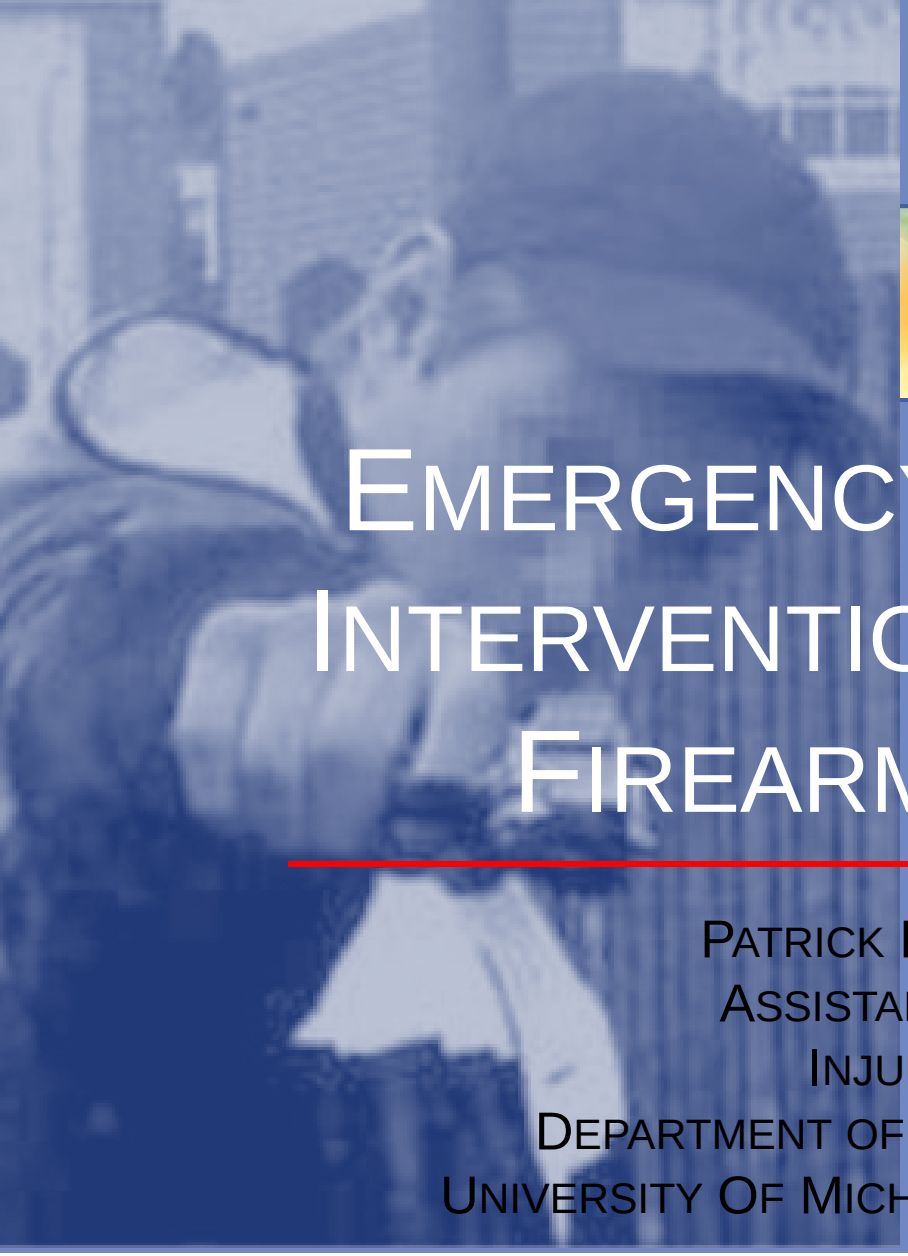

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Emergency Department Interventions for Youth Firearm Violence

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Disclosures

- No Conflicts of Interest
- No Relevant Financial Disclosures

Objectives

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- Youth Violence as a Public Health Problem
- Assault-injured youth population and the need for ED/hospital-based interventions
- Prior successful ED/Hospital-based youth violence interventions
- Future individual-level ED/Hospital based interventions

