Technologies for Less Lethal Force and Use of Force: A presentation to the Michigan Department of Corrections Warden’s Meeting

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Instructor certifications:
1. impact weapons
2. electric weapons
3. less lethal munitions
4. chemical agents
5. K9
6. defensive tactics
7. FN 303 / Pepperball
8. flash bang / Stingball
FGCU Research

- Funded by BJA and NIJ grants
- Purchase all equipment for unbiased testing
- Mission is to provide technical assistance and create web-based training on less lethal weapons
Initial Outdoor Weapons Testing
Weapons and Equipment Research Institute (WERI)
Less-lethal or non-lethal

Most can become lethal if used improperly.

Some can become lethal if used too close or improperly.
What the public expects

Public Expectations

- Criteria
  - Highly Portable
  - Discriminating
  - Instantaneous Effects
  - 100% Effective
  - 100% Reversible
  - 100% Safe
  - Environmentally Benign

Phaser
Star Trek
September 1966

Heal, 2003
What the public gets

Before

After
The extent of many citizens’ (and sometimes juries) knowledge of less lethal force options is often limited to what they have gleaned from popular culture, films and movies.

This phenomena has created what Surette (1998) has termed a weapons cult within the entertainment media, “with weapons made increasingly more technical and sophisticated but less realistic”.

Media Impact
Caselaw

Fourth Amendment's 'objective reasonableness' standard: was the decision of the officer reasonable based on the information he had at the time. Three prongs: severity of crime, danger to officer, and risk of flight. (Graham v. Connor, 1989).

The question is not whether an officer could have used less-lethal alternatives, but whether it was reasonable for him to use lethal force under these circumstances.

The reasonableness of the use of force depends not only on whether the officers were in danger at the precise moment that they used force, but also on whether the officers' own "reckless or deliberate conduct during the seizure unreasonably created the need to use such force." (Sevier v. City of Lawrence, 1995)
Factors Impacting Force

- Reactionary Gap (distance)
- Known ability of suspect
- Weapon type
- Availability of less lethal alternatives
- Effectiveness of specific less lethal system
Less Lethal Weapons Categories

- Impact Weapons
- Chemical agents
- Less Lethal munitions
- Electric weapons
- Light and sound weapons
- Compressed air weapons
- K9
Strengths and Weaknesses

- **Training**
- **Cost**
- **Effectiveness**
- **Range**
- **Probability of injuries**
- **Escalation / De-escalation of force**
How they work

- Most based on pain compliance or avoidance
- Some disable senses
- Most effective disable motor function
- Deterrence?
TASER

Range is determined by vertical probe spread.

TASER X26 spread = 1.77 inches / foot (r=.983)

TASER X2 spread = (r = .966)

Beyond fifteen feet, probe spread makes a “miss” of the bottom probe likely.


Impact Weapons

Must be very close to use a baton (3-4 feet)
Balance between weight and length, which ultimately affect velocity.
Least effective of all LLW and most likely to cause escalation in suspect resistance

## Baton Data

### Features

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<th>Features</th>
<th>Length Closed</th>
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(A=Enlarged Striking Tip; B=Enlarged End Cap)

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Chemical Agents

- No correlation between canister size and range (for belt carried systems).
- Carrier determines the distance that the agent travels linearly.
  - Foam = 9.2 feet
  - Gel = 16.8 feet
- Accuracy varies drastically in the way it is fired
- Incapacitation time varies drastically by formulation.

Pepperspray

Contents are a mystery and end-users must rely completely on factory literature.

However, this information may not be accurate and is not regulated. This includes MSDS.

Confirmed by FDA and OSHA
Flammable OC and TASER

Despite labeling on canisters that claim that they are ECD safe, we continue to see flammable reactions.
Chemical munitions

- Broad spectrum of produced
- Launched or hand thrown
- Pyrotechnic or non-pyrotechnic
- Quality control is least reliable in this area and is most unpredictable.
- Majority are “duds” but others react violently. 50-70% do not perform as advertised.
Compressed Air Weapons

FN303 has 15 round capacity.
Smaller air tank

Pepperball has 180 round capacity
Larger air reservoir
PAVA chemical agent
Both systems can be filled from SCUBA tank with an adapter.
Iron sights are accurate to 30 yds with only a three inch drop.

Consistent drop rate (R = .91) allows predictive modeling to extend range well in excess of 70 yards.

O-rings in the weapon are the weak link.

Pepperball

- PepperBall projectile spread and distance is highly correlated ($r = .94$)
- However, drop rate is not consistent and can actually rise.
- Projectile is the weak link.

Float Pattern

15 Feet

20 Feet

25 Feet

30 Feet
Less lethal munitions
12 Gauge Beanbag

Accuracy varies greatly from both the weapon brand, length of barrel, the brand ammunition and the method the weapon cycles the rounds.

So many factors at work that predictive modeling is almost impossible.

The vast majority of beanbags travel at the advertised velocity of approximately 280 f.p.s.

However, in one case, we measured a beanbag travelling at 861 f.p.s., which is approximately the speed of a .45 acp bullet.
Lightfield Ammunition

1198 f.p.s.

1327 f.p.s.

1021 f.p.s.

921 f.p.s.
Same ammo-different guns
Different ammo - same gun
Saiga 12
Light and Sound Weapons
Stingball Grenade

Advertised to have 360 degree coverage utilizing 105 rubber balls.
Above is a side by side comparison of two stingball grenades which were both detonated in the same fashion. Notice the difference in the amount of rubber pellets, but most importantly the difference in the amount of fragments from each detonated grenade.
# Stingball Detonation Distances

Average Distance 83.2 inches

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<th>Distance</th>
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<td>9</td>
<td>22 inches</td>
</tr>
<tr>
<td>10</td>
<td>37 inches</td>
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</table>
Maximum Effective Ranges and Success Rates

- Baton = 3-4 feet (45%)
- Chemical agent = 9-20 feet (64%)
- TASER X26 = 15-20 feet (69%)
- TASER X2 = 20-25 feet
- Pepperball = 60 feet (57%)
- Beanbag = 80 feet (29%)
- FN 303 = 180 feet (57%)

Negative impacts of LLW

- Unrealistic expectations
- Extreme scrutiny by watch groups and courts
- Litigation for using and for NOT using
What can we say...

- Not every weapon works every time
- Effectiveness varies greatly
- Important to not rely on the technology
- Even more important to be very familiar with whatever technologies you decide to adopt and conduct at least a superficial product test
Questions?

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