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Double jeopardy: Predictors of elevated lethality risk among intimate partner violence victims seen in emergency departments

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Introduction

Intimate partner violence (IPV) is a significant public health problem, with 25–33% of U.S. women experiencing some form of IPV in their lifetimes (Black et al., 2010; Breiding et al., 2014). Half of all homicides against U.S. women are perpetrated by intimate partners, resulting in approximately 2340 deaths in 2007 alone (Salari and Sillito, 2016; Stöckl et al., 2013; Catalano et al., 2009; Smith et al., 2014). Children are at considerable risk of death in the context of intimate partner homicide (Hamilton et al., 2012; Sillito and Salari, 2011; Smith et al., 2014). For example, a study of the 84 intimate partner homicides in one Canadian province between 2003 and 2009 reported that in a third of intimate partner homicides where a child resided with a primary victim, a child was targeted for homicide as well (Hamilton et al., 2012). Experiencing IPV is associated with long-term health and psychological complications, such as chronic illness, depression and post-traumatic stress disorder for both victims and their children (Dillon et al., 2013; Hamby et al., 2011; Herrenkohl et al., 2008). For victims with children, these adverse outcomes often begin in the prenatal period (Gardner et al., 2012; Lipsky et al., 2004; Samandari et al., 2010). Perpetration of both IPV and intimate partner homicide may be affected by the relationship between perpetrator and victim. Existing literature suggests ex-partners perpetrate both IPV and intimate partner homicide at higher rates than spouses (Block, 2000; Catalano, 2006). These trends may be similar for dating partners, although evidence for elevated risk is more robust for intimate partner homicide than IPV (Block, 2000; Catalano, 2006; Campbell et al., 2009).

Many victims of intimate partner homicide are seen in emergency departments (EDs) in the year prior to their death, making EDs a critical point of intervention and prevention (Block, 2000; Campbell et al., 2007; Juodis et al., 2014). National estimates approximate that over 14%

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of women treated in EDs were there for IPV-related reasons, with > 1.25 million estimated visits annually (Ambuel et al., 2013; Davidov et al., 2015). A majority of patients experiencing IPV state a willingness to disclose their victimization to healthcare providers (Beynon et al., 2012; Boyle and Jones, 2006; Davidov et al., 2015). While EDs are a key point of IPV intervention, providers are often poorly equipped to manage these disclosures, citing time limitations, discomfort with the subject area, or lack of knowledge in accurately recognizing and responding to IPV (Beynon et al., 2012; Hoffstetter et al., 2005).

Many EDs report having at least one protocol or procedure in place for IPV prevention or intervention (Glass et al., 2001; Saltzman et al., 2005). EDs typically address IPV through a combination of brief screening and paper-based referrals, but this approach does not decrease IPV re-victimization at follow-up (Hegarty and Glasziou, 2011; Ramachandran et al., 2013; Ritchie et al., 2009). Disclosing victims report finding providers perfunctory or non-responsive in addressing IPV (Rhodes et al., 2006). These challenges are compounded by victim concerns about privacy and the legal or social consequences of disclosure, such as the removal of children from the home (Robinson and Spilsbury, 2008).

Recently, some EDs and other healthcare settings have successfully implemented enhanced IPV preventive interventions, aimed at addressing barriers at the provider and patient levels (Marino et al., 2014; Ranney et al., 2012). Enhanced referrals, which typically include a warm hand-off to a victim advocacy agency, allow IPV victims to experience continuity of care between hospitals and advocacy agencies, while accommodating, as necessary, provider time limitations and experience with IPV intervention (Marino et al., 2014; Wolff, 2015).