Firearm Violence in the United States

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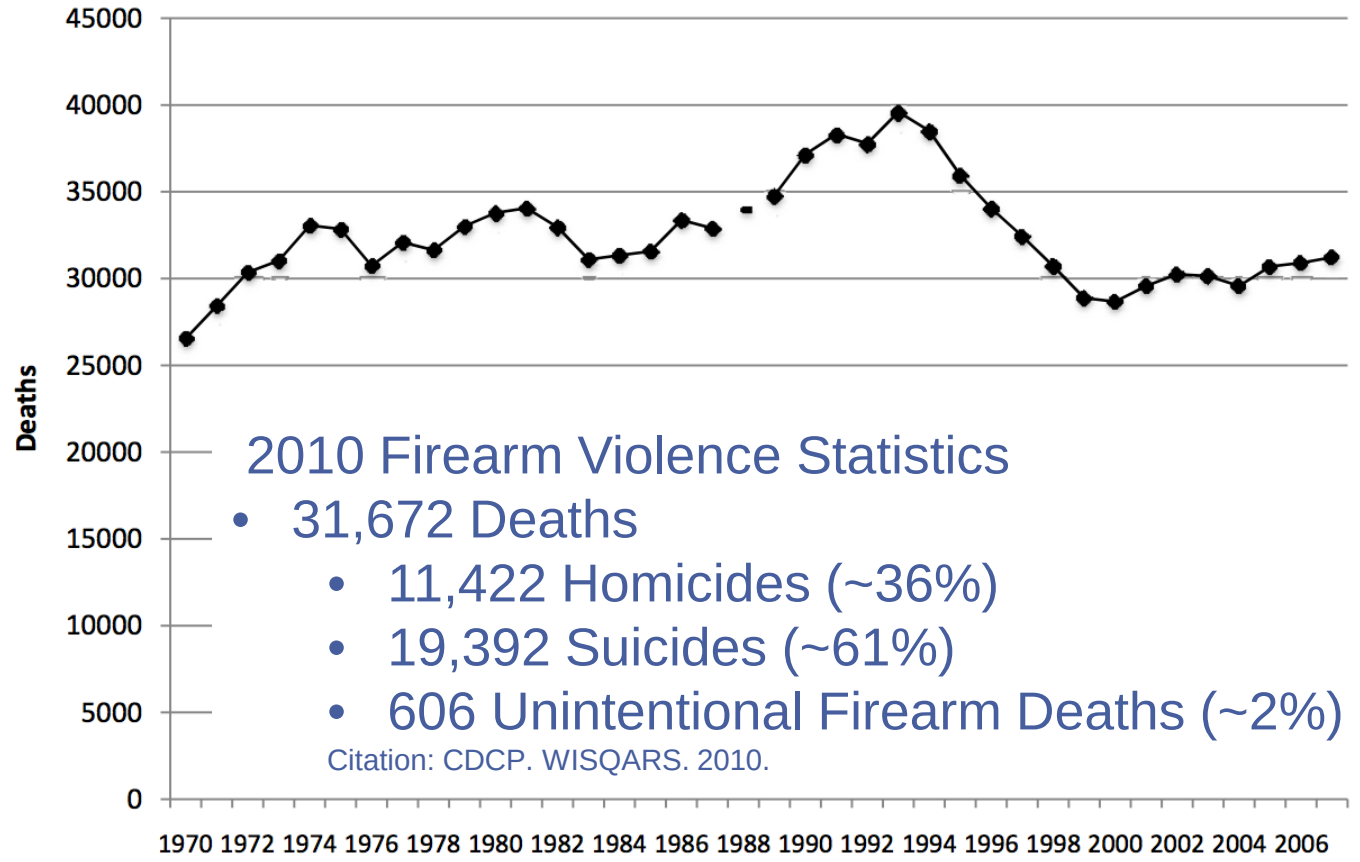
From 1981 to 2007, an average of almost 33,000 Americans have died each year from firearm



2010 Firearm Violence Statistics

- 31,672 Deaths
  - 11,422 Homicides (~36%)
  - 19,392 Suicides (~61%)
  - 606 Unintentional Firearm Deaths (~2%)

Citation: CDCP. WISQARS. 2010.

Source: National Center for Injury Prevention and Control, CDC, 2010.

Graph: Firearm and Injury Center at Penn. 2011. “Firearm Injury in the United States.”

Youth Violence as a Public Health Problem

- Violence disproportionately affects youth populations (14-24 years-old)
  - 2nd leading cause of death
  - 4,500 homicides in 2010
    - 85% resulting from firearm related homicide
  - Homicide rate (11.55 per 100,000) more than twice the rate of homicide among the overall US population (5.27 per 100,000)
  - U.S. youth firearm homicide rates 42.7 times higher than children in 22 other developed nations

(WISQARS CDC 2010; Richardson 2011; Cook 2002)

Costs of Youth Firearm Violence

- 2013 Study of Acute Care Costs
  - Average cost of hospitalization
    - $75,884 on avg. per hospitalization (LOS = 7.1 days)
    - $18.9 billion dollars (2003-2010)

- Majority of costs are due to long term care and lost productivity, wages and legal fees.
  - Total annual societal cost = $100 billion

(Lee 2013; Cook 1999; Cook 2000)

Who pays for firearm violence?

