

You Can't Fight Crime If You Don't Have The Time

By Dale Harris

If we accept the premise that a major function of police patrols is to fight crime, and if we accept that this crime-fighting requires time and effort from patrol officers, then it is only logical that police executives and managers must staff their patrol forces so that there is sufficient time available for these efforts. As elementary as that sounds, it is quite common for the incoming demand for service to completely consume so much of the officers' time that there is not enough left to prevent, interdict, or even investigate crimes. Here we discuss some options and implications for patrol management.

Introduction

Just as common as *insufficient* staffing of patrol operations is *inefficient* staffing. Some agencies actually do have enough officers for fighting crime, but they are allocated and scheduled so inefficiently that their best efforts are ineffective.

Patrol is typically the most visible and the most expensive operation for local law enforcement agencies. Usually half or more of the sworn officers are assigned to regular patrol duties, plus there are supervisors and support personnel to help complete the mission. Personnel costs are typically about 85% of a police agencies budget. Given these, it is clear that effective and efficient management of patrol operations can have a very positive impact, while poor management can cripple the agency.

For all the importance of patrol management, it is often surprising how little knowledge there is within most agencies of the proven concepts and techniques for conducting patrol management. This paper will review some of the major patrol management principles and offer some ideas for improvement.

This paper will demonstrate the utility of creating a comprehensive patrol management plan for allocating police resources. We will describe why it is important to formulate the critical

components of such a resource allocation model, that is, a beat plan, a proportional staffing plan, and a patrol schedule. A beat plan, or district plan, should optimize the ability of each unit to not only handle the demand for service in a beat, but to have a reasonable amount of time available for proactive work. A good beat plan, combined with a proportional staffing plan and an efficient patrol schedule will ensure that a police officer is around when you need one.

Proportional Staffing

"You will never have enough officers, and no one else does either."

In over 25 years of working with police agencies, we can count on one person's thumbs the number of agencies we have come across that said they were sufficiently staffed. Nearly everyone says they need more people, and backs that up with budget requests for more officers every year. The question of how many would be enough is usually asked at that point, but seldom satisfactorily answered.

The reason that the question is so difficult to answer is that most agencies have not developed a set of operational goals for patrol. The most commonly stated goal is to respond to emergency calls within a specific amount of time, often five or six minutes. While having such a goal is laudable, there seems to be no scientific

basis for it. Arriving at emergencies in four minutes is better than five, which is better than six, but there is little evidence as to how much better the outcome of the emergency would be with a four-minute response time. Generally, these are numbers chosen because they are perceived to be achievable and are acceptable to the public.

Another common driver for police staffing is to have enough officers on duty to “fill the districts.” This can be a valid argument for staffing if the number of districts to be filled is appropriate for achieving the operational goals. Filling districts is not an operational goal. Later we will discuss how to determine the appropriate number of districts, or beats.

To resolve the question of how many are enough, we suggest that the agency make a careful study of what the demands for their services are, develop operational goals that will meet not only the demands for service, but allow sufficient staff time to pursue proactive work, then calculate the staff resources necessary to achieve those goals.

The above is easily said, but often difficult to accomplish. Actually, *accomplish* is not the appropriate word because this is a task that is never completed. Policing is dynamic, filled with constant changes and unforeseen demands. There are, however, predictable patterns in police work and understanding those will allow competent staff management.

The demand for service for most patrol operations is recorded very well by their computer-aided dispatching (CAD) systems. Nearly all CAD systems automatically record the critical information for each incident. That information includes:

- Incident number
- Source of the information
- Nature of incident

- Location
- Date and time of:
 - Receipt of the call
 - Dispatch of each unit
 - Arrival of each unit
 - Clearing of each unit
 - Closing of the incident
- Disposition

This is by no means a complete list of necessary information from a CAD system, but it does include all of the critical data elements for patrol staffing analysis. Following is more detail on some of these elements:

Source: The Source is important because it allows the determination whether the time consumed on the incident resulted from a demand for service (call) or from officer-initiated activity. The distinction is important because the agency has little control over when a citizen will call for service. While the volume and frequency of those calls is measurable and predictable, it is not controllable.