Several enhanced IPV interventions use eHealth technology to accomplish these goals (Choo et al., 2015; Eden et al., 2015; Feder et al., 2011). eHealth screening and referral systems simplify

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the screening process and facilitate providers' intervention efforts. These interventions frequently enable digital screening for all patients, often prior to their appointments. As appropriate, these screening data are used to give alerts or actionable steps to providers (Choo et al., 2015; Feder et al., 2011; Humphreys et al., 2011; Miller et al., 2015; Rhodes et al., 2006). eHealth screenings typically result in higher rates of disclosure, more conversations about IPV, and increased referrals to supportive services (Ambuel et al., 2013; Feder et al., 2011; Haegerich et al., 2014; Humphreys et al., 2011; Miller et al., 2015; Rhodes et al., 2006; Trautman et al., 2007). eHealth screenings alone, when accompanied by educational video clips about IPV, serve as a systemic treatment for chronic IPV and increase victim contact with supportive services (Choo et al., 2015; Haegerich et al., 2014), or reduced rates of IPV at one-month follow-up (Humphreys et al., 2011). Several studies indicate facilitated referrals to domestic violence advocates also increase contact with supportive services and reduce rates of subsequent IPV (Ambuel et al., 2013; Feder et al., 2011; Miller et al., 2015; Trautman et al., 2007). eHealth interventions can increase privacy for patients and practicality of IPV screening (Feder et al., 2011; Trautman et al., 2007).

The current study examines the Domestic Violence Report and Referral (DVRR) app, an eHealth intervention for IPV employed by a high traffic, Northern California ED. The purpose of this study is to identify which ED patient groups seen for IPV are at highest risk of intimate partner homicide.

Methods

DVRR is an eHealth IPV intervention that facilitates the delivery of enhanced referrals. When an ED patient discloses that their presenting injury was caused by IPV, the physician alerts a physician's assistant, nurse, or social worker to administer the brief (5–10 min) DVRR intake

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questionnaire, including a short list of demographic questions, a body map of the nature and extent of the patient's injuries, and an assessment of the victim's level of safety using a modified version of the Lethality Risk Assessment Instrument for Intimate Partner Femicide (Lethality Risk Assessment) shown in Fig. 1 (Campbell, 2004). The Lethality Risk Assessment is a validated prevention tool comprising a victim-reported calendar of abuse events and weighted questionnaire that predicts female IPV victims' risk of intimate partner homicide by a male partner. Existing literature suggests this is the first such use of the Lethality Risk Assessment (Belfrage et al., 2012; Campbell et al., 2009; Juodis et al., 2014; Williams, 2012). The DVRR app calculates a Danger Assessment (DA) score based on the weighted questionnaire from the Lethality Risk Assessment without the victim-reported calendar. With the patient's consent, an electronic summary report, including the DA score, is automatically sent to case managers at a local advocacy center. The DVRR consent form gives advocates two weeks to contact the victim at a safe phone number provided by the victim. At the provider's discretion, victims may also be presented with this score in the ED.

