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Community Health From The Inside Out

- **Introduction**
- **ACEs Study**
- **Mechanism**
- **Health Disparities**
- **Recommendations**

CPMC Bayview Child Health Center



The ACEs Study



- **Vincent J. Felitti, MD and Robert J. Anda, MD, MS**
- **Asked 26,000 adults at Kaiser, San Diego's Dept of Preventive Medicine.**
- **17,421 participated in the study.**
- **Participants completed a questionnaire.**

ACEs Criteria

- 1. Recurrent physical abuse**
- 2. Recurrent emotional abuse**
- 3. Contact sexual abuse**
- 4. An alcohol or drug abuser in the household**
- 5. An incarcerated household member**

ACEs Criteria

- 6. Someone who was chronically depressed, institutionalized, or suicidal**
- 7. Mother treated violently**
- 8. One or no parents, or parents divorced.**
- 9. Emotional or physical neglect**

Population Demographics

GENDER

- **Male 46%**
- **Female 54%**

ETHNICITY

- **White 74.8%**
- **Hisp 11.2%**
- **API 7.2%**
- **AA 4.6%**
- **Other 1.9%**

Population Demographics

AGES

- **19-29** **5.3%**
- **30-39** **9.8%**
- **40-49** **18.6%**
- **50-59** **19.9%**
- **≥60** **46.4%**

EDUCATION

- **Not HS Grad** **7.2%**
- **HS Grad** **17.6%**
- **Some college** **35.9%**
- **≥ College grad** **39.3%**

Results

Abuse:

- **Emotional 10%**
- **Physical 26%**
- **Sexual 21%**

Neglect:

- **Emotional 15%**
- **Physical 10%**

Results

Household Dysfunction

- **Mother treated violently** 13%
- **Mental illness** 20%
- **Substance abuse** 28%
- **Parental separation/divorce** 24%
- **Household member imprisoned** 6%

Results

- **Dose-Response relationship between adverse childhood events and numerous organic diseases.**
- **Person with an ACEs score of ≥ 4 is 260% as likely to have COPD than a person with a score of 0.**

Relative Risk of disease for ACEs ≥ 4

- **Hepatitis** 240%
- **STD** 250%
- **COPD** 260%
- **Depression** 460%
- **Suicidality** 1220%
- **IV drug use** 4,600%

