (i.e., with photographs) the quality of the older adult's home environment (Table 1). Participants who complete the entire in-person interview will receive a \$25 gift card.

Table 1. Measures/instruments used during DETECT follow-up interviews.

Section/Measure/Questions
Sociodemographic information Household size Marital status Age Ethnicity Race Educational attainment Household income Military service history
General health Pain intensity and interference (PEG-3)[40] Medical Outcomes Study (SF-20)[41] Geriatric Depression Scale (GDS)[42]

<p>Alcohol use/misuse National Epidemiological Survey on Alcohol and Related Conditions - III (NESARC-III)[†][43] Alcohol Use (AUDIT-C)[44]</p>
<p>Self-report measures of current and past abuse, neglect, and exploitation National Elder Mistreatment Study[3] Self-Neglect Severity Scale (SNSS)[45]</p>
<p>Military sexual violence history (veterans only) “When you were in the military, did you ever receive unwanted, threatening or repeated sexual attention (for example, touching, cornering, pressure for sexual favors, or inappropriate verbal remarks, etc.)?” “When you were in the military, did you have contact against your will or when you were unable to say no (for example, after being forced or threatened or to avoid other consequences)?”</p>
<p>Self-reported Adult Protective Services Investigations History “Has anyone from Adult Protective Services (APS) ever attempted to investigate whether or not you were living with elder abuse or neglect?” “How many times has this happened in your life?” “When was the first time APS attempted to do an investigation?” “When was the most recent time APS attempted to do an investigation?”</p>
<p>Observational measures of older adult and environment Clutter Image Rating Scale[46] Elder Assessment Instrument (EAI)[47]</p>
<p>[†] We will use two questions from the NESARC-III as screen-in questions for the AUDIT-C. “In your entire life, have you had at least 1 drink of any kind of alcohol, not counting small tastes or sips?”, and “During the last 12 months, did you have at least 1 drink of any kind of alcohol?”</p>

In addition to assessing capacity prior to obtaining formal consent to participate in this study, older adults will be informed of all applicable local, state, and federal laws regarding mandated reporting of suspected or confirmed EM. We will inform older adults of our responsibility to report any suspicions of EM to social services and/or law enforcement agencies. The community paramedic will be instructed to report any suspicion of EM to APS immediately following any follow-up interview where a suspicion arises. Further, if the community paramedic feels as though they, or the older adult, are at risk of serious immediate harm, they will be instructed to communicate that risk to MedStar dispatch via their two-way radio, and contact police if necessary. We anticipate that informing participants about mandatory reporting laws, and our intention to comply with them, will have minimal impact on participation. A recent study that conducted similar interviews in the community with older adults and their caregivers

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3 experienced only 1 out of 130 (< 1%) potential participants refused to participate based on the mandated
4 reporting requirement.[5]
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7 All community paramedics will undergo training that equips them to properly administer study
8 measures, and properly obtain written informed consent from participants. Training for the administration
9 of the DETECT tool and the follow-up interview will involve a multi-hour in-person training prior to data
10 collection. A web-based training module on the DETECT tool and the follow-up interview instruments
11 will be available to medics throughout the study, and in-person refresher training will be offered
12 quarterly. New medics that join the team after the onset of the study will undergo the training prior to
13 administering any measures.
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22 LEAD panel case reviews

