

**PATROL RIFLES:
ARMING OFFICERS TO SUCCEED**

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Executive Summary

The North Aurora Police Department currently allows officers to carry their choice of 9mm or .45 caliber pistols; no long guns are available. The Firearms Training Unit has proposed that the department adopt the .223 caliber rifle for patrol officer use. The reasons for this proposal are: (1) pistols are inherently less accurate and have a shorter effective range than long guns such as rifles and shotguns, (2) pistol caliber bullets penetrate more heavily through interior walls than .223 rifle caliber bullets, which causes an increased risk of unintended persons being hit, and (3) pistol caliber bullets will not penetrate body armor and many other obstacles commonly encountered, while most .223 caliber bullets will.

The objective of this research is to determine if the NAPD should adopt a long gun for patrol officer use or keep the current pistol-only program as it is. The types of weapons under consideration are pistol caliber rifles (9mm and .45 caliber), shotguns (slugs and buckshot), and the .223 caliber rifle. These weapons will be compared and contrasted with respect to accuracy & range, ease of use, wounding ability, and barrier penetration.

Immediate Incapacitation Officers shoot to immediately achieve physiological incapacitation of a suspect who is threatening life. This means that the suspect is rendered physically incapable of continuing his or her life threatening behavior. This is done by (1) damaging or destroying the suspect's central nervous system by shooting the brain or upper spinal cord, or (2) interrupting blood flow to the brain, to cause unconsciousness, through shooting the center mass of the suspect. Stopping blood flow to the brain is done by creating as much trauma and bleeding as possible. Some projectiles cause these effects better than others. Decisions on weapons, ammunition, and training should be made with the goal of immediate incapacitation in mind.

Accuracy & Range Pistols are less accurate than rifles and shotguns due to their short sight radius. Their useful range is 25 yards or less. Shotguns have a range of about 30 yards with buckshot and about 50 yards with slugs. Pistol caliber rifles (9mm and .45 caliber) have a useful range of about 50 yards. The best range and accuracy of all the choices is found in the .223 caliber rifle. It is accurate to over 100 yards, even in the hands of average officers, the majority of the patrol workforce. Officers should be armed with a weapon capable of the longest range that they might reasonably need to engage with lethal force. The longest hallway at Jewel Middle School is about 180 feet or 60 yards. Compare this to the above listed weapons ranges. Other buildings, such as factories and warehouses are usually very large and would likely require long gun capability to adequately respond to an active shooter situation. Even though an active shooter here is unlikely, officers should still be prepared to respond to one. The weapon with the best accuracy and range is the .223 caliber rifle, followed by pistol caliber rifles, shotguns, and pistols.

Ease of use Compared with the shotgun, the rifle (either pistol caliber or rifle) is more comfortable for officers to shoot and be confident with, an important consideration for risk management. The shotgun is known for heavy recoil, something that makes controlling it difficult, especially for female officers and smaller male officers. Rifles, on the other hand, have a mild recoil. Because of this, its use is as easy for women as it is for men. If a weapon is uncomfortable for officers to shoot, it is not an effective weapon. With respect to ease of use, the best weapon is one that the majority of patrol officers can operate effectively, and in this case, rifles are easier to shoot than shotguns.

Wounding ability Handgun bullets have minimal fragmentation and a very small temporary cavity, which causes very little or no additional wounding so their wounding effectiveness is determined simply by the size of the permanent cavity and the depth of penetration. Shotgun slugs produce very devastating wounds due to very high penetration and if that were the only factor in choosing the appropriate round, the best projectile would be a slug. Rifle bullets produce adequate penetration, larger temporary cavitation, and fragmentation, depending on the weight and design. The temporary cavity, acting on tissues already damaged by bullet fragments, causes additional trauma and bleeding. These elements combine to make .223 bullets more severe than pistol bullets. Penetration tests illustrate that, in general, .223 caliber bullets cause more severe trauma than pistol calibers.

Barrier Penetration Pistol bullets have been shown, through ballistic testing, to penetrate further after going through a common interior wall. This is also true for shotgun slugs and buckshot. .223 caliber bullets, on the other hand, have been shown to fragment more and penetrate less after going through an interior wall, thereby reducing the risk of a bystander being injured in an adjacent room. .223 caliber bullets also reliably penetrate body armor, while pistol bullets and shotgun ammunition do not. This would be vitally important if officers must face violent criminals wearing body armor, such as during the 1997 Hollywood bank robbery shootout.

Long Gun Survey Of 21 suburban Chicago area agencies surveyed, every one allows patrol officers to carry a long gun (100%). While it is not surprising that some are carrying shotguns, it is a little surprising to find that the majority of departments surveyed (71%) are actually carrying rifles. In fact, several agencies carry both a shotgun and a rifle or give officers their choice of either weapon. Of those that carry rifles, the majority (80%) uses .223-caliber ammunition.

Conclusion Handguns are inadequate for some situations because of their limited effective range, limited accuracy, lesser wounding ability, and higher risk of over penetration through interior walls. .223 caliber rifles have less recoil, better accuracy, greater range, superior wounding ability, more favorable interior wall penetration, and the ability to penetrate body armor. Since patrol officers are the first to respond to any life threatening criminal incident, however infrequent they may be, law enforcement agencies should arm them with a long gun of some kind. Anything less and they will not be adequately prepared to respond. Having adequate weapons will increase the chances that responding officers can reduce the ability of the suspect to resist.

Recommendations The North Aurora Police Department should adopt .223-caliber ammunition for patrol rifle use. Further investigation of specific .223 rounds in various weights and configurations should be done to precisely determine each round's performance for various uses. Based on anecdotal information from firearms trainers, the Department should select one round for barrier penetration (when this is desired) and one for close quarters use (when interior penetration is not desired). More focused research and/or ballistic testing will help determine the specific cartridges. In addition, the FBI's ammunition testing data will be of some help as well.

Submitted to Chief Thomas Fetzer
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The Village of North Aurora, a community of about 12,500 residents, is not a violent community; in fact, the North Aurora Police Department considers itself “service” oriented. Still, the citizens expect the police to be able to protect lives, our most important service. Currently, officers of the North Aurora Police Department are armed with only a sidearm, their choice of a 9mm or .45-caliber semi-automatic pistol. There is no supplemental weapon available, such as a shotgun or rifle. Even though officers in North Aurora are rarely called upon to face armed, violent offenders, it could happen at any moment.