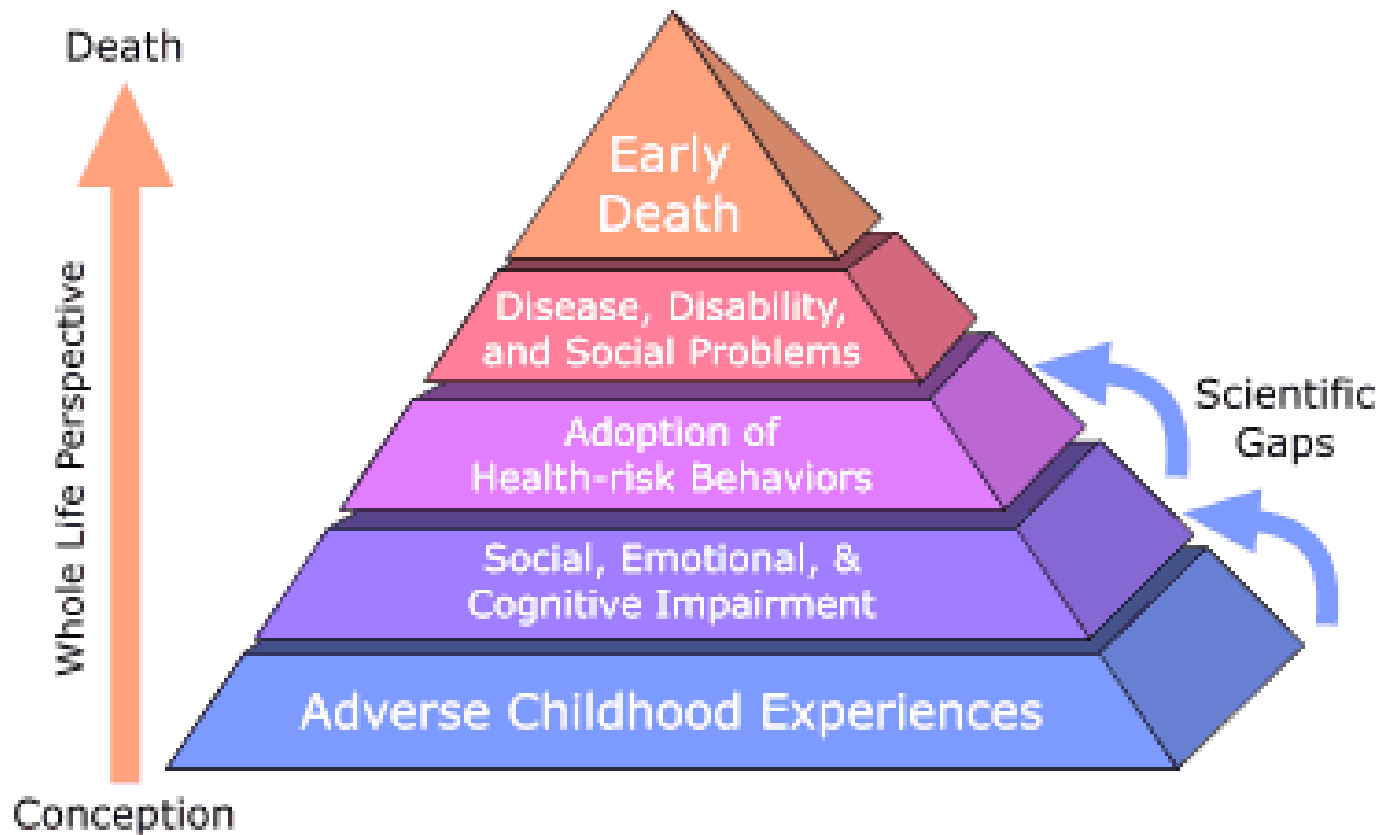
Results

- **Fetal death in pregnant teens – 180%**
- **Ischemic Heart Disease – 360% increase in those reporting ≥ 7 ACEs**

Mechanism

- **Increased engagement in high risk behaviors:**
 - **Smoking**
 - **Substance use**
 - **Violence**
 - **High risk sexual activity**

Mechanism



Neurobiology

- **Amygdala: mediates fear responses**
- **Prefrontal Cortex: mood, emotional and cognitive function including judgment.**
- **Hypothalamic-Pituitary-Adrenal (HPA) Axis: stress response**
- **Hippocampus: learning and memory (high density of glucocorticoid receptors)**
- **Noradrenergic nucleus in the locus coeruleus: regulation of affect, irritability, locomotion, arousal, attention and startle**



Stress Response

- **Activation of the HPA Axis - release of ACTH, epinephrine and cortisol**
- **Increase in centrally controlled peripheral sympathetic tone**
- **Nucleus Coeruleus activation of noradrenergic tone throughout the midbrain and forebrain including the cortex**



Neuropathology

- **Dysregulation of the HPA Axis**
- **Loss of noradrenergic feedback inhibition leads to increased NA responses to subsequent stressors (hyper-arousal, irritability)**
- **Alterations in serotonergic and GABAergic receptors (mood and attachment)**
- **Hippocampal neurotoxicity (memory)**
- **Altered release of dopamine in the nucleus accumbens (reward center)**

Post Traumatic Symptoms

- **Exaggerated startle response**
- **Irritability or outbursts of anger**
- **Poor concentration**
- **Memory impairment**
- **Hyper-vigilance**
- **Intrusive recollection**
- **Restricted range of affect**
- **Numbing**

From Neurochemistry to Behavior

- **Heroin and alcohol decrease firing of the locus coeruleus.**
- **Nicotine and cocaine stimulate dopamine release in the nucleus accumbens.**
- **Sex releases oxytocin which mediates pair bonding and social attachment. It also decreases cortisol levels.**
- **Glucocorticoids stimulate appetite and deposition of abdominal fat.**

Clinical Sequelae

- **COPD**
- **Cancer**
- **Diabetes**
- **Hepatitis**
- **Ischemic Heart Disease**
- **Overweight and Obesity**
- **Sleep Disturbance**
- **Sexually Transmitted Infections**

Controlling For Effects of Behavior

- **ACEs ≥ 4 had 260% as likely to have COPD**
- **Risk was only modestly reduced by adjustment for smoking.**
- **≥ 7 ACEs associated with risk of IHD 360% higher than 0 ACEs**
- **After controlling for traditional and psychological risk factors, associated risk was reduced by 50%.**

Long term alterations in stress hormone levels

- **Adult ACTH and plasma cortisol levels directly correlate with adverse childhood events, neglect and depression measures.**
- **Maltreated children with PTSD were found to excrete greater than normal urinary cortisol and catecholamines years after disclosure of abuse.**