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Danger Assessment	
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<p>Several Risk factors have been associated with increased risk of homicides (murders) of women and men in violent relationships. We cannot predict what will happen in your case, but we would like you to be aware of the danger of homicide in situations of abuse and for you to see how many of the risk factors apply to your situation.</p> <p>Using the calendar [provided], please mark the approximate dates during the past year when you were abused by your partner or ex-partner. Write on that date how bad the incident was according to the following scale:</p> <ol style="list-style-type: none"> 1. Slapping pushing; no injuries and/or lasting pain 2. Punching, kicking; bruises, cuts, and/or continuing pain 3. “Beating up”; severe contusions, burns, broken bones 4. Threat to use weapon; head injury; internal injury; permanent injury 5. Use of weapon; wounds from weapon <p>(If any of the descriptions for the higher number apply, use the higher number)</p>	
Y/N	Mark YES or NO for each of the following (“He” refers to your husband, partner, ex-husband, ex-partner, or whoever is currently physically hurting you.)
	<ol style="list-style-type: none"> 1. Has the physical violence increased in severity or frequency over the past year? 2. Does he own a gun? 3. Have you left him after living together during the past year? (3a. If you have <i>never</i> lived with him, check here _____) 4. Is he unemployed? 5. Has he ever used a weapon against you or threatened you with a lethal weapon? (5a. if yes, was the weapon a gun?) 6. Does he threaten to kill you? 7. Has he avoided being arrested for domestic violence? 8. Do you have a child that is not his? 9. Has he ever forced you to have sex when you did not wish to do so? 10. Does he ever try to choke you? 11. Does he use illegal drugs? By drugs, I mean “uppers” or amphetamines, “meth”, speed, angel dust, cocaine, “crack”, street drugs or mixtures 12. Is he an alcoholic or problem drinker? 13. Does he control most or all of your daily activities? For instance: does he tell you who you can be friends with, when you can see your family, how much money you can use, or when you can take the car? (13a. If he tries, but you do not let him, check here _____) 14. Is he violently and constantly jealous of you? (For instance, does he say “If I can’t have you, no one can.”) 15. Have you ever been beaten by him while you were pregnant? (15a. f you have never been pregnant by him, check here_____) 16. Has he ever threatened or tried to commit suicide? 17. Does he threaten to harm your children? 18. Do you believe he is capable of killing you? 19. Does he follow or spy on you, leave threatening notes or messages, destroy your property, or call you when you don’t want him to? 20. Have you ever threatened or tried to commit suicide?
Total	Total “yes” answers
<p>Thank you. Please talk to your nurse, advocate or counselor about what the Danger Assessment means in terms of your situation.</p> <p style="text-align: center;">Jacquelyn C. Campbell, Ph.D., R.N. copyright, 2003; www.dangerassessment.com</p>	

Fig. 1. Questionnaire for the Lethality Risk Assessment Instrument for Intimate Partner Femicide.

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This study examines the DVRR intake data for 327 female patients aged 16 and older seen at a level-2 trauma center ED for injuries caused by a current or former intimate partner between February 2014–August 2015. The ED caters to a large, urban catchment area comprising a racially/ethnically diverse, typically low-income population. Participants excluded from this analysis were missing data with respect to their DA score (N = 61), whether they had children at home (N = 1), or their age (N = 5), resulting in a final analytical sample of 263.

The outcome measure, victim DA score, is reported by the Lethality Risk Assessment on a continuous scale. Based on the score, risk for intimate partner homicide is classified as low (8 or less); moderate (9–13); high (14–17), or extremely high (18 or higher). Independent variables of interest include victim relationship to the abuser (spouse; dating partner; or ex-partner, including both ex-spouses and ex-dating partners); victim age in years over age 16; whether the patient was pregnant; and whether the patient was living with minor children in their home at the time of the DVRR intake.

Our primary research question concerns the association of patient characteristics (age, pregnancy status, presence of children in the home, and relationship to abuser) with patient DA score. Analysis of variance, difference in means tests, and multiple linear regression models were used to test this relationship. Statistical significance was set at two-sided $p < 0.05$. Beta coefficients, standard errors, and corresponding 95% confidence intervals are presented. Analyses were performed using Stata statistical analysis software (version 14.1).

Results

The DA scores associated with low, moderate, high, and very high risk of intimate partner homicide, along with the distribution of patients' scores, are presented in Table 1. The

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mean population DA score was 15.5 (standard deviation, 7.93; range 0–35), representing high risk of intimate partner homicide for the average victim in the sample. A third of respondents (33.1%) had a score indicating very high risk of lethality.

Table 1. Distribution of DA score risk among a sample of urban, female emergency department patients in Northern California, 2014–2015.