Since the Columbine massacre of 1999, police agencies have begun training their patrol officers in rapid deployment procedures for active shooter situations and other critical incidents. The NAPD has done this as well. However, while many other police agencies, both large and small, carry side arms *and* long guns, the North Aurora Police Department is only prepared to respond to these incidents with handguns, a significant tactical disadvantage. Columbine was the law enforcement community’s wake up call and there is no longer any excuse not to be prepared. This does not mean that every agency should field a SWAT team. Patrol officers are the backbone of every police department and the first to respond to every call. They should have the tools and training to handle any reasonably predictable incident. Even though they are rare in North Aurora, incidents of violence are not confined to any particular jurisdiction size or socio-economic class, so it could happen anywhere. During the North Hollywood bank robbery shootout in Los Angeles, California in 1997, heavily armed offenders wearing several layers of body armor outgunned responding patrol officers for 45 minutes. Since this incident, police agencies across the nation began arming their patrol officers with rifles. On Halloween 2002 in St. Charles, a man fired several shots through his apartment door at children trick or treating. Patrol officers were the first to respond to these incidents and they handled at least the first several minutes until relieved by better-equipped personnel. What would have happened if the armed suspect confronted the police? What would have happened if that happened in North Aurora, where sidearms are the only weapons available to officers? While North Aurora has been blessed by being relatively violence-free, it is not immune to violence. There is nothing to indicate that any of those incidents could not have happened in North Aurora. Police administrators are responsible for ensuring that their agencies are prepared to respond to life threatening

emergencies. This means adequately equipping and training personnel to meet challenges that could reasonably be expected. If it is predictable, then it is preventable.

PROBLEM STATEMENT

The North Aurora Police Department currently allows officers to carry their choice of 9mm or .45 caliber pistols. No long guns are currently authorized for use. Members of NAPD's Firearms Training Unit have suggested that the pistol is inadequate for all situations and that a long gun should be adopted. The deficiencies in the current pistol-only program are: (1) pistols are inherently less accurate and have a shorter effective range than long guns such as rifles and shotguns, (2) pistol caliber bullets penetrate more heavily through interior walls than .223 rifle caliber bullets, which causes an increased risk of unintended persons being hit, and (3) pistol caliber bullets will not penetrate body armor and many other obstacles commonly encountered, while most .223 caliber bullets will. The primary issue is to evaluate whether or not a supplementary long gun is necessary for patrol officer use in the North Aurora Police Department. If a long gun is needed, what is the best type to choose: a .223 caliber rifle, a pistol caliber rifle (9mm or .45 cal.), or a shotgun (buckshot or slugs)?

ACHIEVING IMMEDIATE INCAPACITATION

According to the law, a police officer can only shoot in defense of his or her own life or that of another—to immediately stop the life threatening behavior of the suspect. Police officers shoot to achieve *immediate physiological incapacitation*—defined as “the sudden physical or mental inability to pose any further risk of injury to others.” (Patrick). If not physiologically incapacitated, the suspect is still able to continue life-threatening behavior. In some cases, a hit to a suspect's arm or leg might obtain *psychological* incapacitation, where the suspect voluntarily stops fighting due to the ‘shock’ of being shot. In this type of case, the suspect is still physically able to continue the fight, but chooses to surrender. Psychological incapacitation is very unreliable, since it varies greatly from person to person without regard to a particular cartridge. (Roberts 17) Therefore, we must strive to achieve immediate physiological incapacitation to stop life threatening behavior. Decisions on weapons, ammunition, and training should be made with this goal in mind.

There are only two ways to cause immediate physiological incapacitation. The first is to damage or destroy the Central Nervous System, by shooting the brain or upper spinal cord. In order to damage or destroy the CNS, officers are taught that a hit in the triangle between the eyes and nose is most likely to succeed. Hits outside that area have a higher chance of hitting bone at an angle and can actually fail to penetrate, bouncing off. Or they can hit a part of the brain that will not incapacitate the suspect. “. . . individuals can perform tasks or even survive gunshot wounds of the brain—especially if they involve the frontal lobes. In documented cases of suicide, an individual has fired a bullet through the frontal lobes, to be followed by a second fatal shot into the basal ganglia.” (DiMaio 210) The author once responded to a shooting where the victim was shot at close range in the side of the head with a .25 caliber bullet at an angle and the bullet bounced off his skull. He suffered only a minor flesh wound. Shooting the brain or spinal cord usually causes death or permanent disability so it is usually done only as a last resort to prevent imminent great bodily harm.

The second way to cause immediate physiological incapacitation is to interrupt blood flow to the suspect's brain, which causes unconsciousness. The best way to do this quickly is to cause heavy bleeding by shooting vital organs or blood arteries and vessels. The faster the suspect bleeds, the faster blood flow to the brain will stop and the sooner that unconsciousness will occur. Since the highest concentration of vital organs and blood vessels is located in the chest and abdomen of the human body, officers are taught to shoot at that area, called the center of mass. Shooting at the center of mass also increases the likelihood of getting a hit, since it is the largest part of the human body. Shooting an arm or leg to wound, as some might suggest police should do, is not likely to cause physiological incapacitation. Physiological incapacitation takes a minimum of 10-15 seconds to occur because even when shot directly through the heart, the suspect's brain and muscles still have a small supply of oxygen and can function until it is exhausted.

The limiting factor for consciousness is the oxygen supply to the brain. When the oxygen in the brain is consumed, unconsciousness occurs. Experiments have shown that an individual can remain conscious for at least 10-15 seconds after complete occlusion of the carotid arteries. Thus, if no blood is pumped to the

brain, an individual can function, e.g., run, for at least 10 sec before collapsing.
(DiMaio 210)

Put simply, the best bullets are the ones that cause physiological incapacitation the quickest. By measuring several factors of projectile wounding, the most appropriate type of round(s) can be selected for the various types of applications.

There are four factors of projectile wounding: (1) Depth of penetration, (2) Permanent cavity, (3) Temporary cavity, and (4) Fragmentation. Depth of penetration is the amount of tissue that the bullet passes through and destroys, which is important because in order to cause physiological incapacitation, the projectile must make it deep enough to damage vital organs and blood vessels. (Patrick)

The permanent cavity is the hole left by the bullet's path through the body. (Patrick) As it passes through, tissue is crushed and bleeding occurs. The bigger the hole, the more tissue that is damaged, the more bleeding that will occur.

