Efficacy of Control Measures Used to Prevent Needlestick Injuries
Outline:

- Hierarchy of Controls
- Efficacy of Individual Types of Controls
  - Examples
  - Published studies
- Conclusions
Hierarchy of Controls:

*Most effective*
- Elimination of hazards
- Engineering Controls
- Administrative Controls
- Work Practice Controls
- Personal Protective Equipment

*Least Effective*
Elimination of Hazard

- Use of needle-less IV systems
- Removal of sharps and needles
- Elimination of unnecessary injections
Elimination of Hazard

- “Efficacy and Cost-Effectiveness of a Needleless IV Access System.” Yassi et al. 1995
  - Compared NSI for year before/after introduction
  - 78.7% effective in reducing IV line-related NSI
  - Overall reduction of 43.4% in total NSI from all procedures
  - Also used universal precautions and education
Elimination of Hazard

- “Assessing the Effect of Long-Term Availability of Engineering Controls on NSI among HCW.” Reddy et al. 2001
  - Implementation of needleless IV systems and safety syringes
  - Incidence pre-implementation: 10.6%-6.4%
  - Incidence post-implementation: 6.3%-4.2%
  - Confounding variables: educational component, availability of traditional needle devices
Engineering Controls

- Needles that retract, sheathe, or blunt immediately after use
  - Active
  - Passive
- Sharps container styles
Percent reduction in needlestick injuries for major safety device categories

<table>
<thead>
<tr>
<th>Device Category</th>
<th>% Reduction in Injuries</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV Needleless Systems</td>
<td>Up to 88%</td>
</tr>
<tr>
<td>Self-blunting phlebotomy needle</td>
<td>76%</td>
</tr>
<tr>
<td>Phlebotomy needle with add-on safety feature</td>
<td>66%</td>
</tr>
<tr>
<td>Winged steel blood collection needle with sliding sheath</td>
<td>23%</td>
</tr>
</tbody>
</table>

EPINet
Centers for Disease Control and Prevention

- Compared NSI 6 months before/after introduction of shielded safety syringe and needleless IV system
- Overall NSI rate reduced by 61%
- NSI rate assoc. with IV line manipulation, proc. with syringes, and sharps disposal declined by 50%
  - Reductions in these subcategories not statistically significant
Engineering Controls

  - Evaluation of NSI during disposal of used sharps before/after change in container style
  - Before: straight-drop style
  - After: ‘letter-drop’ style
  - Before change, staff 2.9 x more likely to have a disposal injury than after
  - Annual NSI rate reduced by 2/3
Engineering Controls

“Evaluation of a Safety Resheathable Winged Steel Needle for Prevention of Percutaneous Injuries....” Mendelson et al. 2003

- Compared percutaneous NSI rate assoc. with standard vs. safety resheathable winged needle
- Pre: 19 mo.; Training: 3 mo.; Post: 11 mo.
- Rate assoc. with winged steel needles decline 13.41 to 6.41 per 100,000 (52.2% reduction)
Engineering Controls

  - Review of 7 studies of needle protective devices
  - “results...demonstrate that needle protective devices reduced associated sharps injuries by 23-100%, with a mean of 71% compared with conventional products.”
Administrative Controls

- Policies limiting exposure to hazard
- Allocation of resources demonstrating commitment to HCW safety
- Needlestick prevention committee
- Consistent training on use of safe devices
- Policies implementing Universal (standard) Precautions
  - a set of effective practices designed to protect HCW from infection from bloodborne pathogens, applied universally when caring for patients regardless of diagnosis.
Administrative Controls

- “Effects of Hospital Staffing and Organizational Climate on NSI to Nurses.” Clarke et al. 2002
  - Retrospective: 1 month; Prospective: two 1 month periods
  - Likelihood of NSI 3x higher among nurses with:
    - less adequate resources
    - less nurse leadership
    - lower staffing
    - higher levels of emotional exhaustion
Administrative Controls

- “Organizational Climate, Staffing, and Safety Equipment as Predictors of NSI and Near-Misses in Hospital Nurses.” Clarke et al. 2002
  - Poor organizational climate and high workloads assoc. with 50% or greater increase in likelihood of NSI and near-misses
  - Study suggested working conditions can be as important in determining risk as compared to safety equipment.
Work Practice Controls

- No re-capping
- Placing sharps containers at eye-level and at arms reach
- Emptying sharps containers before they are full
Work Practice Controls

- “Impact of Introduction of Sharps Containers and of Education Programs on Pattern of NSI in a Tertiary Care Center in India.” Richard et al. 2001
  - Compared NSI before intro of containers and education
  - 1995: large containers placed in center of ward, plus education
  - 1998: small containers placed close-by in all patient areas.
  - Proportion of NSI by improper disposal reduced from 69% to 38% after 1995, and to 18% after 1998
Work Practice Controls

- Studies investigating the implementation of ‘No Recapping’ have shown an approximately 2/3 reduction in Needlestick Injuries at the study sites
Personal Protective Equipment

- Barriers and filters between the worker and the hazard
- Gloves
- Gowns

Reviewed studies evaluating use and variations of double gloves in preventing NSI

- One study showed an increase in glove perforations with double gloves
- Review of other studies, measuring # of perforations in inner glove, found “reductions of 60% to 70% in glove perforations”
Conclusions

- Data limited due to fact that number of NSI events can be low

- Can’t easily compare research findings due to differences in study design

- New products continue to become available
Conclusions

- While studies show that reductions of NSI are achievable, it is difficult to identify efficacy of individual control measures in studies with numerous interventions.

- Reducing NSI by greatest amount possible will likely entail a combination of:
  - Elimination of procedures using sharps
  - Education
  - Safer devices
  - Positive work conditions
  - Universal Precautions
Useful Websites

- [http://www.cdc.gov/sharpssafety/](http://www.cdc.gov/sharpssafety/)
  Workbook for Designing, Implementing, and Evaluating a Sharps Injury Prevention Program

  The International Health Care Worker Safety Center at the University of Virginia

- [http://www.cdc.gov/niosh/topics/bbp/safer/](http://www.cdc.gov/niosh/topics/bbp/safer/)
  Safer Medical Device Implementation in Health Care Facilities

  NIOSH Alert: Preventing Needlestick Injuries in Health Care Settings
THANK YOU