Effect of Perceived Stress and Religiosity as Modulators for C-Reactive Protein, a Known Risk Factor for Cardiovascular Disease

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Overview

• Health First Population Health Screenings for Cardiovascular Disease (CVD)
• Traditional vs. psychosocial risk factors
• C-reactive protein (CRP)
• Stress, religiosity and CVD risk
• Statistical analysis results
• Conclusions and implications
Current population health screening model

- Usually at health fairs
- Can be costly and unreliable
  - Indiscriminant
  - POCT procedures- high false positives and false negatives
- No case management or follow-up

Health First model

Pre-Screening $\xrightarrow{}$ Clinical Screening $\xrightarrow{}$ Referral Case Management
Survey risk factors for CVD

Traditional risk factors

- Family history
- Hypertension
- Cholesterol
- Diabetes mellitus
- Tobacco use
- Being overweight
Survey risk factors for CVD

Psychosocial, mitigating influences

- Perceived stress
- Religiosity
- Early parental care
- Social support
- Difficulty sleeping
- Humor

Clinical screening

Blood pressure check
Blood draw for total cholesterol and hs-CRP
Clinical screening

Referral case management

- Referrals to FQHCs and safety net providers
- Follow-up at 2 weeks, 1 month, 6 months
- Group appointment
  - Motivate high-risk, compliance resistant to ask questions and seek medical care
  - Structured around award-winning film, “A Little More Time... What’s It Worth to You?”
Screenings results

- 7,002 Heart Health Surveys completed and collected
- 25% at-risk based on survey (similar to CVD prevalence rate in general population)
- 1,028 participated in the clinical screening

<table>
<thead>
<tr>
<th>Screening results</th>
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<tr>
<td><strong>Blood pressure</strong>&lt;sup&gt;*&lt;/sup&gt; (n = 1015)</td>
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<tr>
<td>Desirable</td>
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<tr>
<td>Borderline high risk</td>
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<td>High risk</td>
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<td><strong>Total cholesterol</strong>&lt;sup&gt;†&lt;/sup&gt; (n = 1026)</td>
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<tr>
<td><strong>Hs-CRP</strong>&lt;sup&gt;‡&lt;/sup&gt; (n = 1026)</td>
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<tr>
<td>Low risk</td>
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<tr>
<td>Moderate risk</td>
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<td>High risk</td>
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*JNC7 guidelines.
†NCEP ATP III guidelines.
‡Centers for Disease Control and Prevention and American Heart Association guidelines.
C-Reactive Protein (CRP)

Cardiovascular Risk

- Lipids
- HTN
- Diabetes
- Behavioral
- Hemostatic
- Thrombotic
- Inflammatory (e.g. CRP)
- Genetic

25% of Americans are still at risk for cardiovascular disease - low cholesterol, but high CRP.

C-Reactive Protein (CRP)

- 1 mg/L: Low Risk
- 3 mg/L: Moderate Risk
- 10 mg/L: High Risk
- >100 mg/L: Acute-Phase Response; Ignore value; Repeat test in two weeks


Stress, religiosity and CVD risk

- Stress induces chronic inflammatory process of atherosclerosis
  - Inflammatory markers (e.g. CRP) produced in the process
- Frequent religious attendance associated with lower mortality
- Intrinsic religious beliefs associated with better cardiovascular outcomes

Stress, religiosity and CVD risk

• Some evidence of religiosity buffering the effect of stress on cardiovascular and immune function
  – Small sample size
• Thus, retrospectively used Health First data to assess this relationship


Study purpose

• Assessed relationship between:
  – Perceived stress
  – Religiosity (regular attendance at religious services)
  – Factors indicating high CVD risk
    • CRP greater than 3 mg/L
    • At least two reported primary CVD symptoms
Study collaborations

- Bruce Nelson
  GAMC Director of Community Services
- Sally Shaw, DrPH
  GAMC Health First Project Director
- Lee Berk, DrPH
  LLU Associate Professor and Molecular Laboratory Director, Schools of Allied Health Professions and Medicine
- Michelle Prowse, MS
  LLU Physical Therapist and Graduate Student, School of Allied Health Professions
- Dana E. King, MD
  MUSC Professor, Department of Family Medicine

Study population

- 1,028 participants
  - Age range: 18-89 years old
  - Average age: 54 years old
  - 67% female
  - 30% Caucasian, 35% Caucasian-Armenian, 21% Hispanic, 9% Asian, 3% African-American, 2% Other
Study population

- 1,028 participants
  - Average blood pressure: 127/80 mm Hg
  - 17% smokers
  - 21% diabetics

Results

- Commonly overstressed
  - 1.4 times more likely to have high risk CRP levels (greater 3 mg/L) (p < 0.01)
  - Twice as likely to report at least two symptoms indicating CVD risk (p < 0.001)

- Regularly attended religious services
  - 26% less likely to have high risk CRP levels (greater 3 mg/L) (p = 0.03)
  - 49% less likely to report at least two symptoms indicating CVD risk (p < 0.001)

* Independent of aging and social support
Results

- Regular religious service attendance
  - Overstressed were **27.5% less likely** to have high risk CRP levels.
    
    \[(p = 0.06)\]

- No religious service attendance
  - Overstressed were **1.4 times more likely** to have high risk CRP levels.
    
    \[(p = 0.06)\]

- Regular religious service attendance
  - Overstressed were **50% less likely** to report at least two symptoms indicating CVD risk.
    
    \[(p < 0.001)\]

- No religious service attendance
  - Overstressed were **2 times more likely** to report at least two symptoms indicating CVD risk.
    
    \[(p < 0.001)\]
Conclusions

We suspect that regular religious services attendance not only reverses the CVD disease process, but regular religious services attendance creates health.

Conclusions

• Stress increases CVD risk (i.e. CVD symptoms and CRP levels).
• Regular religious service attendance not only lowers CVD risk for the general population, but also for those who perceive they are commonly overstressed.
Conclusions

• Regular religious service attendance may mitigate negative effect of stress on reporting at least two symptoms indicating CVD risk.
• Regular religious service attendance may mitigate negative effect of stress on elevated CRP levels.

Implications

• Clinical relevance
• Medical history intake forms to include spiritual history
• Include not only negative influences, but also mitigating influences
• Stress-promoting and stress-reducing factors
Acknowledgements

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- Collaborations

For more information

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