The temporary cavity is the tissue surrounding the permanent cavity that stretches away from the bullet as it passes through the body. (Patrick) This is a little like what happens when a rock is thrown into water. The impact of the rock initially moves the water out of the way, causing a temporary hole in the water. The water quickly moves back and fills the hole. The amount of damage caused by this effect varies greatly based (generally) on the velocity of the bullet and the elasticity of the tissue. Anatomical structures such as blood vessels, muscles, lungs, and bowels are able to survive significant stretching with a minimum amount of damage but inelastic tissues will sustain significant damage because of the temporary cavity stretching. (Patrick) "Inelastic tissues such as the liver, kidney, spleen, pancreas, brain, and completely full fluid or gas filled hollow organs, such as the bladder, are highly susceptible to severe permanent splitting, tearing, and rupture due to temporary cavitation insults." (Roberts 18)

Fragmentation is the breakup of the bullet. (Patrick) Fragments of the bullet can spread out wider than the permanent cavity, causing multiple, smaller permanent cavities and bleeding as they pass through tissue. "Projectile fragmentation in tissue can also greatly increase the perma-

ment cavity size. When a bullet fragments in tissue, each of the multiple fragments spreads out radially from the main wound track, cutting its own path through tissue.” (Roberts 20) Fragmentation also increases the chances that the bullet will remain in the body, thereby, reducing the chances that an innocent bystander will be seriously injured by a bullet that passes through the target’s body.

The extent of injuries caused by a bullet depend, in part, on how well the bullet produces the four listed wounding components and how well they compliment each other. Temporary cavity and fragmentation, under the right conditions, can complement each other because the bullet fragments can weaken surrounding tissue, which can then be detached by the temporary cavity, in effect creating a larger permanent cavity with additional trauma and bleeding. “It is the synergy of the temporary cavity acting on tissue that has already been riddled with bullet fragments that produces the increased permanent cavity . . .” (Fackler 27) Therefore, the temporary cavity is reliant on the velocity of the bullet, where in the body it hits, and what the bullet does inside the body. According the Federal Bureau of Investigation, depth of penetration and permanent cavity are considered the most important of the wounding components, especially for pistol ammunition. The FBI recommends penetration of at least 12 inches to ensure this damage. (Patrick) Pistol ammunition involves a very small temporary cavity and very little fragmentation. However, the component that most affects the severity of a gunshot wound is the size of the temporary cavity. Due to their very high velocities and high kinetic energies, rifles can produce very severe wounds. (DiMaio 142) As stated earlier, the more trauma and bleeding caused, the more likely physiological incapacitation will occur.

IS A LONG GUN NECESSARY?

Before considering whether a supplementary long gun is necessary, we must first compare and contrast pistols and long guns. The greatest strength of pistols is that they are always readily accessible, while their weakness is their limited accuracy and short useful range. Long guns, however, have increased accuracy and longer range than handguns. Their weakness is limited accessibility in unexpected situations. However, some policy makers, in spite of the evidence, will still be concerned about liability. “Liability issues should not be the main focus of whether rifle/carbines are permitted to be carried by officers. Public safety and officer survival should

be the prime consideration.” (Chudwin 15) Since public safety and officer survival are the focus, the differences of pistols and long guns in accessibility, accuracy, and range will be shown. In addition, results of a long gun survey as well as some views opposed to patrol rifles will be presented.

Accessibility

The greatest strength of pistols is that they readily available. They are best suited for use at close range (under 25 yards) in situations in which an *unexpected* threat confronts officers. “When faced with a non-anticipated life-threatening situation, a peace officer is best armed with the firearm of convenience, a handgun” (Bollig 24) The National Tactical Officers Association, in its Tactical Team Weapon Selection position paper agrees: “It is recommended by the Association that members tasked with entering high-risk areas **be adequately armed with a shoulder-fired weapon** Handguns are to be carried as ‘secondary’ or ‘back up’ weapons and not as primary entry weapons.” (“Tactical Team Weapons Selection” 5-6) Special Agent Urey Patrick, of the Federal Bureau of Investigation, agrees:

A review of law enforcement shootings clearly suggests that regardless of the number of rounds fired in a shooting, most of the time only one or two solid torso hits on the adversary can be expected. This expectation is realistic because of the nature of shooting incidents and the extreme difficulty of shooting a handgun with precision under such dire conditions. The probability of multiple hits with a handgun is not high. Experienced officers implicitly recognize that fact, and when potential violence is reasonably expected, their preparations are characterized by obtaining as many shoulder weapons as possible. Since most shootings are not anticipated, the officer involved cannot be prepared in advance with heavier armament. As a corollary tactical principle, no law enforcement officer should ever plan to meet an expected attack armed with only a handgun. (Patrick)

The most general description of a situation where a pistol is inadequate and a long gun would be preferred is one where officers reasonably believe that lethal force might be necessary.

Accuracy

Pistols are inherently less accurate than long guns. “The .223 has advantages relative to a handgun, partly by creating greater wound trauma, but primarily through greater accuracy of fire and the associated extension of effective range.” (MacPherson 30) At the practice range, missed shots are caused by the failure of the shooter to align the sights at the moment the trigger breaks and the bullet leaves the barrel. In real life, where both the shooter and the target are usually moving, missed shots are very common. In a study of 19 officer-involved shootings the Joliet, Illinois Police Department found that officers, using various types of firearms, missed their intended target 71 percent of the time. (Kerr and Wilkerson 10) Pistols are imprecise for two main reasons. The first reason is simply the distance between the front and rear sights. Pistols have a short sight radius, while long guns have a much greater distance between the sights. The greater the sight radius, the greater the accuracy will be. The second reason for pistols limited accuracy when compared to long guns is the stability (or instability) of the way that pistols and long guns are held. Most officers use a two-hand hold when firing a pistol, while a long gun allows a four-point hold—both hands, cheek, and shoulder. (Lesce 28) With a two handed pistol hold, misalignment of the sights from the eye of the shooter happens with only a slight movement of the wrist or a lowering of the arms, which is very easy to do in a gunfight. This misalignment is possible because of the short sight radius and the unanchored hold. Any misalignment of the sights translates to a missed shot. In order to break the eye-rear sight-front sight alignment using a long gun, an officer would have to hold the weapon incorrectly. The superior range of long guns is closely related to greater effective range than pistols.