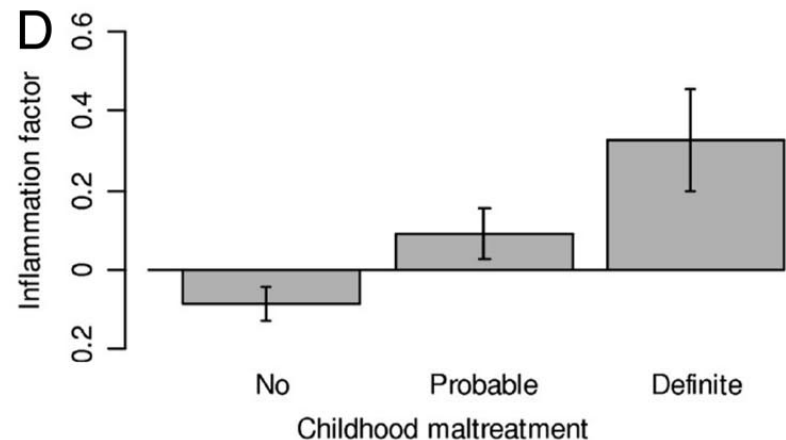
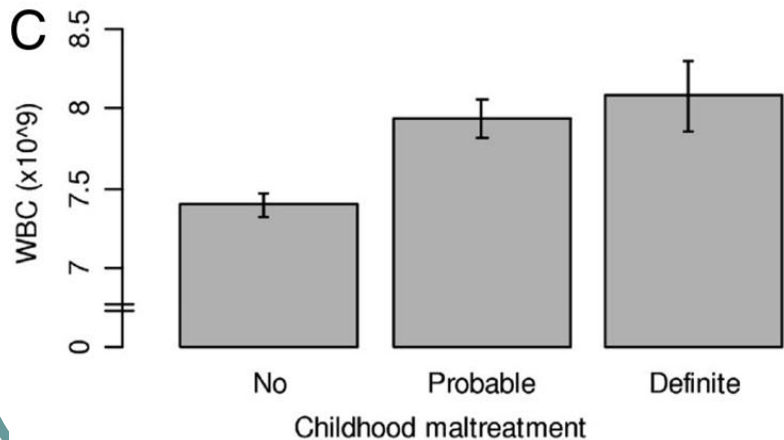
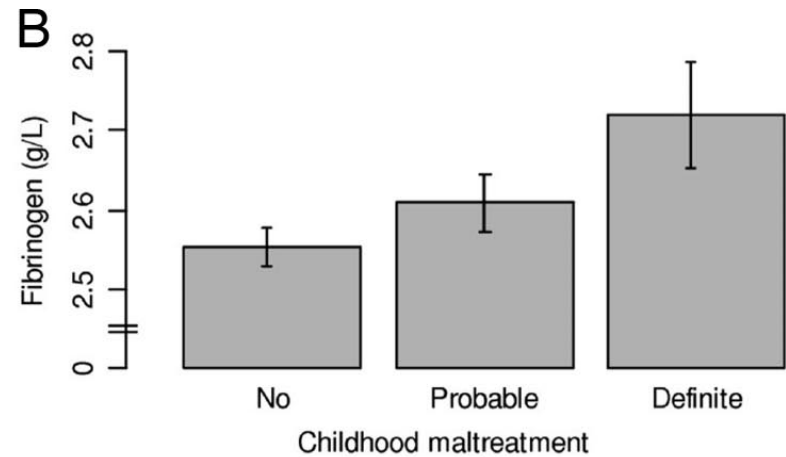
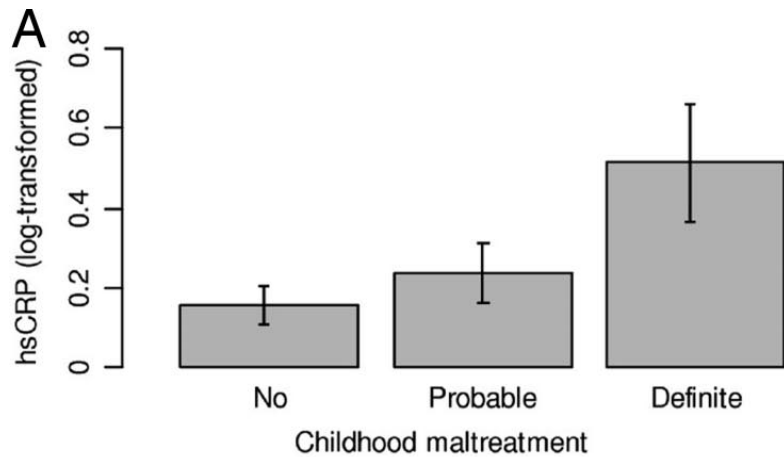
Immunology