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24 Using a LEAD panel framework similar to that used by Wigglesworth and colleagues,[5,48]
25 approximately 25% of all follow-up interviews will be randomly selected (n = 18 per month, 648 total)
26 each month for expert review. The LEAD panel includes a Texas based: a) board-certified geriatrician, b)
27 geriatric nurse practitioners, c) board-certified geriatric psychiatrist, d) geriatric social worker, and e)
28 special victims' prosecutor. This is consistent with the composition of LEAD panels used in the EM
29 literature. [1,5,48]
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37 Prior to the first case review LEAD panel session, the PI will convene a meeting of the LEAD
38 panel members to establish a systematic process for considering the data presented in each case review,
39 operational definitions of each type of EM, and a priori thresholds for making a determination of any type
40 of EM. For example, kicking an older adult once may be considered EM, but perhaps, given no other
41 evidence of psychological abuse, insulting and swearing at an older adult must occur six to 10 times over
42 a year to be considered EM.[5] The established process, definitions, and criteria will be included in a
43 manual that all LEAD panel members will review each month.
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51 On the first day of each month, we will create a summary report of all of the information gathered
52 by the CP during the follow-up interview for each of the 18 randomly selected cases. We will securely
53 transmit that report to all LEAD panel members who will then review each case prior to the monthly
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3 meeting. This summary report will not contain the results of the initial DETECT screening. Qualtrics
4 survey software will be used to gather an initial independent determination of EM for each case reviewed
5 from each LEAD panel member. For each case, the panel member will select “yes” or “no” for each of
6 the following EM categories: physical abuse, emotional/psychological abuse, sexual abuse, financial
7 exploitation, and neglect.
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14 Finally, the LEAD panel will meet in-person for approximately 3 hours on one day per month to
15 discuss each case and make a final consensus-based EM determination after considering all the evidence
16 presented (i.e., follow-up interview responses and medical information collected by MedStar Mobile
17 Healthcare). Aggregate deidentified results from this initial survey will be presented with each case at the
18 monthly LEAD panel meeting. After up to 10 minutes of discussion, each LEAD panel member will vote
19 for a second time in Qualtrics. If voting is not unanimous for each form of EM, then the determination
20 will be made by a simple majority. Other LEAD panels used to determine EM found that more than 96%
21 of cases reviewed resulted in a unanimous decision. In the 5 cases that were not unanimous, only one
22 LEAD panel member disagreed with the majority.[5] Any case that the LEAD panel determines to be
23 positive for any single form of EM will be considered a positive instance of EM.. Conversely, any case
24 receiving a negative vote for all forms of EM will be considered a negative instance of EM.. The LEAD
25 assessments will be treated as the gold standard in subsequent analyses.
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39 **Planned Analyses**

40 Aim 1. Validation of DETECT for the screening and detection of EM

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43 The sensitivity and specificity of the DETECT tool will be estimated relative to the LEAD panel
44 standard. Ideally, the LEAD panel review would be performed on all subjects. However, the LEAD panel
45 reviews are time intensive and therefore not feasible for all participants. Therefore, we will adopt a
46 planned missingness strategy for our Aim 1 analysis. Specifically, we will randomly sample 25% of
47 follow-up investigations to receive LEAD assessment. The results of this sample will be used to estimate
48 the sensitivity and specificity of the DETECT tool with high statistical efficiency and without bias by
49 treating the LEAD sample as a validation study and employing modern missing data techniques. We will
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3 use multiple imputation for measurement error correction (MIME) to impute the expected LEAD panel
4 review result from the same measures the LEAD panel will use to make their determinations.[49] This
5 imputed gold standard measure will then be compared against DETECT to estimate the sensitivity and
6 specificity of the screening tool. All imputations will be done using a fully conditional specification in
7 PROC MI in SAS v9.4. This approach has been successfully used with validation subsamples in chronic
8 disease studies including studies of older adults entering hospice care.[50] Sensitivity and specificity will
9 be calculated directly from the collected data using PROC FREQ in SAS v9.4. Exact confidence intervals
10 will be estimated based on a binomial test using PROC FREQ. Multiple imputations will be combined
11 using PROC MIANALYZE in SAS V9.4. The use of a validation sample will allow for efficient
12 estimates of the sensitivity and specificity of DETECT, while still allowing a large sample size for
13 etiological analyses not using the LEAD outcome.

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15 To characterize the expected precision of our validation analysis accounting for the sampling
16 error introduced by the MIME procedure, we performed Monte Carlo simulations estimating the marginal
17 error of our sensitivity estimate - varying the baseline EM prevalence and sensitivity. Prevalence was
18 varied between 11% (estimated population baseline rate) and 16% (the estimated rate in the DETECT
19 pilot studies). Sensitivity was varied from 0.7 to 0.9. Type-1 error was fixed at 0.05. Based on expected
20 monthly screenings from the pilot study and budgetary constraints, sample size was fixed at 2,500 follow-
21 up interviews. The marginal error of our estimated sensitivity decreased with increased sensitivity and
22 increased prevalence (Figure 2).