Effective Range

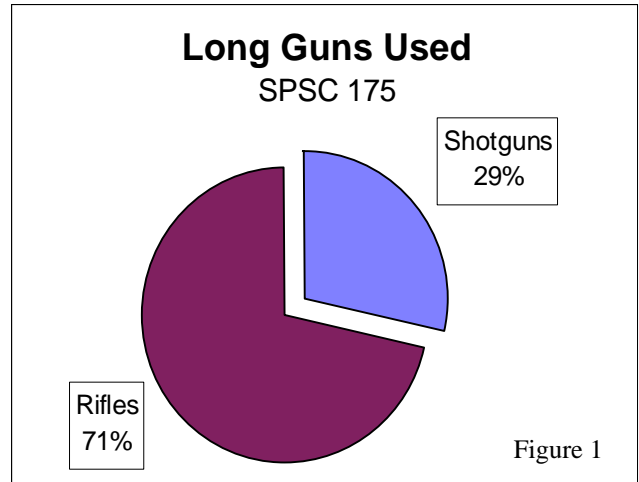
In contrast with the performance of handguns, long guns offer greater range. The useful range of a pistol is 25 yards or less. For some officers the ideal pistol range may be only as far as 15 yards. When used with buckshot, a shotgun’s maximum useful range is around 30 yards. With slugs, the maximum range for the average officer is no more than 50 yards, while a rifle, on the other hand, is best for intermediate ranges (up to 100 yards). (Fairburn 39) Sniper rifles, of course, are useful for longer ranges but patrol officers would not have a need for such long-range accuracy. Armed with a patrol rifle, an officer can control a 100 yard radius which “. . .

allows fewer officers to control a given area and still deliver far more close-range precision than that offered by a sidearm or a shotgun.” (Fairburn 59)

Specifically, long guns would be advantageous to deploy in the following types of situations: hostage situations, barricaded subjects, felony stops, perimeter containment, confronting armed criminals wearing body armor, tactical entries on search and arrest warrants, and crimes involving weapons. Their advantages in accuracy and range increase the tactical advantage for responding officers, allowing them to be farther away behind better cover.

Long Gun Survey

A number of area police agencies currently use long weapons of some kind or another and many have replaced their shotguns with patrol rifles. Of 21 agencies surveyed, every one allows patrol officers to carry a long gun (100%). Of those, seven (33.3%) carry only rifles, eight (38.1%) carry rifles *and* shotguns or the officer’s choice, and six (28.6%) carry only shotguns. Therefore, 71.4% of the agencies surveyed allow patrol officers to carry rifles and 28.6% carry only shotguns. See pie chart in figure 1. Of the fourteen departments that allow rifles, eleven of them (78.6%) use .223-caliber ammunition. Only three of fourteen, (21.4%) use 9mm ammunition. (Class survey) While this survey is not scientific, it certainly demonstrates that long guns are the norm and patrol rifles are not a revolutionary idea.



Opposing Views

Even though a number of departments have switched or are switching to the use of rifles by patrol officers, there are opposing viewpoints. One view says that if police are armed with more firepower, they will feel pressure to use them. “‘It’s courting trouble,’ said Tom Diaz of the Violence Policy Center, a Washington-based non-profit research group that studies the effects of violence. ‘The average cop never has the occasion to use his gun,’ Diaz said. ‘So if this kind of firepower is available, there is an implicit pressure to use it. Yet the average officer often

lacks the training and experience.” (Vogt 8) Some of the LAPD officers involved in the 45 minute long North Hollywood bank robbery shootout probably had never used their guns in the line of duty before and they clearly needed a more powerful weapon that day. While events like this are not likely in North Aurora (or anywhere for that matter), patrol officers should be reasonably prepared to respond

Another viewpoint says that community policing and more firepower do not mix. “Particularly problematic . . . is that while the federal government is arming police departments, it is also promoting a softer, gentler approach to law enforcement with the Community Oriented Policing program.” (Elbow 5A) Community policing is based on officers responding to the problems and concerns of the community, along with the community members. If an armed offender is endangering the community, the community wants the police to come prepared to put an end to it. Is the community going to care what the weapon looks as long as it helps the police conclude the incident safely? Will they be upset if an innocent bystander is hurt by a rifle or shotgun? Of course they will, but this would also be the case if a bystander were hurt by an officer armed with only a pistol.

Finally, this opposing viewpoint agrees that more heavily armed suspects are a problem for the police. He says that arming police with such weapons is not a good idea and offers no better way to deal with the problem.

It takes little imagination to guess the difficulties this poses for the police in the future. Shootouts with criminals equipped with handguns are dangerous. Facing adversaries armed with military assault rifles substantially increases the risk to both police and innocent citizens Increasing police weaponry is really not a sound solution to the problem. In a gun battle, the police are usually not in a position to unleash the fury of an automatic weapon at an armed opponent. Most gun battles take place in an urban setting. Firing off a clip of ammunition in the direction will, sooner or later, result in the killing of an innocent bystander. The police are therefore limited in their ability to respond to sophisticated weaponry. (Holden 341)

Mr. Holden agrees that heavily armed criminals pose a great risk to police and civilians and he is right about that. His point that the police are not in a position to use an automatic weapon misses the point. First, very few departments, if any, are actually arming patrol officers with fully automatic rifles. Rather, they are semi-automatic rifles, which fire one round at a time with each trigger pull. In unexpected confrontations with armed offenders, his point is accurate, because they cannot call timeout to get their rifle. However, the value of having patrol officers armed with rifles is that when they are responding to a situation where they can reasonably expect an armed offender, they can have the rifle in their hand when they exit their patrol car (with an interior mounted rack.) This is no slower than drawing their pistol from its holster. Finally, Mr. Holden refers to a magazine, the container that holds the cartridges, as a 'clip.' If he does not even know what the name of the part, how knowledgeable is he and how intensive was peer review of his book? The above opinions expressed against arming patrol officers seem either misinformed or based on something other than facts and tactical principles.

Is a long gun a necessary piece of equipment for a patrol officer to carry? The answer is an emphatic ABSOLUTELY. Without long guns, officers will be nearly tactically helpless beyond 25 yards.

WHAT TYPE OF LONG GUN IS BEST SUITED FOR PATROL USE?

Many agencies are concerned about liability and rightly so. However, choosing the wrong tools and training for the job seems more at risk for incurring liability than doing careful research and then selecting the best solution. It is a far greater liability risk to fail to give officers the tools & skills they need to survive and succeed. "The key case of *City of Canton v. Harris* (1989) identifies 'deliberate indifference' toward civil rights on the part of city policy makers as the mental state needed to subject a municipality to Section 1983 liability. Recall here that deliberate indifference is akin to recklessness in the disregard of risk to others." (Mijares et. al 36) In other words, to be aware of a risk and fail to prepare for it can create civil rights liability.