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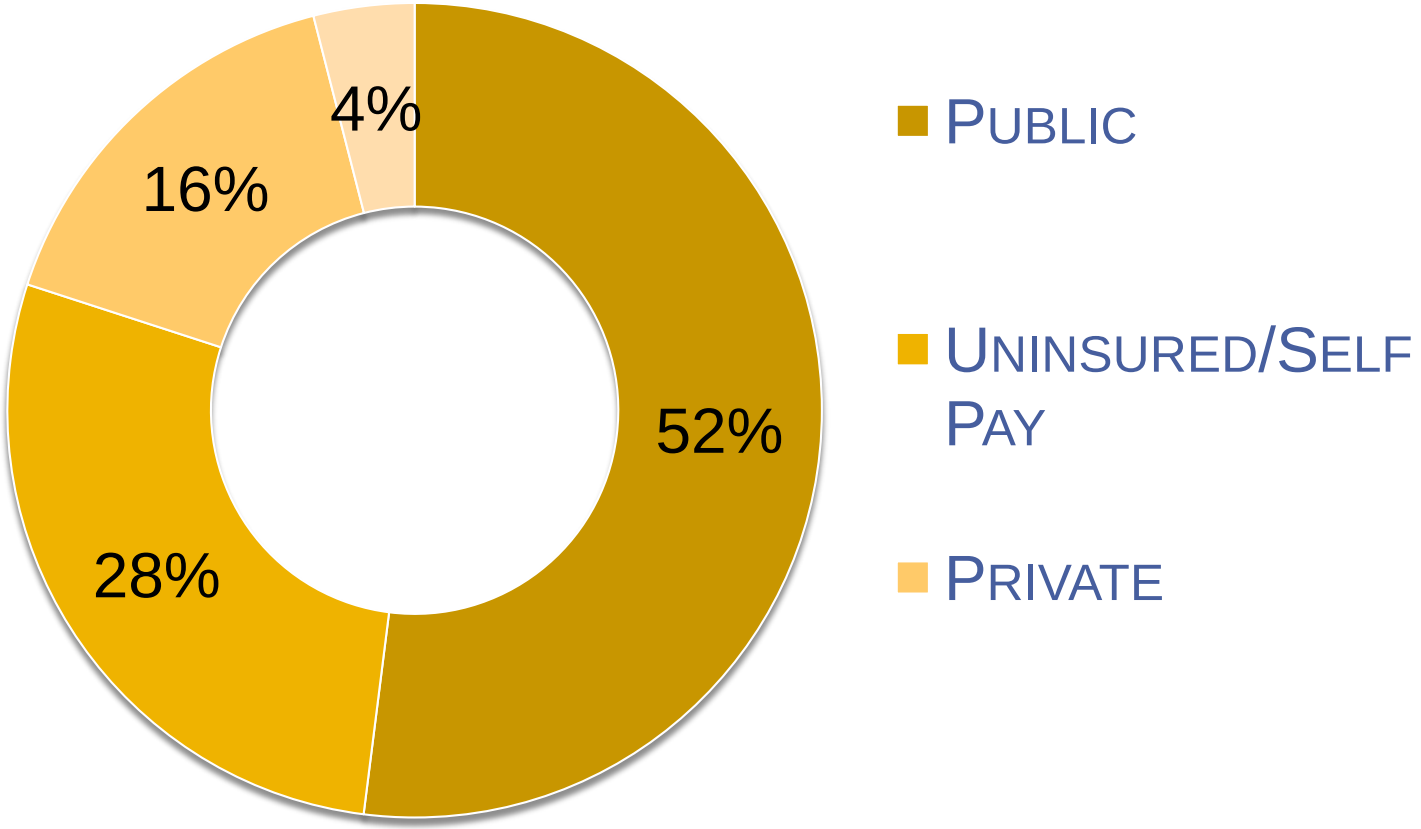
Hospital Costs of Firearm Assaults



(The Urban Institute 2013)

Health Disparities

- Violence disproportionately affects lower-income, urban, minority youth
  - Homicide leading cause of death
  - Firearm homicide rates 8X higher
    - 30.3 → 3.7 per 100,000
- Incarceration for violent crime and drug use
  - Six times higher for African-American males than white males
  - Increases risk for becoming part of a chronic hardcore offender population
- Compounded by disparities in access and utilization of substance use and mental health services

(CDC WISQARS 2010; Glaze 2012; Wells 2001; Wu 2002; Heflinger 2006)

Violence and Substance Use

- By age 18:
  - 73% of teens have consumed alcohol
  - 26% report binge drinking (5+ drinks) in the past month
- Violence and alcohol use cluster together
  - Binge drinking is an important predictor of initiation of violent behavior
- Violence and drug use cluster together
  - Teens who use marijuana more likely to engage in violent behavior
    - Risky behaviors cluster together

Why study high-risk youth in the ED?