Nature: Police dispatchers and call takers typically classify each incident to one of a list of nature codes. These lists vary among agencies in length and detail, but there are common features among them. Essentially, they give the officer some idea as to what he is responding to. From an analytical standpoint, it allows calculation of how much time is being spent on each type of incident. This then allows informed management decisions to be made on possible alternative means of handling some incidents.

Location: Because a significant portion of the time consumed in

handling calls for service is spent on traveling to the call, it is important to be able to track the locations with the goal of better geographic deployment of units.

Date and time: As mentioned above, workload from calls for service can be calculated and predicted if it is collected, and CAD systems are excellent data collectors. This information is required for each action or each unit because the total time consumed is critical to good analysis. Time is all that patrol officers have to spend, so knowing how it is spent is essential.

Some systems do not record time stamps for each unit on an event, but rather only collect one set of time stamps for the incident in general. This is very unfortunate because different calls require different numbers of units for different amounts of time. For example, some calls that may be serious receive a large number of units initially. Once the situation is stabilized, most of the units leave the call. Failing to collect individual time stamps has a tendency to seriously inflate the amount of time consumed on the incident by giving the impression that all officers remained on the scene for the duration of the call.

Disposition: For staffing analysis, this is less important than the other items, but can be useful in tracking time consumed by false calls, calls resulting in reports, and calls resulting in arrests. Regarding calls resulting in reports, this is an issue that can have a huge impact on the determination of staffing requirements.

Report writing, or data entry, usually consumes a significant portion of a patrol officer's day. For some agencies, this time is recorded with the incident that caused the report to be written. Others record the time as a separate incident or status code, while others, probably most, do not record this time at all. This is a serious weakness in data collection and should be recognized by the analyst.

Once the data has been collected, from a CAD system or from a manual log, it can be analyzed with any of a number of tools. These tools range from simple hand calculations to computer spreadsheets to sophisticated computer models specifically designed for patrol analysis and optimization.

The analysis of staff needs must be based on time. That is, time consumed or available to be consumed performing the patrol operation. The most common sophisticated method for this kind of analysis, used in policing as well as widely used in industry, is the queuing model. In essence a queuing model allows the analyst to infer the impact on operations by manipulating the number of calls for service, the amount of time required by each call, and the number of units providing the service. These models have been shown to be very accurate in predicting the service environment.

Take, for example, the people going through the checkouts at a supermarket. For each register there is a queue (or line) that varies in length according to how many checkers there are on duty, how long it takes to handle each customer, and how many customers join the queue. Observation will reveal that as the queues grow, the

customers become impatient and may change queues or even abandon the queue and leave the store. The supermarket model is analogous to police patrol operations, but with some differences.

In the store, check stands can be opened or closed quite quickly as the demand for service changes. A customer's abandoning the queue is a loss of profit for the store, but has little consequence beyond that. In police work, long waits for service can be much more serious, endangering the public as well as the responding officers when a situation deteriorates.

So back to the central question of how many officers are enough. The results of the queuing model, or whatever other technique is used, will indicate what level of service can be provided by a certain staffing level. Alternatively, the model should calculate the staff requirement for a stated service level goal.

After the data collection and preparation, the operation of the model is actually the easy part. It is normally a matter of plugging in the input values and reading the outputs. Using the outputs, however, is another matter.

A common standard for patrol staffing is to have enough units to allow the on-duty hour to be broken down into three equal parts: calls for service, officer-initiated activities, and uncommitted patrol time. While this is common, it is not necessarily best for all agencies. Many prefer different proportions of the three time categories according to their philosophy of policing. The calculations will reveal how many units are required for the preferred distribution of time, and if desired also reveal how many are necessary for response time standards and other goals. Now it is likely that the agency will need to do one of two things: either increase staff or reduce workload.

Assuming for the moment that the preference is to add staff, then the number of staff required to achieve the stated on-duty complement must be calculated. That leads to the next enduring issue in patrol staffing.

"Somebody won't show up for work."

Although absenteeism is universally recognized, it is seldom managed well. People get sick, take vacation, have personal and military leave, and have many other reasons for not showing up. In the United States, it is common for a police officer to actually work about 80 percent of the hours for which he would be scheduled. That calculates simply to an overall average of 80 percent of the scheduled staff showing up for duty when normally scheduled. A sergeant with a squad of ten officers then should expect to work with an average of eight.