Which type of weapon (and what cartridge) is best ultimately depends on the needs of each particular agency, but weapons that are easy for officers to operate will be the best choice. The primary choice each agency must make is first, to decide the caliber and second, to decide the

configuration (i.e. full metal jacket, hollow point, etc.) and in what situations each type will be used. Then they should select the weapon to use with the ammunition. First, some ammunition-related definitions, since these terms and abbreviations are used throughout this discussion:

- Full metal jacket (FMJ): This bullet has a metal jacket surrounding the lead or steel core, to prevent it from expanding on impact. The FMJ is the bullet configuration used by the military. (DiMaio 143)
- Jacketed soft point (JSP): Unlike the full metal-jacketed bullet, a metal jacket partially covers the soft point bullet. The core is exposed at the tip, which helps the bullet expand upon impact. Soft point bullets are usually used for hunting. (DiMaio 143)
- Jacketed hollow point (JHP): Like the soft point bullet, the hollow point bullet has a metal jacket partially covering it. However, the exposed tip is hollow, which encourages expansion upon impact. Hollow point bullets are usually used for hunting and shooting competitions. (DiMaio 144) Hollow point bullets are the official bullets of the NAPD.

The three different types of ammunition under consideration are (1) Pistol Calibers (9mm and .45 calibers), (2) Shotgun (both buckshot and slugs), and (3) Rifle Calibers (.223 caliber). 9mm and .45 caliber bullets are being considered because these are the currently issued duty ammunition for the North Aurora Police Department. Shotgun slugs and buckshot are being considered because they have always been the standard second weapon of law enforcement. Finally, .223 caliber bullets are being considered because they seem to be the most popular rifle round that agencies select. .308 caliber bullets are not being considered because they are generally considered too powerful for patrol use. They are most commonly used by police snipers. Deciding what caliber to use requires some knowledge about the wounding mechanics of each of the major choices for long guns. Comparisons will be made between shotguns, pistol caliber rifles, and .223 caliber rifles in the areas of ease of use, accuracy and range, wounding ability, interior wall penetration and body armor penetration.

Ease of Use

Compared with the shotgun, the rifle is more comfortable for officers to shoot and be confident with, an important consideration for risk management. While this is not an advantage over pistol caliber rifles, it is huge advantage over shotguns. The shotgun is

a difficult gun to master. Its recoil is excessive for many small-statured officers and at least bothersome to even the biggest, strongest men. This recoil hampers precise placement of slugs as well as limiting the practice many need to be effective with shot. . . . The shotgun, despite its long history of use in the United States, is not an ideal second weapon for police agencies (Fairburn 39)

If officers are not comfortable with a weapon, they will not practice as well and their handling of the weapon during real-life situations will be tentative. This becomes a liability issue.

As police agencies become more sensitive to the liability aspects of police firearms training, specifically the lack of such training, the rifle or carbine becomes more attractive. Officers are more comfortable with a rifle since it allows more precision and metes out less abuse. The comfort factor promotes increased training and familiarity, which in turn, increases confidence. And being confident with one's weapon is the secret to effective use. (Fairburn 39)

Would you want officers, armed with a weapon that they do not feel comfortable with, to respond to a life-threatening situation? Due to the excessive recoil, training is limited because the body can only take so much. With limited training comes limited confidence and limited familiarity. These are not acceptable qualities of a weapon for law enforcement. In contrast with shotguns, the rifle's low recoil makes it as easy to master for women as it is for men. The .223 cartridge offers a milder recoil than shotguns and full size rifle cartridges because it is an intermediate sized cartridge. This is important for training female and smaller male officers. (Parker 3-4) "It is my experience that training officers to effectively use the rifle/carbine is easier due to the shoulder mounted stability, low recoil, and long sight radius." (Chudwin 17) Once an officer is taught the proper way to hold the rifle, getting accurate hits is as simple as lining up the sights with the target and making a smooth trigger pull.

Accuracy & Range

Long gun accuracy, from least accurate to most accurate, is the shotgun, the pistol caliber rifle, and the .223 caliber rifle. Slugs and buckshot are the least accurate of all three types of long gun ammunition under consideration. When used by the average officer, the shotgun has a useful range of around 30 yards with buckshot and about 50 yards with slugs. Buckshot is terribly

imprecise since the pellets spray outward after they leave the barrel. They spread wider the farther they travel, which is why the range is so limited. (Fairburn 39) While the best officers might be able to hit a suspect farther than 50 yards away with a shotgun with good quality sights, average officers are not capable of this, and they represent a much larger percentage of the patrol workforce. The accurate range of a pistol caliber rifle may be no more than 50 yards, although a patrol rifle should be capable of accurate head shots at 50 yards and accurate body shots at 100 yards (or more). (Fairburn 59) In comparison, a rifle caliber weapon, in the hands of an average officer, is capable of accurate shots to a range of at least 100 yards, if not more. (“Tactical Team Weapons Selection” 2) Well-trained officers might be capable of distances greater than that but probably would not be much need for a shot to be taken at those ranges. The most accurate long gun, of those under consideration, that you can arm a patrol officer with is rifle chambered in an intermediate rifle cartridge, such as the .223.

Critics might suggest that the range of the .223 caliber bullet makes missed shots too dangerous because they will travel a very great distance, increasing the chances for an innocent bystander to be struck. However, Chief Jeff Chudwin, of the Olympia Fields Police Department and a police rifle instructor, points out that the maximum range (with optimum barrel angle) of the .223 (8,300 ft.) is similar to that of the 9mm (6,800 ft.) and the .357 magnum (7,100 ft.). The 12 ga. 1 oz. Slug, which weighs considerably more than the others do, travels only 1,830 feet. “Any stray round is a hazard and it is illogical to claim one type of firearm is more or less dangerous than another based only the maximum range of the round. The key issue is, what is the penetration and ricochet potential of the bullet type and caliber in a residential area?” (16)

Wounding Ability

The FBI recommends projectile penetration of at least 12 inches in order to ensure that the projectile gets deep enough to damage vital organs and large blood vessels. (Patrick) Dr. Martin Fackler, a world-renowned ballistic expert, believes that in order for the .223 bullet to cause adequate tissue damage, it must produce a 14-15 cm temporary cavity along with bullet fragmentation of 30-50%. (27) In terms of terminal wound ballistics (the study of what projectiles do after they hit something), there is no more devastating projectile than a shotgun slug. In tests of hollow point projectiles shot into bare gelatin conducted by Dr. Gary Roberts, a 12-gauge 1-

ounce shotgun slug had an average penetration of 26.4 inches and average maximum temporary cavity of 13.0 cm. 12 gauge 00 buckshot had an average penetration of 22.8 inches. Maximum temporary cavity was not measured for this round. A 9mm 147gr JHP bullet (similar to an NAPD issued round) had an average penetration of 13.2 inches and an average maximum temporary cavity of 5.5 cm. A .45 cal 230gr JHP bullet (similar to an NAPD issued round) had an average penetration of 14.2 inches and an average maximum temporary cavity of 6.5 cm. The shotgun slugs and pistol bullets did not fragment in the testing. The .223 bullets (various weights and configurations) tested had varied performance depending on the grain weight and the configuration of the round. The average penetration ranged from 6.1 inches to 16.8 inches, while the average maximum temporary cavity ranged from as small as 7 cm to as large as 14 cm. The .223 bullets fragmentation ranged from as little as 2.4% to as high as 100%. (28)