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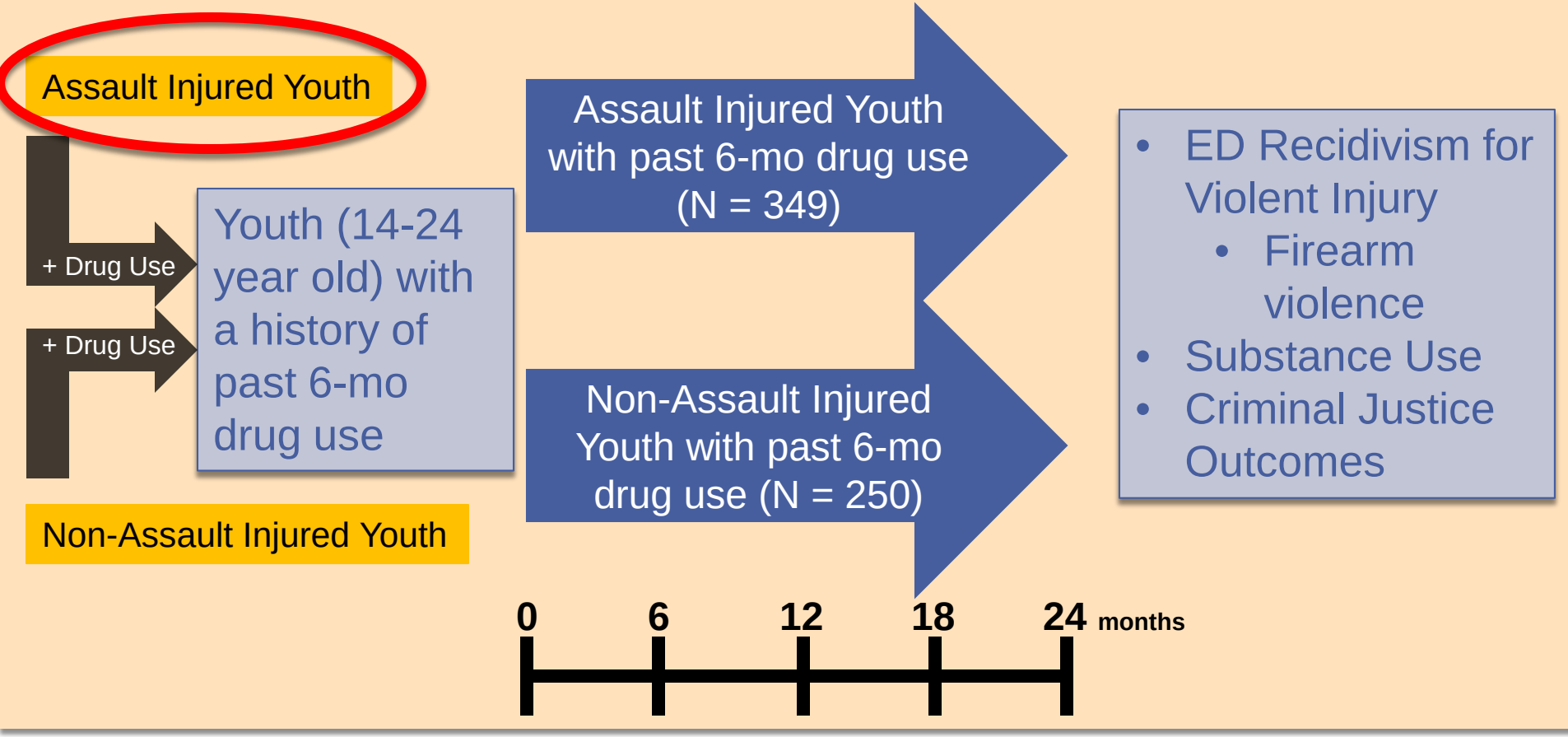
- ED's are a critical access point for urban youth
  - 1 in 4 inner-city minority youth do not have a primary care physician
  - Low rates of attendance at school among high-risk youth with involvement in drug use and violence
  - In 2011, >900,000 youth (10-24) visited EDs due to violent injury
  - 54% of assault-injured youth seeking ED care have past 6-month drug use

Flint Youth Injury Study

- Youth seeking care for violent injury are a high risk population that urgently needs attention
- Sims et al (1989) studied admitted youth
  - Readmission rates as high as 44%
  - Mortality of 20% due to homicide
  - 5-year follow-up, Poor follow-up rates
- Recognized need for longitudinal studies to identify future trajectories for violence, substance use and criminal justice involvement among high-risk youth

Flint Youth Injury Study

Prospective Cohort Study Design



PI: Rebecca Cunningham, MD

Flint Youth Injury Study

ARTICLE

Firearm Possession Among Adolescents Presenting to an Urban Emergency Department for Assault

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PEDIATRICS
OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

WHAT'S KNOWN ON THIS SUBJECT: Violence involving firearms is a leading cause of death among US youth ages 14 to 24. The emergency department is the primary medical setting for care of assault-injured youth and an underused but important setting for violence-prevention programs.

WHAT THIS STUDY ADDS: Among assault-injured youth seeking emergency department care, firearm possession rates are high, most obtained outside of legal channels. Higher rates of negative retaliatory attitudes and substance use among those youth with firearms increases risk of future lethal violence.