- **Acute psychosocial stress can induce activation of the transcription nuclear factor κ B and secretion of pro-inflammatory cytokines (presumed to be through adrenergic stimulation).**

Immunology

- **Children who were maltreated were 1.8 times as likely to have elevated hsCRP in adulthood compared with non-maltreated children**
- **After controlling for the effect of health-damaging behaviors, the association between childhood maltreatment and elevated adult hsCRP was still significant (RR= 1.76)**

Effect of Child Maltreatment on Inflammatory Mediators



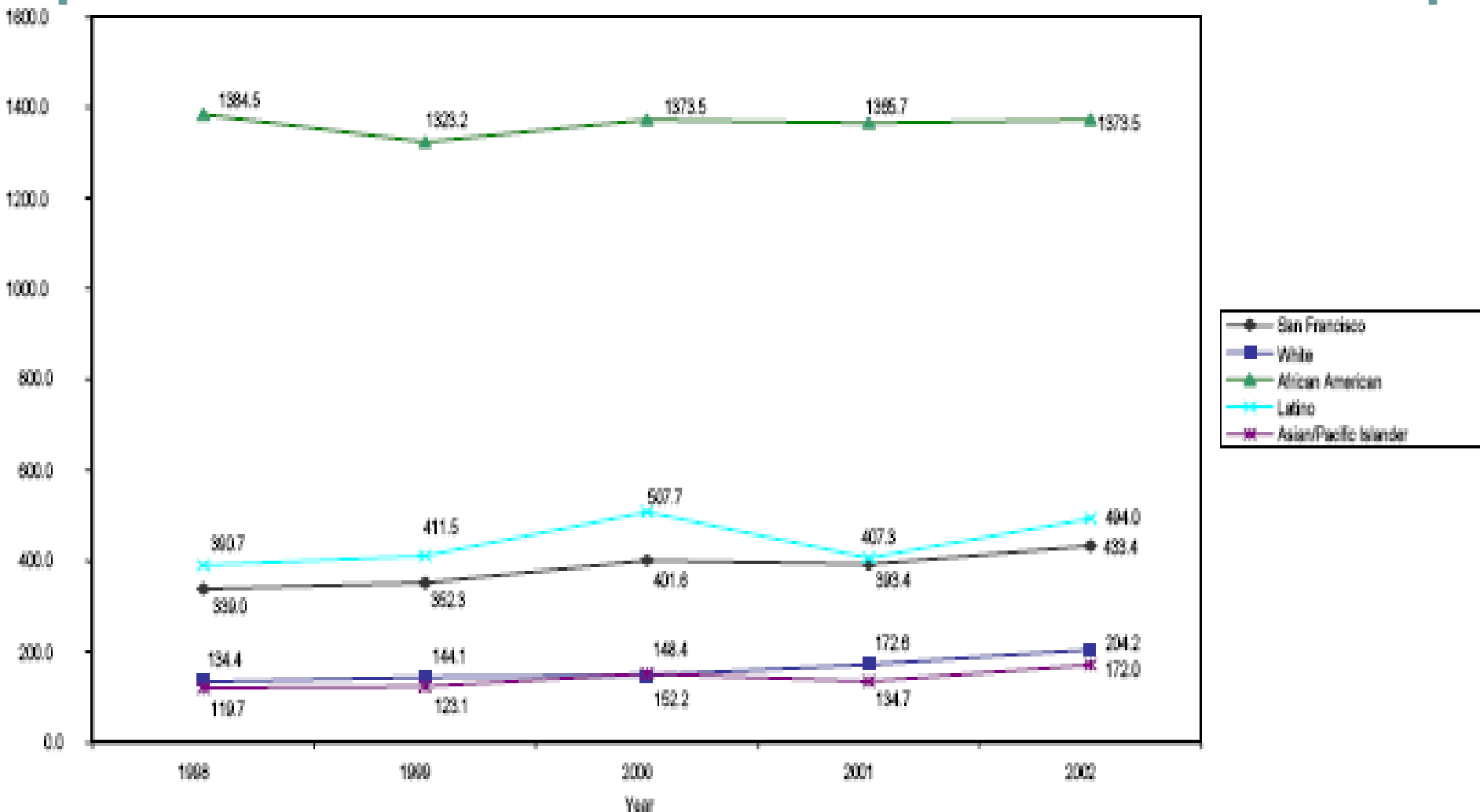
Child Trauma Is Bad For Your Health

- **Long term neurophysiologic and anatomic changes**
- **Receptor dysregulation**
- **Chronic neuroendocrine dysregulation with altered levels of ACTH, cortisol and catecholamines**
- **Immune dysfunction with increased pro-inflammatory cytokines and increased inflammatory mediators**