Having an average of eight officers appear for duty means that most likely the squad will work with seven, eight, nine, or maybe occasionally ten. If the workload analysis demands seven units to provide the necessary level of service, then this is not much of a problem. When more than seven appear for duty they will all have more time available for proactive work. If, however, the analysis shows that ten units are required to meet the demand for service and someone staffed the squad with ten officers based on this analysis, then a serious mistake has been made.

The ratio of people who appear for duty compared to those scheduled for duty is called the *Availability Factor*. From the above example, that ratio would be .80, or 80 percent. The inverse of the Availability Factor is the *Staffing Factor*. Again using this example, the Staffing Factor would be 1/.80, or 1.25. The practical use of the Staffing Factor would be to analyze the on-duty staffing demand, then multiply the

result by 1.25, rounding up to the next whole number of units.

You will never be up to staff."

One often hears, when discussing an activity that requires patrol staff, that nothing like that can be done until the squad/shift/department is “up to staff.” This is an understandable and convenient response from the patrol supervisor or commander who has been told he has twenty officers to manage, but finds he is down four due to resignation, transfer, promotion or injury. His plans and expectations depend on having twenty officers, and, having fewer, he takes a protective stance for his remaining resources. This is neither desirable nor necessary.

Let us assume that a patrol force is authorized 100 patrol officers of 200 total sworn officers. Let us also assume that the agency has an annual turnover rate of ten percent, meaning that ten percent, or 20, officers leave the department each year. The next concept we need to understand is the *Replacement Cycle*. In American law enforcement it is typical to have one year pass from the time an officer leaves the department until he has been replaced by a trained, capable officer. That year covers the time required for the authorization to hire, the recruiting process, the background investigation, the hiring offer and acceptance, police academy training, and the field training program.

Continuing the above example, this means that of the 200 authorized officer positions, only 90 percent (180) are filled at any one time. Given this vacancy rate, an undesired effect usually occurs that additionally aggravates this problem. Agencies usually fill their promoted or specialized positions from the pool of patrol officers. Thus, when a captain retires, they are down a patrol officer. When a detective

resigns, they are also down a patrol officer. If half of the sworn officer positions are for patrol, then the effective turnover rate for patrol is double that of the agency. For this agency, for the 100 authorized patrol positions they should expect to have 80 filled. For an agency this size to be “up to staff” is practically impossible. This agency should plan their operations around a staff of 80 officers, not 100. Or, they can begin the hiring process prior to having actual vacancies, preparing themselves for the probable.

Patrol Scheduling

“Police work happens at night and on weekends”

It is true that there is more need for police patrol services at these times than at others. To efficiently manage a patrol force, then management must put more people on duty at busy times than at slower times. As elementary as this is, it is often overlooked or ignored in police work.

At some point in the distant past of policing, someone got the idea that patrol officers should rotate their work periods. Presumably, the underlying reason was that it was unfair for an officer to be “stuck” on nights or working weekends while others enjoyed more normal working hours. As often happens in police work, once a practice is in place it is nearly impossible to dislodge.

Policing seems to be the only industry in the world that follows this practice. Private sector businesses, of course, have to be concerned about the efficient allocation of resources to be competitive. Police departments enjoy local monopolies, so they are not subject to the demands of the marketplace, and thus are not so constrained by efficiency. As the cost of employing police officers continues to go up, this luxury may be reduced, but there are better reasons for efficient staffing.

A sergeant from a large police agency relates the following anecdote. Every year he goes to his officers and asks what is the most important issue to them in staffing and scheduling. Universally, the answer is that they need a schedule that gives them more weekends off and not so many night shifts. He carefully records that answer, then asks what the second most important issue is. To that, he is told “We need more coverage on weekends. We’re getting our

butts kicked out there!” This is the paradox of patrol staffing and scheduling.

We operate on the principle that every schedule is a compromise between personal preference and efficiency. Where the line is drawn is up to the agency, subject to constraints such as labor laws, labor agreements, and personnel policies. Personal preference, however, does not necessarily mean rotating shifts. Our experience is that informed officers who have worked both fixed and rotating shifts will prefer the fixed shifts. This is good, because rotating shifts are exceedingly difficult to make efficient.