Carter et al. 2013. Pediatrics

Firearm Possession Among Assault-injured Youth

- 23.1% (N = 159 of 689) reported firearm possession within the prior 6-months
  - 41.5% reported carrying the firearm outside the home
  - 80% firearms obtained from likely illegal source

TABLE 3 Multivariate Logistic Regression Predicting Gun Possession Among Adolescent ED Patients (14 to 24 Years Old) Presenting for a Violent Injury

Risk Factors for Gun Possession	AOR (95% CI)
Age	1.04 (0.97–1.12)
Male gender[a]	2.76 (1.83–4.18)
Not receiving public assistance[b]	1.51 (1.01–2.26)
African American	0.84 (0.57–1.23)
Illicit drug use[b]	1.63 (1.10–2.42)
Retaliatory attitudes[b]	1.58 (1.09–2.28)
Serious fight within previous 6 mo[b]	1.73 (1.02–2.93)

AOR, adjusted odds ratio; CI, confidence interval.

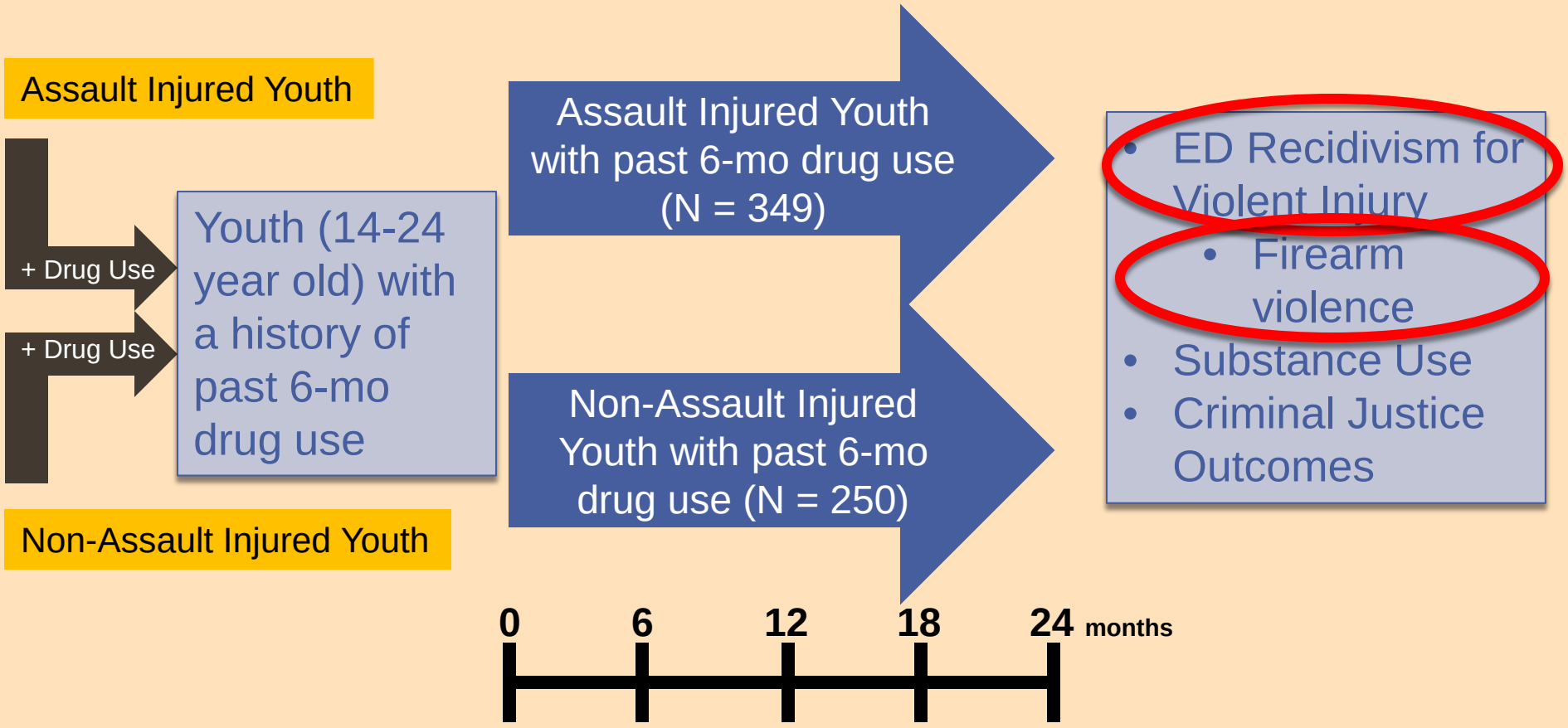
[a] $P < .001$.

[b] $P < 0.05$.