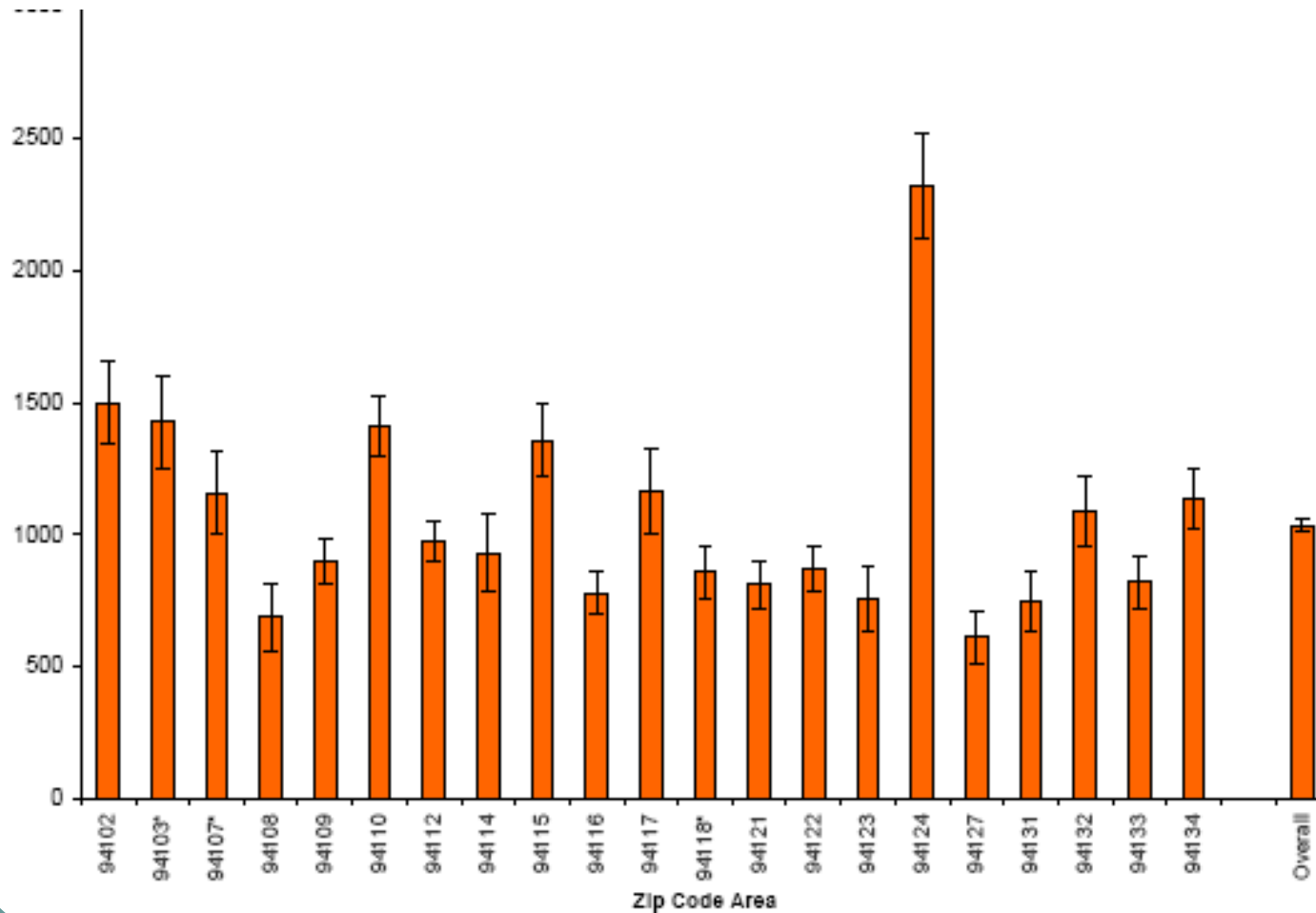
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