Police work follows daily, weekly and seasonal cycles. Ignoring those cycles by fielding the same number of officers at all times is both a disservice to the public and a waste of resources, which is in itself a disservice to the public taxpayers. It is first a disservice in that there is very likely to be insufficient on-duty staff to adequately respond to emergencies and crimes in progress, let alone conduct preventive activities. The danger to officers is also increased by having insufficient units available for backup on hazardous calls. Obviously, we recommend proportional staffing, meaning that on-duty staff should be proportional to the demand for service.

Beat Planning

“There can be a cop around when you need one.”

Having a sufficient number of patrol officers on staff and efficiently scheduled is very beneficial to a community, but much of that benefit is lost if they are in the wrong place. Here we will discuss the geographical deployment of patrol forces and some of the considerations that should be taken into account.

Virtually all patrol forces assign units to geographical areas. Most common is to have one unit assigned to an area we will call a beat. This concept goes back to the beginning of modern policing in London in the nineteenth century, and is still valid today. In some cases multiple units are assigned to cover an area, and in some cases one unit is required to cover multiple defined areas. These are relatively unusual and we will assume the one unit per area plan here.

A beat is typically small enough that one unit on duty can handle the routine work that originates from that beat. Calls that require multiple units require either that a unit from a neighboring beat come in to assist, or a unit that is not assigned to a beat may assist in covering these types of calls.

There are both tactical and strategic reasons for assigning a unit to a beat. Tactically, units will be more likely to be near a call for service if they are dispersed through the jurisdiction, and thus more likely to be able to reap the benefits of a quick response. Strategically, agencies are finding that communication between citizens and officers is enhanced as a sense of community grows in a defined area. This is especially true when individual officers are consistently assigned to the same area. This community policing practice enhances community relations and improves officer-citizen information sharing and neighborhood problem solving.

Once the decision has been made to use a beat plan, then the plan must be established. There are two basic questions that must be answered in creation of a beat plan, plus several secondary questions. First, it must be decided how many beats to establish. Second, the boundaries must be established.

The question of how many beats to have is not easily answered, yet it is very important. Earlier we referred to those who thought minimum staffing should be sufficient to fill the beats. Here we suggest the reverse; that the number of beats should be equivalent to the minimum staffing. By minimum staffing, we mean that level the agency is committed to maintaining even if it means calling in officers for overtime. For example, if a patrol force varies between six and fifteen officers on duty, they would have six beats. Any on-duty units above six would be assigned as cover units, as multiple officers in beats, or on special assignments.

In the above example, it is useful to know which beats are busier during different shifts and on different days of the week so the additional officers can be assigned where they will be most effective. Also, these officers can be used not just to handle calls for service, but can be directed to proactive work like problem solving or directed patrol. In this way, their assignment may not be just to the busier beats, but to targeted areas.

Most beat plans are fixed, being modified only as the workload or geographical features change, usually annually. A few police agencies, however, use variable beat plans. Here they have a set of beat plans, each with a different number of beats. They select the one that is appropriate, usually by shift and available staff, meaning that several different plans can be in effect during a day. Many CAD systems can accommodate rapid and frequent changes of beat plans, but most humans are not so flexible. Where this has been done, our observation is that the dispatchers, patrol officers and supervisors are hampered in their work by having to re-orient themselves not just at the beginning of the shift, but frequently within the shift. An unfortunate result is often that people

will ignore the beat boundaries and roam, perhaps limiting themselves to general areas.

Once the question of how many beats to establish is answered, then the next question is where to establish the boundaries. First, though, let us discuss the concept of *reporting districts* or *atoms*. Sometimes called grids, these are typically small geographic areas, generally neighborhood size, or roughly equivalent to a census block group. For convenience, we will use "RD" to refer to these small areas.

Some agencies use a simple grid overlay to establish RD's, ignoring natural boundaries. These are the least useful for any analytical purpose or for building beat boundaries because there is no natural continuity and patrol response cannot be expected to be consistent. If a river runs through an RD, access for patrol response will be difficult no matter which beat the RD is in. Good RD designs do follow natural, man-made, and political boundaries. They do not cross rivers, freeways, railroads, or extend beyond the borders of the jurisdiction.

Most CAD systems identify each call for service by the RD in which it originated. Therefore, all call activity and time consumption is identifiable by RD. Whether or not officer-initiated activity is coded to an RD is usually determined by how the local CAD system is set up. Most agencies probably do not track officer-initiated activity by geography, but that is of relatively little importance here. The amount of work initiated by citizens in an RD is the primary statistic in analyzing beat balances, so that is critical at the RD level.