	Score range	N (%)
Low risk	≤ 8	61 (23.2%)
Moderate risk	9–13	42 (16.0%)
High risk	14–17	73 (27.8%)
Very high risk	18 +	87 (33.1%)

Descriptive statistics for each covariate and the mean DA score for each covariate are outlined in Table 2. A minority of patients had children at home (38.40%) or were pregnant (14.07%). Most patients stated their abusive partner was a boyfriend (65.02%). Participants' ages ranged from 16 to 66 (data not shown). Patient age was skewed to the right, reflective of a mean age (34.36 years) higher than the median age (32 years). A two-sample *t*-test with unequal variances for difference in means showed a higher mean DA score for patients with children at home compared to those without children, a difference that approached statistical significance ($p = 0.056$). The mean DA score by pregnancy status was not different at a statistically significant level ($p = 0.17$). A one-way ANOVA test for differences in mean by relationship status showed higher mean DA scores for dating partners or ex-partners than spouse perpetrators ($p = 0.051$).

Table 2. Characteristics of DVRR participants with population counts (N) and proportions (%), *p*-values for differences in means (*t*-test or F-test), and unweighted mean DA score (SD) in a Northern California ED, 2014–2015.

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	% (N)	p-Value	Mean DA score (SD)
Children at home			
Yes	38% (101)	p = 0.056	16.44 (7.45)
No	62% (162)		14.87 (8.18)
Pregnant			
Yes	14% (37)	p = 0.17	16.62 (7.94)
No	86% (226)		15.29 (7.93)
Abuser relationship			
Dating partner	65% (171)	p = 0.051	15.96 (8.22)
Spouse	13% (33)		12.33 (6.42)
Ex-partner	22% (59)		15.85 (7.54)

Multiple linear regression models were employed to test the association between the outcome of the DA score and the selected covariates (Table 3). Presence of children at home, increasing victim age, and a dating or ex-partner relationship to the abuser predicted a higher DA score. The lethality scores predicted by an ex-partner or dating partner were comparable to one another and significantly higher than the lethality scores predicted by a spousal relationship. Five additional years of age predict a one-point increase in victim DA score, suggesting, in the absence of any other risk factors (spousal relationship to the perpetrator, not pregnant, and absence of children at home), a moderate estimated risk of intimate partner homicide at age 36 (10.56, 95% CI: 8.80–12.32), and a high estimated risk at age 56 (14.54, 95% CI: 11.01–18.07). Tests for association of the DA score with the squared term of age, as well as tests for interaction between having children at home and pregnancy, abuser relationship and having children at home, abuser relationship and pregnancy, and abuser relationship and age were not statistically significant (results not shown).

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Table 3. Association between selected risk factors and DA score, with 95% confidence intervals (CI) and standard errors (SE) using linear regression among DVRR participants in a Northern California ED, 2014–2015.

	Adjusted coefficient (95% CI)	SE
Children at home	2.61(0.63–4.58)**	1.02
Pregnant	2.34 (– 0.42–5.11)	1.40
Age	0.20 (0.11–0.29)***	0.05
Abuser relationship		
Dating partner	4.50 (1.62–7.38)**	1.46
Spouse	(reference group)	
Ex-partner	4.38 (1.10–7.66)**	1.67
Intercept	6.58 (3.02–10.13)***	1.81

** p < 0.01.

*** p < 0.001.

Discussion

This study makes an important contribution to the nascent literature investigating the role of digital technology in facilitating supportive interventions for ED patients experiencing IPV. The risk of intimate partner homicide is high among our sample of IPV victims seen in the ED for their injuries, and varies according to risk factors of age, presence of children at home, and relationship to the abuser. Taken individually, these factors indicate intervention when victims present with IPV injuries in EDs. Taken holistically, these findings support existing interventions for IPV in hospitals and EDs and suggest a need for scaling up these preventive efforts. In this study, increasing age and the presence of children at home are associated with an increase in DA score. This is consistent with previous research indicating the average age of intimate partner homicide victimization is 39 years (Smith et al., 2014), substantially older than the

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average age of IPV incidence at 21 years (Johnson et al., 2014). Studies in medical settings find that older and younger victims experience IPV at similar rates, but that IPV-related health risks compound as victims age, resulting in increased health problems for older women victimized by IPV (Bonomi et al., 2007; Mouton et al., 2004). This suggests a critical need for ED healthcare provider awareness of the increased lethality risk faced by older IPV victims who disclose IPV, as well as effective resource allocation to services for these victims.