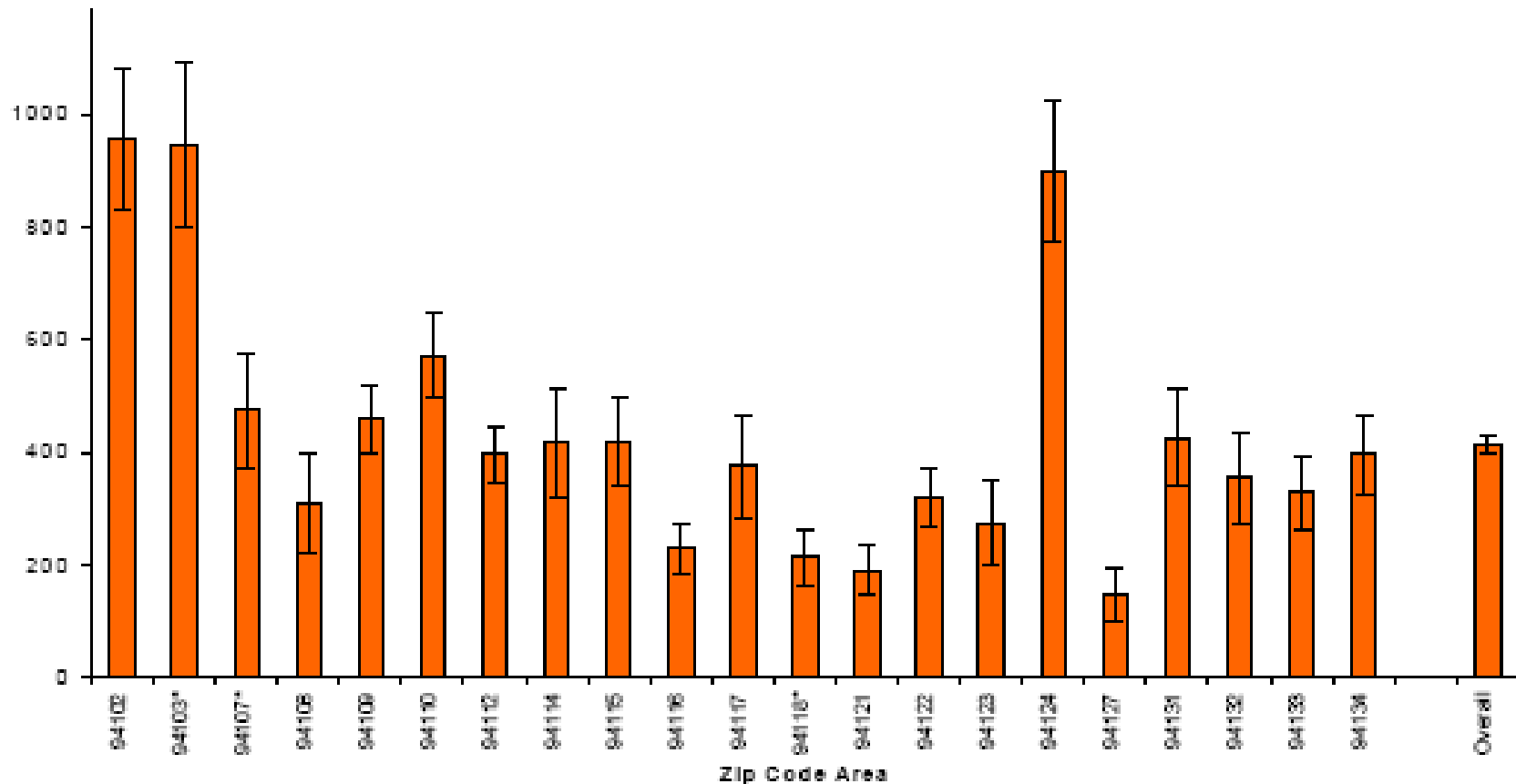
Reported Incidence of Chlamydia By Race/Ethnicity, San Francisco 1998-2002