If possible, data should be pulled from the CAD indicating how much citizen-generated work there has been and will be in each RD. The RD's then will become the building blocks for the beats. In calculating

citizen-generated work, it can be useful to include the time between dispatching and clearing for each unit on the event. Doing this includes the travel time to the call, and thus accounts for all of the time consumed by the unit. A caution, though, is that if the beat boundaries or staffing changes, the travel time under the new plan will probably not be the same as the historical data. Because emergency response time is important in beat planning, relying on historical data that is not likely to predict the future is more harmful than beneficial. An alternative is to exclude the travel time, counting only the time from arrival to clearing, then include the land area and/or road miles as part of the balancing equation. This allows modeling of probable response times for various plan scenarios.

Assuming that the RD's will be the building blocks for the beat plan, and that the desire is to balance the beats, the next issue is to determine what statistics are to be used for balancing. Most agencies seek to balance primarily on workload, which is easily documented from the CAD system at the RD level. Other considerations are natural boundaries, land area, traffic issues, time for suppression of crime and disorder, and many other concerns specific to the agency.

Natural boundaries, including bodies of water, freeways, railroads, etc. can be generally classified as *impediments to response*. These impediments can be anything that slows a responding unit from its normal response speed, or increases the distance to be traveled. Beat boundaries should be arranged along the impediments as much as possible in order to optimize the response time within the beat. If the impediments are arranged along the edges of the RD's, then they can be more easily arranged along the edges of the beats.

Another major consideration for beat boundaries regards major thoroughfares. It seems that major streets show prominently on maps and draw the eye of the planner of beat boundaries. It is natural to view these thoroughfares as logical dividing lines for beats, but we suggest that careful thought be given to this. In most urban areas, major thoroughfares have commercial or industrial developments along them, with the same type of developments on both sides of the road. Given that homogeneity, it is worth considering that one beat officer could be attuned to the nature of policing issues that are generated by those kinds of developments and work both sides of the street rather than dividing them between two officers.

General principles of beat alignment try to place the concentrations of work in the center of the territories, or beats in this case. Since major thoroughfares are often the busiest areas in regard to responding to calls for service, placing them at the edges of beats tends to draw the officers away from the center. That increases response time and reduces proactive work in the rest of the beat. Better to have the busy areas in the center and only draw the officer to the edges when called or when proactive work requires. These principles of beat alignment enhance the likelihood that officers will be in the right place at the right times more often than not, thus greatly increasing their presence and crime prevention potential.

After the number of beats is determined and the general design philosophy is decided, then the relative weight of the various statistics needs to be established. Usually workload is weighted heaviest, but of course that is up to the agency. Any other statistics that are available at the RD level can be included and given appropriate weights.

The actual process of beat design comes down to multiple iterations, testing various groupings of RD's. The various iterations are compared by calculating the variance among the weighted variables, with the least variance being the best, assuming all other constraints are recognized. This level of calculation is exceedingly difficult without a software program designed for this purpose. For agencies that do not have access to such a program, less rigorous calculations can be done, usually extending only to manually trying various aggregations of RD's and watching the totals of the statistics. If more than two or three statistics are used this becomes very difficult, if not impossible, for the analyst.

To aid in the manual design process popular geographic information system (GIS) programs include or make available redistricting tools. While they do not automate the iterative process and do not calculate the variance, they at least combine the visual aspect of the map and sum the statistics. More sophisticated automated redistricting tools can handle much more complicated calculations and build the districts while respecting all of the constraints. These are available from companies specializing in law enforcement software.

The result of the redistricting process should be a beat plan that optimizes the ability of each unit to not only handle the demand for service in his beat, but to have a reasonable amount of time available for proactive work. A good beat plan, combined with a proportional staffing plan and a good schedule will indeed have "a cop around when you need one."

Conclusion

There are no perfect plans, and you will still be under-staffed at times, but if you adopt these principles of appropriate

staffing, proportional scheduling, and efficient beat planning, you will have improved your odds as much as possible. As a further benefit of good management of your patrol force, you will be able to demonstrate to those who pay the bills, your citizens, that you are providing the most effective and efficient services given your limited resources.

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