23 Aim 2. DETECT item reduction

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25 DETECT is a priori hypothesized to assess a single underlying latent construct, EM. As such,
26 confirmatory factor analysis (CFA) will be used to reduce the number of DETECT screening tool items.
27 The CFA model will estimate factor loadings of all DETECT screening items on a single latent construct
28 while allowing for covariance between the items. Any items with negative factor loadings will be
29 trimmed from the model. Further items will be considered for removal based on their factor loadings
30 (loading <0.3), positive covariance with other items, and overall model fit. Appropriate model fit will be

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3 assessed using the comparative fit index (CFI>0.9) and the root mean square error of approximation
4 (RMSEA<0.08). Internal consistency will be estimated for the abbreviated tool using Cronbach's alpha.
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7 To verify that item reduction has not negatively impacted the validity of the DETECT tool, we
8 will reassess the validity of the shortened tool using the methods described in the aim 1 analysis. If
9 substantive reductions in sensitivity or specificity are seen in comparison to the full tool, we will
10 iteratively replace removed items until sensitivity and specificity are restored.
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15 Aim 3. Explore potentially modifiable risk and protective factors

16 The association of modifiable risk and protective factors with EM will be estimated using logistic
17 regression with PROC GENMOD in SAS v9.4. Information from our follow-up measures and the LEAD
18 panel's determination will be pooled using the multiple imputation techniques previously discussed.
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24 Patient and Public Involvement

25 Medics at MedStar and Texas APS caseworkers previously identified barriers to the detection and
26 reporting of EM experienced by medics providing emergency medical services in the field.[20] MedStar
27 medics were also involved in creating and pilot testing the DETECT tool.[18,32] In the current study, our
28 data collection software includes a link that community paramedics can use to provide the PI with
29 feedback at any time. There is also a plan to elicit feedback from medics during all training sessions, and
30 the PI will elicit feedback from older adults in the community during "ride-alongs".
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39 DISCUSSION

40 In our experience, hospital environments are highly complex, and changing screening practices
41 can be a slow process with many barriers. By comparison, EMS services organizations are nimble,
42 adaptive, and eager to find new ways to contribute to the public's health. The primary purpose of the
43 current study protocol is to test the validity and reliability of the DETECT screening tool using a gold-
44 standard LEAD panel. This will be the first study conducted, to our knowledge, to validate and
45 psychometrically test an elder mistreatment screening tool that uses systematic observation of the older
46 adult and their environment.
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3 Best practices for LEAD panel case review methodology — including their composition — are
4 incompletely understood. We modeled our LEAD panel after the LEAD panels described by Wigglesworth
5 and colleagues,[5,48] which were the best-documented LEAD panels at the time this protocol was
6 written. Although we did not specifically design the current study to test hypotheses related to LEAD
7 panel best practices, we are currently planning exploratory studies with other research groups who are
8 also using LEAD panel methodology that will investigate the impact of panel composition on case
9 adjudication. Indeed, documenting the LEAD panel composition and procedures we are utilizing in this
10 manuscript, along with future studies documenting the potential impacts of the composition and
11 procedures, may prove to be of great value to the field.

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22 Given that there are more than 800,000 medics providing services in every county
23 nationwide,[51] a valid and reliable screening tool that is easy for EMS providers to use could
24 dramatically increase sentinel surveillance of EM in a very short time. Therefore, successful completion
25 of this project has the potential to make a significant, immediate public health impact.