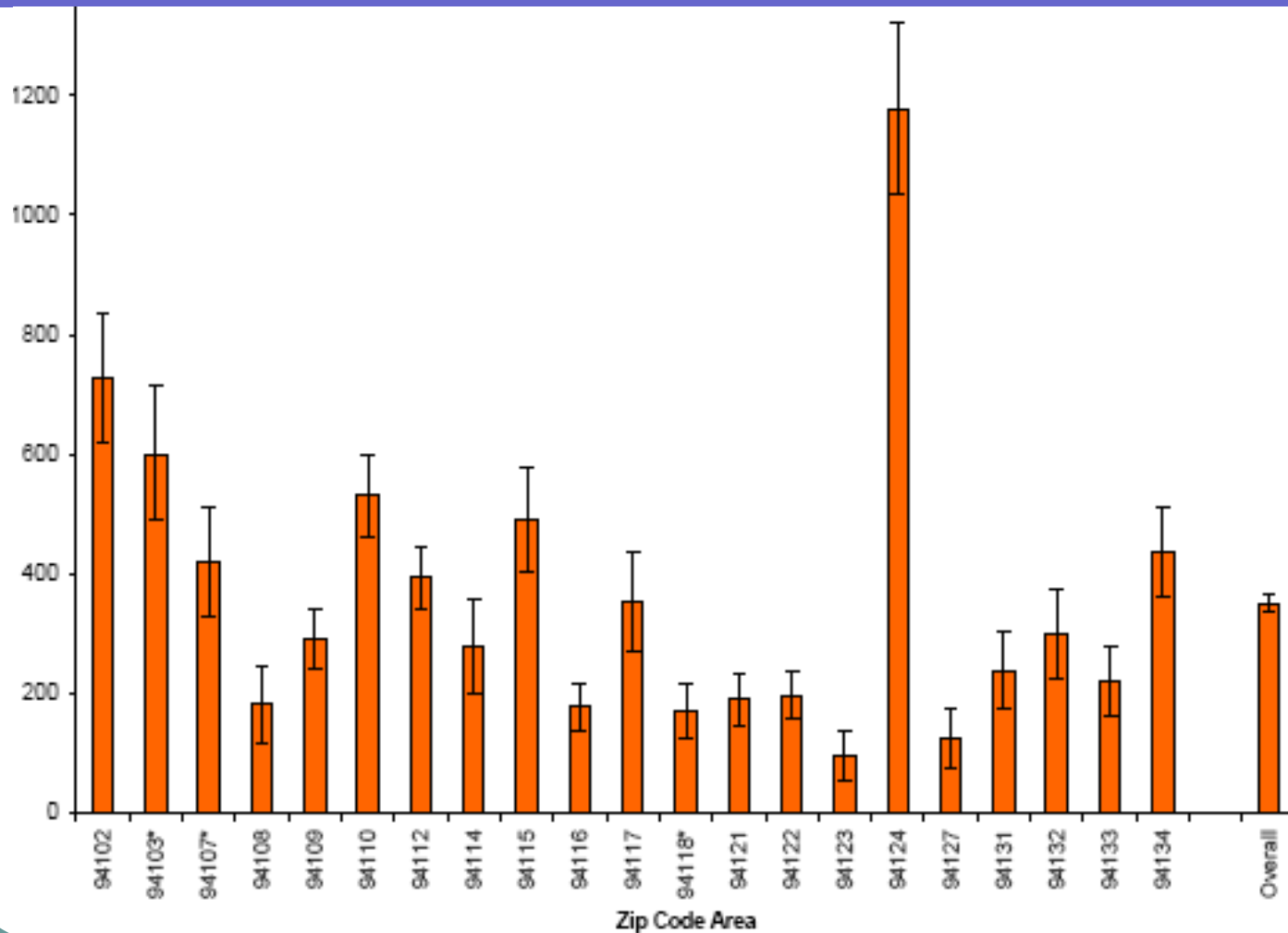
Ambulatory Care Sensitive Hospitalizations: Congestive Heart Failure