Carter et al. 2013. Pediatrics

Flint Youth Injury Study

Prospective Cohort Study Design



PI: Rebecca Cunningham, MD

Baseline Participants

- Demographics
  - 53.8% Male
  - 58.2% African-American
  - Mean Age = 20.1 years old
- Substance Use
  - 97% Marijuana Use
  - 57.2% Drug Use Disorder
  - 19.7% Alcohol Use Disorder
- Mental Health
  - 10% PTSD
- Criminal Justice
  - 12.5% on Parole/Probation

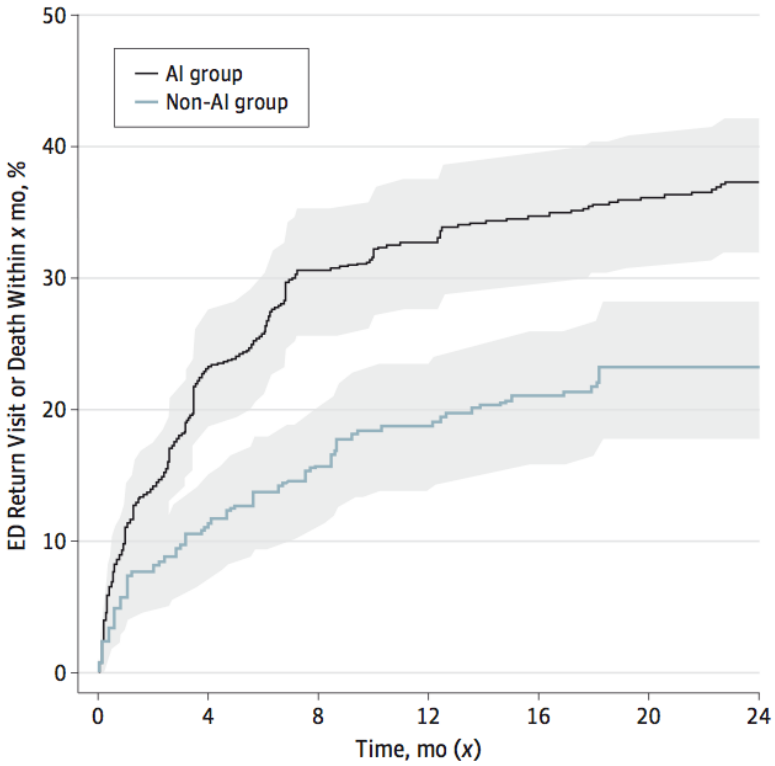
(Bohnert 2013)

- AI Group (vs. CG)
  - Type of Assault (n=349)
    - Firearm (n = 70; 20%)
    - Struck by/against (n = 224; 64%)
  - Substance use
    - More drinking days in past 30 days
    - > Illicit Drug Use (excl. MJ)
    - > use in 24 hrs. prior to ED visit
      - Illicit drugs/MJ
      - Alcohol
  - 28% had firearm possession
  - 25% reported intention to retaliate
    - 49% of them with firearm access

Violent Injury Recidivism & Mortality

- AIG had almost twice the risk of a violent re-injury
  - 35.7% vs. 21.6%
  - RR = 1.65 [1.25-2.14]
  - 19 return visits were for firearm related injury
- Two-year mortality for overall sample
  - 0.8% (N = 5)
  - 4/5 deaths related to violence or drug use
  - 2 deaths related to firearms

Figure 2. Cumulative Frequency of Time to Return Emergency Department (ED) Visit or Death From an Assault-Related Injury



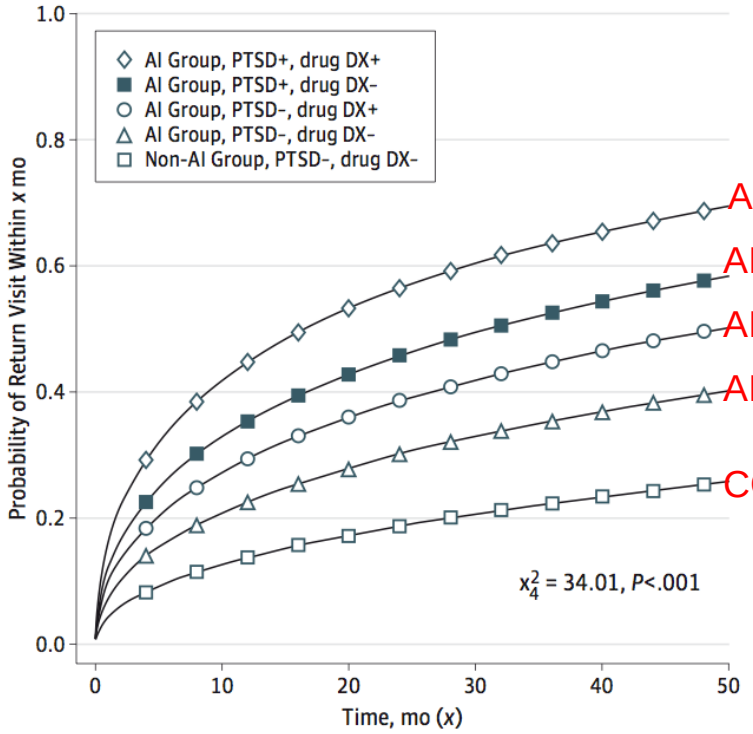
AI indicates assault injured. Gray area around curves indicates 95% pointwise CIs.