In contrast with rifle bullets, handgun bullets cause a much smaller temporary cavity, which does not usually add wounding effectiveness. (Roberts & Bullian 143) Part of this is because rifle rounds travel close to 3,000 feet per second and pistol bullets travel around 1,000 fps, depending on the caliber. (Roberts 28)

All handgun wounds will combine the components of penetration, permanent cavity, and temporary cavity to a greater or lesser degree. Fragmentation, on the other hand, does not reliably occur in handgun wounds due to the relatively low velocities of handgun bullets. Fragmentation occurs reliably in high velocity projectile wounds (impact velocity in excess of 2000 feet per second) inflicted by soft or hollow point bullets. In such a case, the permanent cavity is stretched so far, and so fast, that tearing and rupturing can occur in tissues surrounding the wound channel which were weakened by fragmentation damage. It can significantly increase damage in rifle bullet wounds. (Patrick)

The high velocity of rifle bullets, when rapidly slowed by the body, causes the tearing and rupturing associated with the temporary cavity, especially when combined with fragmentation.

Research by the military has revealed that the feature of a bullet's interaction with soft tissue that contributes most to the severity and extent of the wound is the size of the temporary wound cavity. The size of this cavity is directly related to the amount of kinetic energy lost by a bullet in the tissue. Rifle bullets, by

virtue of high velocities, possess considerably more kinetic energy than pistol bullets.

The severity and extent of a wound, however, are determined not by the amount of kinetic energy possessed by the bullet but rather by the amount of this kinetic energy that is lost in the tissue. The major determinants of the amount of kinetic energy lost by a bullet in the body are (1) the kinetic energy possessed by the bullet at the time of impact with the body, (2) the shape of the bullet, (3) the angle of yaw at the time of impact, (4) any change in the presented area of the bullet in its passage through the body, (5) construction of the bullet, and (6) the biological characteristics of the tissues through which the bullet passes. (DiMaio 142)

Pistol bullets, unlike rifle bullets, have insufficient velocity to cause fragmentation. (DiMaio 47) “Individuals shot with high-velocity rifle bullets, whether full metal-jacketed military rounds or soft-point hunting rounds, show more severe wounds than people wounded by pistol bullets. This is especially true of [rifle] hunting ammunition. It is also true that [rifle] hunting ammunition, because it is soft-point, does fragment in the body.” (DiMaio 311) If the pistol bullets do fragment, the fragments stay very near the permanent cavity (within 1 cm), essentially reducing wounding effectiveness since the smaller main bullet will cut a smaller permanent cavity. (Roberts 20) Rifle bullets break up easier than pistol bullets due to their small size and weight and the increased stress caused by the high velocity.

To summarize, with handgun bullets there is essentially no fragmentation and a very small temporary cavity, which causes very little or no additional wounding so wounding effectiveness is determined simply by the size of the permanent cavity and the depth of penetration. Therefore, by going with a pistol caliber rifle, an agency does not really gain anything but better accuracy over a handgun. Shotgun slugs produce devastating wounds due to very high penetration and if that were the only factor in choosing the appropriate round, the best projectile would be a slug. But the fact is that pistol bullets and shotgun slugs and buckshot have a tendency to penetrate more than rifle bullets. Rifle bullets can produce adequate penetration, temporary cavitation, and fragmentation, so by selecting a rifle, an agency gains range, accuracy, and wounding ef-

fectiveness over pistols & shotguns. While Dr. Roberts' test results are not conclusive enough to select one specific cartridge (due to the limited number tested), they do demonstrate better overall performance by the .223 caliber cartridge than pistol caliber cartridges and shotgun slugs and buckshot. Examination of more test results are needed to specify an exact cartridge for duty use.

Acceptable wounding performance of the .223 bullet is based, at least partly, on its velocity and the type of weapon (length of barrel) used. "5.56mm/.223 weapons require a minimum barrel length of 14.5 inches to optimize incapacitation potential, as 5.56mm/.223 weapons with barrel lengths shorter than 14.5 inches . . . exhibit significantly decreased wounding effects and limited incapacitation potentials, similar to those produced by the 9mm pistol bullets used in handguns and SMG's [submachine guns]." (Roberts 24) In order to ensure fragmentation and effective wounding ability, weapons used should have a long enough barrel length to produce muzzle velocities above 2,500 feet per second. Examples of weapons that meet this criterion are the Colt M-16/AR-15 and M-4/CAR-15, H&K G41 and HK33, and the Ruger Mini-14. (Roberts & Bullian 145) While recommending a specific weapon and specific ammunition is outside the scope of this paper, it is important to keep these factors in mind when making selections.

Barrier Penetration

While deep penetration in soft body tissue is desirable for wounding effectiveness (immediate physiological incapacitation), there must be a balance of enough penetration without too much. Since the selected shoulder-mounted weapon will undoubtedly be used in close quarters, such as during a high risk raid or near residences, police must try to prevent missed shots from over penetrating and striking an innocent bystander in an adjacent room or on an adjacent floor. While some police administrators select pistol calibers for their rifles to reduce the perceived over penetration liability risk with rifle calibers, there is actually an increased liability with pistol calibers when used inside structures. Handgun bullets, including rounds similar to NAPD's duty rounds, have been shown to penetrate further through common building materials than do rifle bullets. "The fragmenting behavior of most 5.56mm (.223) bullets in both soft tissue and building materials, drastically limits their over penetration potential compared with that of many pistol bullets." (Roberts & Bullian 145) "As suspected based on previous testing, all of

the 9mm 147 gr JHP, .40 S&W 180 gr JHP, and .45 ACP 230 gr JHP bullets failed to expand and had very deep, excessive penetration after passing through the interior wall, due to plugging of the hollow point. With the hollow point plugged, the bullets performed nearly identical to FMJ pistol bullets” (Roberts 23) The NAPD issues Speer brand jacketed hollow point (JHP) ammunition in both 9mm 145 grain and .45 ACP 230 grain. In tests of hollow point projectiles shot through a simulated interior wall into bare gelatin, a 1-ounce shotgun slug had an average penetration of 22.8 inches and average maximum temporary cavity of 14.0 cm. 12 gauge 00 buckshot had an average penetration of 23.2 inches. Average maximum temporary cavity was not measured. A 9mm 147gr JHP bullet (similar to an NAPD issued round) had an average penetration of 22.8 inches and an average maximum temporary cavity of 2.0 cm. A .45 cal 230gr JHP bullet (similar to an NAPD issued round) had an average penetration of 29.7 inches and an average maximum temporary cavity of 3.0 cm. (Roberts 28) In these tests, all projectiles had more penetration into gelatin (a simulation of the consistency of human soft tissue) after having penetrated a common interior wall than without penetrating a wall. As stated above, the drywall plugs the hollow point, causing it to function like a full metal jacket bullet. The .223 bullets tested (various weights and configurations), on the other hand, had less penetration into

gelatin after penetrating the interior wall. Their average maximum penetration ranged from 10.6 inches to 16.1 inches, their average maxi-