While the presence of children at home is not necessarily associated with an increased degree of IPV, the present study suggests that, as with victim age, the presence of children at home may be associated with a higher risk of intimate partner homicide (Probst et al., 2008; Slep et al., 2010). Existing literature indicates that children are among the most frequent additional victims of intimate partner homicide; even when children are not killed, the traumatic loss of a caregiver can have severe long-term consequences (Hamilton et al., 2012; Smith et al., 2014). Healthcare providers and advocates may use these results to provide tailored services to victims with children sensitive to the risk of fatal and non-fatal victimization.

This study also highlights the relevance of the perpetrator's relationship to the victim on the victim's DA score. This is consistent with Campbell et al.' (2007) and Block's (2000) findings that spouses pose the lowest lethality risk to their partners, relative to dating partners and ex-partners. Block's Chicago study found that partners who were not married at the time of the victim's death (whether dating, ex-partners, or in a casual, non-dating relationship) constituted an overwhelming majority (63/76) of intimate partner homicides across one calendar year. While the causes of this association are unknown, perpetrators of abuse experience humiliation, shame, rage and a perceived lack of power and control when a victim leaves the relationship that may

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precipitate homicidal behavior (Dobash and Dobash, 2011; Stark, 2009; Websdale, 2010).

Further research is necessary to determine the implications of these associations.

No significant associations were found between pregnancy and the DA score in this sample. The extant literature is mixed with respect to increased, decreased or constant reported rates of IPV and intimate partner homicide among pregnant and post-partum women (Saltzman et al., 2003; Samandari et al., 2010; Taylor and Nabors, 2009; Wallace et al., 2016).

Nevertheless, IPV is a serious health concern during pregnancy. One study found that IPV is the leading cause of hospitalization among pregnant women prior to delivery, with over 40 times the hospitalization rate of the second leading cause (Mendez-Figueroa et al., 2013). This points to IPV as a significant health risk in pregnancy, regardless of how rates of IPV compare with non-pregnant women and irrespective of whether pregnant women's risk of intimate partner homicide is elevated.

In tandem with highlighting need, these results foreground opportunities for intimate partner homicide intervention and prevention in EDs. ED patients with IPV-related injuries face high homicide risk but also view discussing IPV with a medical provider favorably (Boyle and Jones, 2006). This suggests that these patients constitute a unique group of individuals who are both at high risk of intimate partner homicide and willing to receive provider-initiated interventions. IPV interventions that account for and minimize barriers such as time and lack of training may enable providers to provide critical services to victims (Beynon et al., 2012; Chamberlain and Perham-Hester, 2000; Conn et al., 2014). In doing so, these interventions would take advantage of a unique opportunity to intervene meaningfully for a set of vulnerable patients at elevated risk of mortality.

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eHealth interventions, including DVRR, may provide an invaluable link between medical providers and IPV advocates, facilitating a smooth and open transition for high-risk patients as they progress between systems of care. These interventions may identify types of referral that may be best suited to a patient's situation, as well as assist providers in administering IPV interventions that address barriers to service, including patient perceptions of provider disengagement and providers' lack of time and comfort intervening in IPV (Marino et al., 2014; Ranney et al., 2012; Rhodes et al., 2006). By design, successful eHealth interventions frequently take less time to complete than their paper-based counterparts (Humphreys et al., 2011; Rhodes et al., 2006). This has implications for DVRR. The omission of the calendar of abusive events from the modified Lethality Risk Assessment in DVRR was designed to conserve provider time in administering the intervention. A version of the Lethality Risk Assessment designed for first responders, the abbreviated Lethality Assessment Program (LAP), may provide similar actionable insight while further reducing the time required for intervention (Messing et al., 2017). Future research may explore potential benefits to using LAP in DVRR and other eHealth interventions to further reduce provider burden and improve patient IPV care in EDs. Some interventions, including DVRR, can be administered by mid-level practitioners, nurses, or social workers (Choo et al., 2015; Feder et al., 2011). DVRR is one of few interventions that provide victims with a warm handoff to professional advocacy services. Another intervention in the United Kingdom, IRIS, also enables providers to send an electronic referral to local advocacy agencies on behalf of consenting patients. This intervention shows promise in increasing patient connection to services over paper-based referrals (Feder et al., 2011). Unique to DVRR, the DA score gives actionable insight into the level of danger faced by each patient (Campbell et al., 2009). This may help medical staff and advocates tailor care to patient needs, facilitate effective