Cunningham, Carter et al. JAMA Pediatrics. 2014.

Two-year Violent Injury Outcomes

- Baseline Individual Characteristics at ED visit predicting return visit within 2-years
  - Assault-injury Visit
  - Drug use disorder
  - PTSD

Figure 3. Parametric Survival Model Estimating the Effect of Baseline Characteristics on the Expected Time Until First Emergency Department Return for Violent Injury



Characteristics include assault-related injury group, diagnosis of posttraumatic stress disorder (PTSD), and diagnosis of drug use disorder (drug DX).
AI indicates assault-injured; plus sign, present; and minus sign, absent.

Cunningham, Carter et al. JAMA Pediatrics. 2014.

Two-Year Firearm Violence Outcomes

- 59.0% of AIG endorsed firearm violence in two year follow-up period (59.0%-vs.-42.5%; OR = 1.95)
  - 96.4% reported victimization; 31.7% reported aggression
  - 63.5% reported at least one event within 6-months of ED visit
- Multivariate Regression
  - Male (OR = 2.37)
  - African-American (OR = 1.79)
  - Assault Injury at Baseline Visit (OR = 1.92)
  - Firearm Possession (OR = 1.70)
  - Attitudes favoring Retaliation (OR = 1.07)
  - PTSD (OR = 2.47)
  - Drug Use Disorder (OR = 1.59)

(Carter et al. Under Review)

So what does this mean for ED/hospital based violent injury care?

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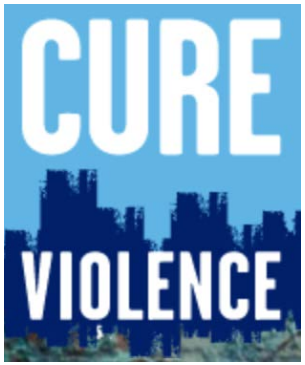
- Current Standard of Care is Inadequate
- ED represents an opportunity for secondary prevention and a critical access point for youth
- Assault-injured youth with drug use are a critical high-risk population
  - Need to address key risk factors:
    - Substance Use
    - Retaliatory attitudes/Violence
    - Firearm Possession
    - PTSD

ED/Hospital Violence Programs

- 2004 NIH State of Science Conference on Youth Violence – identified hospital ED's as key setting for violence prevention
- Current Programs have common elements
  - Built on a care management model linking youth to local services
    - Boys & Girls Club
    - Peer mentorship by former gang members
    - Traditional Care Management
  - Credible Messengers
  - Immediate post-injury period (3-6 months)

(DeVos 1996; Cooper 2006; Zun 2003; Zun 2006; Becker 2004; Cheng 2008; Cheng 2006; Cheng 2008; Dicker 2005)



ED/Hospital Violence Programs

- Weaknesses of Programs
  - No focus on drug or substance use beyond simple linkage to services
    - Many urban settings lack actual services for linkage
  - RCT Evaluations have been limited
    - Retrospective study design
    - Small sample sizes
    - Non-validated assessment tools
    - Low follow-up rates
    - Low rates of participant engagement in programs
    - Primarily linkage, not delivery of services

(DeVos 1996; Cooper 2006; Zun 2003; Zun 2006; Becker 2004; Cheng 2008; Cheng 2006; Cheng 2008; Dicker 2005)

So, what has worked?

- Efficacious Interventions with lower risk populations or non-violently injured populations
  - Brief Interventions using Motivational Interviewing and cognitive skills training
    - safERTeens
  - Strength-based Care Management for linkage to community substance/mental health resources

Youth Alive! (Oakland, CA)

- Hospital-based peer intervention program
- Admitted patients are visited by Intervention Specialist (peer mentor) within hours
  - Promote alternative strategies for dealing with conflict
  - Develop plan for staying safe
- After discharge:
  - Intervention Specialist continues to work with youth
  - Mentoring
- Proven to reduce criminal justice involvement in post-injury period

www.youthalive.org, accessed March 4, 2011

Within Our Reach (Chicago, IL)

- Patients ages 10-24 recruited to program
  - Victims of violence with life-or-limb-threatening injuries
  - Randomly assigned to usual care (given list of services) vs. assessment and referral to social services
- Intervention: Case management, anger management and conflict resolution counseling
- Those in the treatment group were more likely to utilize social services
  - Most common services utilized: Education, Job Readiness, Mental Health