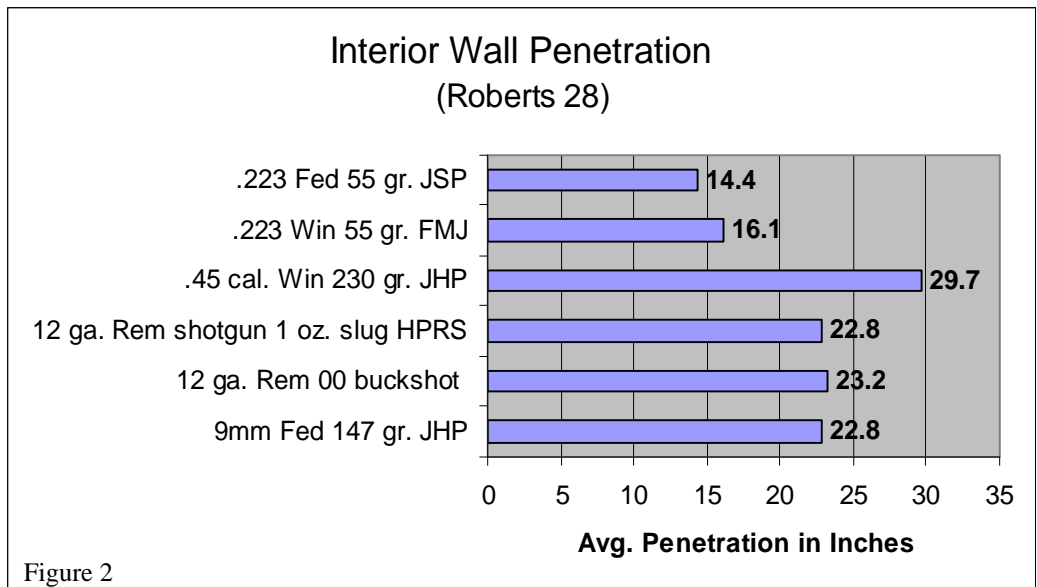


Figure 2

imum temporary cavity ranged from 7.0 cm to 14.0 cm, and their fragmentation ranged from 11.8% to 79.5%. See figure 2. While some rounds still have sufficient penetration to cause a serious wound after penetrating an interior wall, their penetration is clearly less than that of the

pistol calibers. (Roberts 28) The FBI has done extensive testing on the terminal ballistics of all kinds of bullets, however, they will not allow law enforcement agencies to share these statistics outside of their own agency. This is the reason why FBI testing is not cited here. While their bare gelatin testing results will be helpful for a future internal study of ammunition, their penetration tests may not be helpful. “Unfortunately, the testing and evaluation criteria are exactly backwards relative to law enforcement use in gunfight scenarios; the testing and assessment was designed to find ammunition that would produce substantial wound trauma after penetrating housing barriers.” (MacPherson 32) The ideal round would be one that produces incapacitating wounds when striking the intended target but would not produce substantial wound trauma after penetrating walls.

. . . stray 5.56mm/.223 bullets seem to offer a reduced risk of injuring innocent bystanders and an inherent reduced risk of civil litigation in situations where bullets miss their intended target and enter or exit structures. 5.56mm/.223 caliber weapons may be safer to use in CQB situations and in crowded urban environments than 9mm, .45 S&W, or 12 ga. weapons. (Roberts 24)

In another test conducted by the Joliet and Crest Hill, Illinois police departments, pistol ammunition, shotgun slugs and buckshot were found to stay intact after penetrating two residential walls (four pieces of drywall), while many .223 rounds fragmented significantly. Pistol ammunition, shotgun slugs, and buckshot represent “a greater threat to citizenry and other officers than does several of the .223 rounds tested.” (Kerr and Wilkinson 14) More testing is needed in this area to be able to select a specific round, but it is clear that pistol caliber bullets and shotgun slugs fired inside a structure during a raid, for example, penetrate more than .223 caliber bullets.

Body Armor Penetration

Unlike pistol bullets, shotgun slugs, and buckshot, rifle bullets penetrate soft body armor, which is very important if officers have to confront violent offenders wearing body armor. Recall that the suspects in the LA bank robbery shootout wore body armor. In testing published in *Journal of International Wound Ballistics Association*, 9mm, .40 S&W, and .45 ACP bullets plus the 12 gauge 00 buckshot pellets failed to penetrate the body armor. The shotgun slugs did penetrate some, but not all, layers of the body armor. While they did push the armor panels into the gela-

tin, simulating blunt trauma injuries, the body armor did stop the slug from entering the body in every case. Unlike the pistol calibers and shotgun slugs, all .223 bullets defeated the body armor. (Roberts 24) “As law enforcement officers increasingly confront criminals protected by soft body armor designed to defeat pistol bullets and shotgun pellets, the ability of the 5.56mm/.223 bullets to defeat soft body armor has become a significant factor.” (Roberts 16)

To summarize, of the three types of weapons under consideration, the .223 caliber rifle is by far the most accurate. Because of this, its effective range is also superior to the other choices. In the area of wounding effectiveness, the .223 caliber is, again, superior to the pistol calibers. The shotgun, at close ranges, is probably the most devastating firearm that there is. But pistol calibers and shotguns penetrate more through common building materials than the .223 caliber bullet, which increases the chance that an innocent bystander could be seriously hurt by a missed round that penetrates a wall. Moreover, pistol caliber bullets and shotgun slugs and buckshot will not penetrate body armor, while .223 caliber bullets will.