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communication with victims about their risk of homicide, and enable patients to make informed decisions about accepting available interventions and future care.

This study faces several limitations. The sample included only female ED patients who disclosed that their injury resulted from IPV; thus the lethality risk of women who did not disclose IPV in the ED is unknown. Data may not be generalizable to EDs in other settings. The low power from the small sample size made it difficult to draw meaningful conclusions for variables with an unequal distribution of responses, such as pregnant women. Data on victim race/ethnicity, socioeconomic status and insurance status were not collected, thus our analysis does not account for important social determinants of health (Wathen et al., 2016). Victim and perpetrator cohabitation status was also not captured, leading to a conflation and possible confounding of data, particularly when a boyfriend perpetrated the abuse. Additionally, the Lethality Risk Assessment asks if the victim has children who are not related to the perpetrator (potential confounding with the covariate for children at home), and if the victim has separated from the perpetrator in the past year (potential confounding with an ex-partner relationship). These risks were considered nominal, as individual removal of these variables from analysis did not change any other covariate's relationship with lethality risk. Future research with a larger sample and more detailed measures across different hospital settings would elaborate on and bolster the analytical power of this analysis. Such research may be increasingly feasible as EDs adopt DVRR and other eHealth-based tools for IPV and intimate partner homicide intervention.

Study strengths include the introduction of the Lethality Risk Assessment as a tool for predicting risk of intimate partner homicide among patients seen in EDs and strategically allocating preventive care accordingly. This study outlined the presence of children at home, perpetrator relationship to the victim, and victim age as lethality risk characteristics of IPV

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victims seen in EDs for their injuries. The use of the DA score as an outcome variable allows for a quantitative evaluation of victim danger that is often only available qualitatively, retrospectively, or through instruments designed for groups other than IPV victims (Bansal et al., 2008; Bazargan-Hejazi et al., 2014; Belfrage et al., 2012; Smith et al., 2014). While it is important not to overgeneralize victim risk from DA scores (e.g., high-risk factors, such as firearms in the home, should not be ignored in the context of medium or low DA scores), the Lethality Risk Assessment adds an important dimension to IPV prevention and intervention efforts. For IPV prevention and intervention efforts measured using the Lethality Risk Assessment, outcomes can be measured not only in terms of binary revictimization but also severity of intimate partner homicide risk over time using an instrument explicitly designed for IPV victims.

Conclusion

Intimate partner homicide, the most severe form of IPV, is a chief cause of death among women in the United States, many of whom are seen in EDs for injuries related to IPV prior to their death (Mamo et al., 2015; Sharps et al., 2001). Few studies have taken advantage of existing hospital protocols to assess the lethality risk of known IPV victims or to assess factors associated with increased lethality risk. These data were collected in the normal course of hospital operations in a high-traffic, urban, Northern California ED, indicating the practicality of such an intervention for patients seen for IPV-related injuries. Key findings from this study, such as the significant increase in victims' lethality risk by age, the presence of children at home, and abuse by a dating- or ex-partner, may provide a foundation for an investigation of lethality risk as an assessment tool in EDs in response to IPV victimization.

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Conflicts of Interest

None.

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