Ambulatory Care Sensitive Hospitalizations: COPD

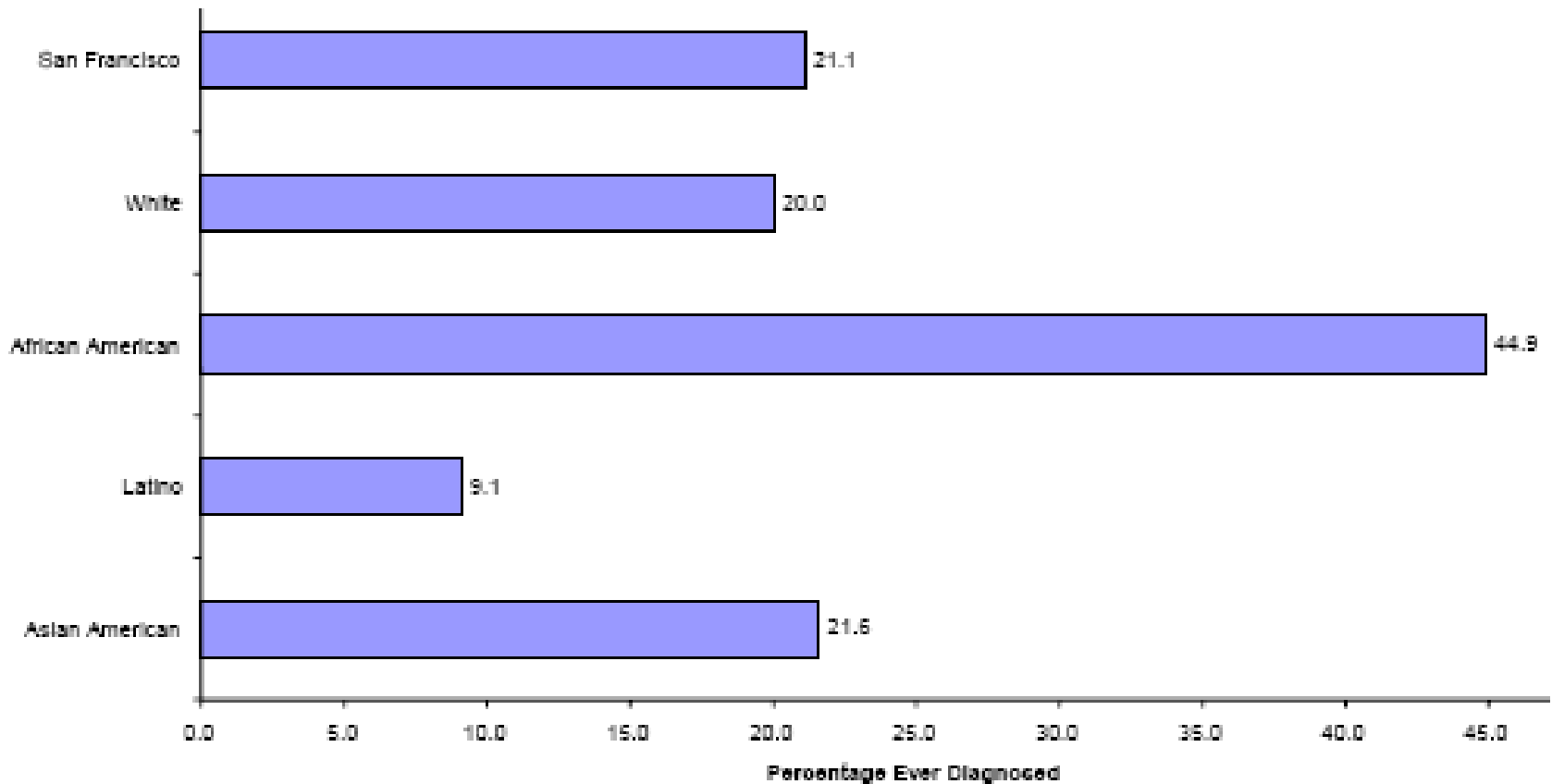


Ambulatory Care Sensitive Hospitalizations: Diabetes



High Blood Pressure by Ethnicity

San Francisco 2001



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History of Significant Trauma	48%
Overweight or Obese	37%
Foster Care	22%
Learning or Behavior Problems	21%
History of Abuse or Neglect	20%
History of Exposure to Violence	20%
Asthma	18%
Intrauterine Drug Exposure	18%

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ACEs ≥ 1	73%
ACEs ≥ 4	14%
ACEs <4 and BMI $\geq 85\%$	33%
ACEs ≥ 4 and BMI $\geq 85\%$	48.5%
ACEs = 0 and learning/beh probs	4.5%
ACEs < 4 and learning/beh probs	15%
ACEs ≥ 4 and learning/beh probs	55%

Treatment

- **Multidisciplinary Approach**
 - **Trauma informed medical care**
 - **Psychiatric and psychological services**
 - **Case Management**
 - **Educational Advocacy**
 - **Integration of Alternative therapies**
 - **mindfulness based awareness**
 - **biofeedback**

Bayview Protocol

- **Every child screened for ACEs**
 - **ACEs = 0 → Yah! Nothing to do.**
 - **ACEs = 1-3 with symptoms → Refer to MDR.**
 - **ACEs \geq 4 → Refer to MDR.**
- **Multidisciplinary Rounds:**
 - **Medical**
 - **Mental Health**
 - **Case Management**
 - **Reception**

Next Steps

- **Standardized screening and treatment protocols**
- **Reimbursement infrastructure**
- **Legislation and policy recommendations**
- **Treatment and referral infrastructure**
- **Patient and Community Education**
- **Incorporation of the ACEs model into design of systems of care to reduce health disparities.**

Thank You!



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