Conclusion

Since patrol officers are the first to respond to any life threatening criminal incident, however infrequent they may be, law enforcement agencies should arm them with a long gun of some kind. Anything less and they will not be adequately prepared to respond. The North Aurora Police Department Firearms Training Unit trains officers according to the Police Training Institute’s philosophy and methodology, which in part says the Strategic Objective of any tactical operation is to “. . . diminish the potential for resistance. Should resistance occur, overcome rapidly with minimal risk.” Officers are taught to “. . . create and maintain a recognizable advantage . . .” (Police Training Institute) Having adequate weapons will increase the chances that responding officers can reduce the ability of the suspect to resist. If he does resist, officers will be better able to defeat his resistance quickly with the least amount of risk to themselves and others. Long guns are more intimidating to criminals and simply deploying one may convince some offenders to give up without a fight. If they do not give up, the officers will be better prepared to defend themselves. If officers confront an armed criminal with less than adequate weapons, they give up some of their tactical advantage, thereby increasing the risk to themselves and innocent bystanders.

Handguns are inadequate for some situations because of their limited effective range, limited accuracy, lesser wounding ability, and higher risk of over penetration through interior walls. The .223 caliber rifles have less recoil, better accuracy, greater range, superior wounding ability, more favorable interior wall penetration, body armor penetration.

Police agencies across the nation, including the NAPD, have been trained in rapid deployment procedures for active shooter situations such as at schools and businesses. These are necessary skills for officers to possess in society today. However, the skills and knowledge gained from these classes is not put to full use unless officers are given the correct tools for the job. Consider the differences between rifles and pistols in the context of active shooter incidents. Many schools and large businesses have long hallways, some in excess of 200 feet. For example, Jewel Middle School's longest hallway is approximately 180 feet long (60 yards). If there were an active shooter at the end of the hall shooting at students and responding officers, a body shot against the suspect would be the minimum need. Of course, this would not immediately physiologically incapacitate the suspect—he or she could continue shooting for 10-15 seconds. How many more students or officers could be shot in this time? It would be optimal for officers to take a precise head shot and immediately end the suspect's life threatening behavior. A pistol is incapable of making an accurate shot at that range and shooting from that far away is truly 'spraying and praying' for a hit. For these situations, the only effective weapon is one capable of accurate shots from at least 100 yards away. Recall the earlier cited maximum ranges: Pistol—25 yards, Shotgun with slugs—less than 50 yards, Shotgun with buckshot—30 yards, Pistol caliber rifle—50 yards, and .223 rifle—100 yards or more. It would be tactically prudent for officers holding the perimeter of such an incident to be behind adequate cover as far away from the building as possible. Of those under consideration, the best weapon for this mission is a rifle chambered in .223 caliber. .223 caliber rifles are available in various weights and configuration that will limit their penetration through common interior walls to reduce the chances of an innocent bystander being seriously injured in an adjacent room. Pistol caliber bullets have been shown to penetrate more in ballistic gelatin (a simulant for human soft tissue) after penetrating a common interior. While more accurate than a pistol, pistol caliber rifles have less wounding ability than a .223 rifle bullet. A shotgun, while superior in wounding ability, is limited in

range and inferior in accuracy compared to a rifle plus it penetrates even more than pistol bullets.

Think of patrol officers responding to a hostage situation where the armed suspect is holding his victim from behind and yelling, "If I can't have her, then no one will." Officers are only armed with pistols and it will take at least thirty minutes for a police sniper to arrive and set up. After fifteen minutes, efforts to convince him to surrender are unsuccessful as he gets increasingly agitated and officers believe that he is about to kill her when he starts raising the gun toward her head. Officers would be derelict in their duty if they did not use lethal force at that point. A headshot would be the only option to immediately incapacitate the suspect before he shoots the victim. Taking that shot with a pistol would be a lot less likely to be successful than the same shot with a rifle. A well-placed shot would likely end the situation successfully. A missed shot could result in the tragedy of the victim being killed, either by the suspect or by the police. Granted, a situation like this is unlikely in any town, but the police should still be adequately prepared to respond.

Because of the totality of the information available, it is this author's recommendation for the North Aurora Police Department to adopt .223 ammunition for patrol rifle use. For those concerned about incurring additional liability, consider this: "As John Hall of the FBI pointed out in his series of articles in the FBI Journal, a firearms training program that addresses legal, practical and policy considerations will likely win in court." (Chudwin 15) Further investigation of specific .223 rounds in various weights and configurations should be done to examine more closely their performance in both desired penetration (shooting through barriers at a suspect behind cover) situations as well as limited penetration (inside structures). If this does not produce clear enough data to make an informed choice, then the Department should conduct gelatin testing before selecting official ammunition.

Rifle bullets, including the .223 is not the magic bullet (pardon the pun) that works perfectly in all applications. But certain weights and configurations perform well in their intended missions and can be deployed based on the situation. Ballistic testing must be done with each of the various cartridge configurations (i.e. full metal jacket, hollow point, soft point, etc.) in order to

gauge their effectiveness for the given application. This testing can usually be arranged through the Illinois Tactical Officers Association or various ammunition manufacturers for free or at a very low cost. In closing, Chief Chudwin's comments sum up the need for a patrol rifle program the best:

In conclusion, establishing a rifle/carbine program is a positive approach to meet needed officer survival and public safety demands. From rural America to the big cities, law enforcement officers have faced violent, heavily armed offenders. Let history be our guide. There is a proven need for the rifle/carbine as a patrol weapon. These firearms, in the hands of select well-trained officers, are a line of defense against the ultimate predators. (20)

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Patrol Rifle survey

Please fill in as much information as you know & return to Scott Buziecki.

- 1) Department name _____
- 2) Does your department allow patrol officers to carry any long guns in their patrol cars? _____
- 3) If yes, what type of weapons? (Rifle/carbine or shotgun)
- 4) For rifle/carbines only:
 - a) What is the primary cartridge (i.e. Federal .223 cal 55 grain FMJ)? _____
 - i) What application(s) is this round used for (i.e. interior work / defeating barriers)? _____

 - b) If you use a secondary cartridge, what is it? _____
 - i) What application(s) is this round used for (i.e. interior work / defeating barriers)? _____

 - c) What make(s) and model(s) are the weapons? _____
 - d) What was the approximate cost per weapon, excluding accessories? _____
 - e) What type of action do they have? (semi-auto / other _____)
 - f) In what situations are they used? _____
- 5) For shotguns only: (Slugs or buckshot)? Are any reduced recoil loads used? _____
 - a) What make(s) and model(s) are the weapons? _____
- 6) Was any ballistic testing done by your department prior to adopting your official rounds? _____
- 7) Do you put the weapons in the squads or are they assigned to each officer? _____
- 8) How are the weapons stored in the squad? (cage rack / floor rack / trunk / other _____)
- 9) Any comments about the program (what works, what doesn't, etc.) or other helpful information _____

- 10) Is there anyone at your department knowledgeable about your long gun program that I could talk to? If so, please provide a name and contact information. _____

Thank you for taking the time to fill this out!