26 27 28 29 30 31 **ETHICS AND DISSEMINATION**

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33 Ethical and safety considerations for this work include consideration of matters of capacity (i.e.,
34 to consent), personal safety (i.e., safe to participate in an interview about maltreatment), the reality that
35 disclosure of maltreatment may be unpleasant and uncomfortable for older adults even in circumstances
36 where it is not physically unsafe, and participants may experience embarrassment about EM, the
37 condition of their health, home environment, etc. However, the study protocol ensures that all participants
38 are well informed about the scope of the study and the topics included in the interview prior to obtaining
39 consent. Participants are informed that their participation is voluntary, they may choose to skip any
40 question they like, and may withdraw from the study at any time without consequence. In addition, older
41 adults will be informed of all applicable local, state, and federal laws regarding mandated reporting of
42 suspected or confirmed EM prior to obtaining consent. We will inform older adults, and other
43 informants/guardians where applicable, of our responsibility to report suspected EM to the appropriate
44 social services or law enforcement agencies.

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3 Ethical and safety considerations regarding breach of privacy and the social, economic and safety
4 consequences such a breach may introduce also warrant comment. As with any research, the risk of
5 breach of confidentiality, particularly the inadvertent transmission of health information, personal
6 identifiers, contextual factors associated with the quality of environment in one's home, the status of
7 one's physical and/or mental health and the health of one's relationship with a primary caregiver, is a
8 serious ethical consideration. Our study protocol ensures that data are collected, stored, analyzed and
9 ultimately discarded in a manner consistent with the highest ethical standards.
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12 It is our intention to disseminate study findings to the scientific community through formal
13 presentations at local, national and international conferences and through publication in peer reviewed
14 scientific journals. Given the large number of Tarrant County older adults who will participate in this
15 study, we will also work with local agencies that serve this population, local churches, and community
16 centers to hold town hall meetings where our findings are discussed. Finally, if successful, we intend to
17 develop and implement continuing medical education and professional credentialing education about the
18 use of the DETECT tool among medics.
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35 **AUTHOR CONTRIBUTIONS:**

36 BC, JMRG, MDL, and JCW conceived the study protocol and obtained funding for the study. All authors
37 (BC, JCM, MDL, JB, MP) made substantial contributions to translating the study's funding proposal into
38 the current manuscript.
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49 Robbins, and the Fort Worth Safe Communities Coalition for their continued support and dedication in
50 this project.
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The authors have nothing to disclose.

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Figure 1. Data collection activities and timeline.

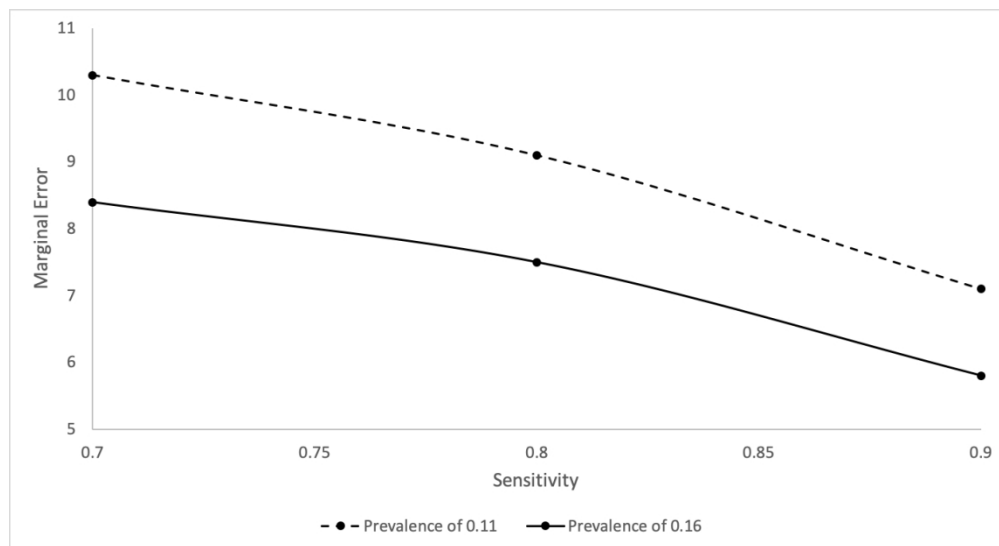


Figure 2. Marginal error around estimates of sensitivity at varying levels of sensitivity and baseline EM prevalence.

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