Zun LS, Downey LV, Rosen J. Violence prevention in the ED: linkage of the ED to a social service agency. Am J Emerg Med. 2003; 21:454-457

safERteens

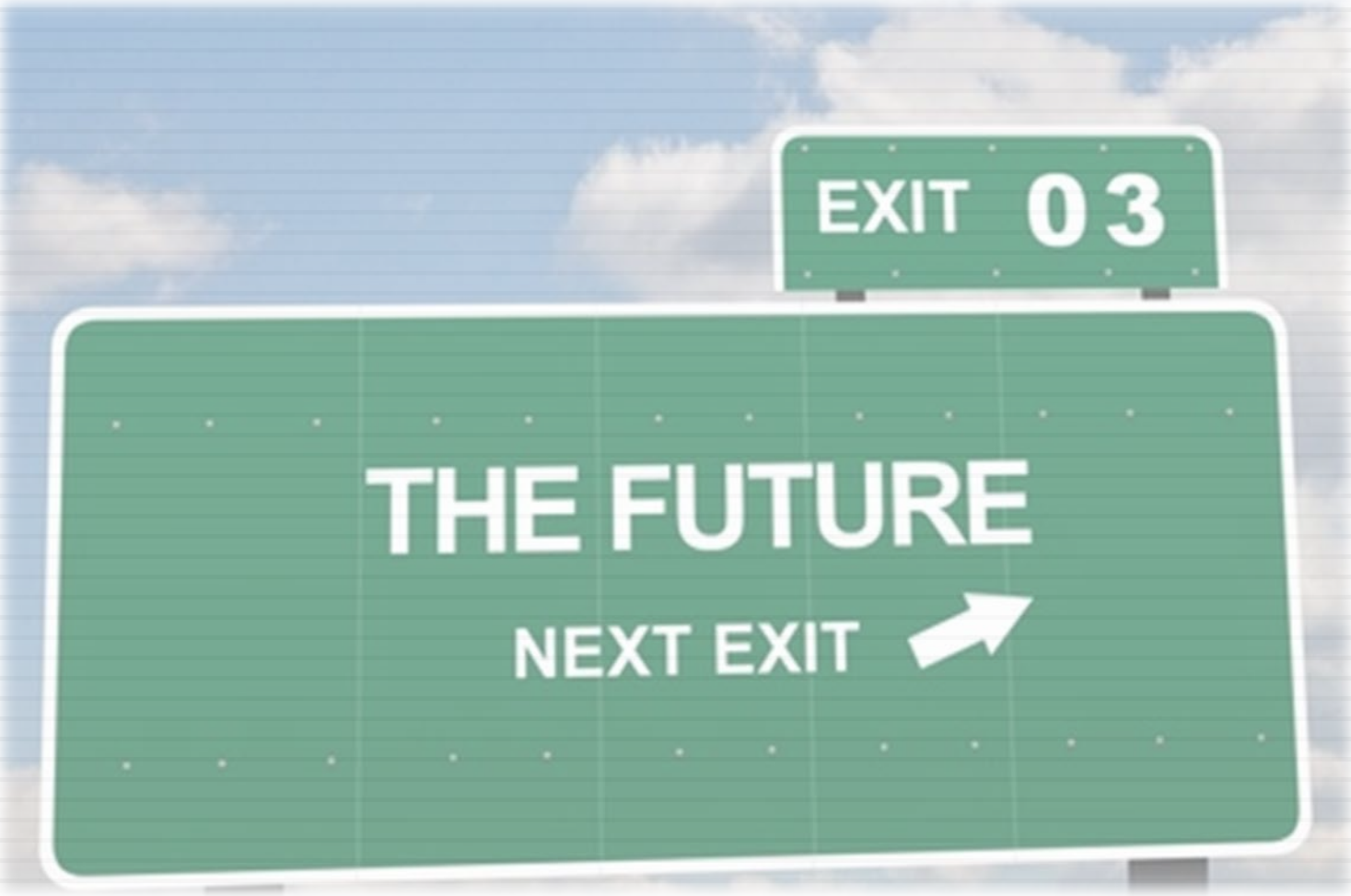
- Randomized Control Trial of teens (14-18 y/o) with past year h/o fighting and alcohol use
- Alcohol & Violence SBIRT (Brief Intervention) combining motivational interviewing (MI) and cognitive skills training (CST)
- 726 teens randomized into 1 of 3 arms
  - Computer Therapist [CBI]
  - In-person Therapist [TBI]
  - Enhanced Usual Control [EUC]
- 84% follow-up; 3,6, and 12 month follow-ups

Walton et al. JAMA. 2010.

safERteens

- 3-months: Therapist brief intervention effective decreasing peer violence
- 6-months: Both therapist and computer brief interventions effective reducing alcohol consequences
- 12-months: Therapist brief intervention decreased peer aggression/victimization
- Subsequent Cost Evaluation
  - $70,000 to implement intervention in trauma center
  - $17 per violence or consequence averted

Future Directions in Research



Future Directions in Research

- Expand current brief intervention model to be applicable to higher risk violently injured youth
  - Multi-session
  - Focus on high-risk firearm behaviors
- Incorporate care management components with linkage to available services
- Incorporate substance abuse and PTSD treatment components (due to lack of services)
- Incorporate skills training to address high-risk firearm behaviors and retaliatory attitudes (i.e., conflict resolution)
- Technology-based?

Questions/Discussion

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