Making Good Data-Driven Decisions by Asking Your Police and Fire Chiefs the Right Questions

Q. Why do you rob banks?

2

"Because that's where the money is."

– *Willie Sutton*

3

There really is a “Sutton’s Law”:

- In medicine states that when diagnosing, one should first consider the obvious;
- Used in g (ABC) of management accounting, the law stipulates that ABC should be applied "where the money is," meaning where the highest costs are incurred and, thus, the highest potential of overall cost reduction is.

Overview

- Typical Request is MORE resources PLEASE!
  - Limited analyses of workloads, performance, and value of MORE?
- Aggregate data on total calls misleading
- Performance NOT linear function of total calls:
  - An increase of 50% may require little or no additional resources
- Fire - Primarily insurance - daily call for service workload range - small (2 hrs.) to miniscule (30 min.)
- EMS – First responders or transport? ALS vs. BLS?

Police & Fire Budget Comparisons
$1 Police ➔ $0.59 - $0.80 Fire

	NY – City 275,058	Texas City 101,236	Georgia City 48,632
Budget: Police	$94.2M	$17.7 M	$9.8M
Budget: Fire	$74.9M	$10.2M	$7.4M
Personnel: Police (Sworn + Other)	780 + 170	181 + 60	88 + 40
Personnel: Fire Sworn	710	143	72

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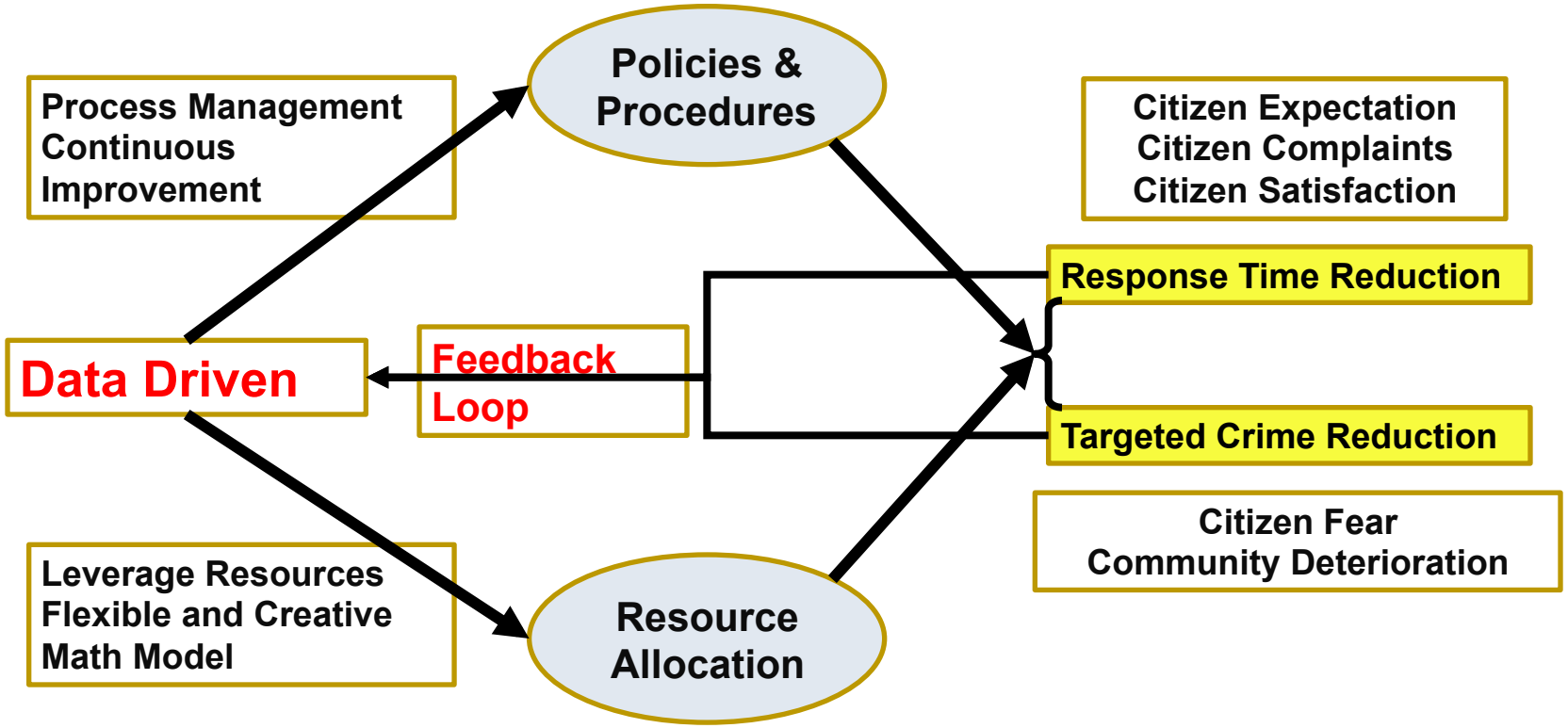
Police Issues

Police Patrol: Reactive and Proactive



Q. What is the FBI recommended officers per thousand for a jurisdiction of your size?

A. THERE IS NO SUCH THING!

Deployment Questions to Ask Chief

Q. How many patrol personnel are actually on the street? By Season, Day of Week, Hour of day?

Q. What's the difference between Calls For Service (CFS) vs. Workload

- CFS is a quantity – a number
- Workload is the cumulative time to handle CFS

Example of CFS vs. Workload

- Burglary – we send two officers to handle call. They are there for 1 hour each.

- Calls for Service = 1
- Workload = 2 Hours (2 x 1 hours)

Response Times Questions

Q. Do you know that response time is only important on limited number of high priority calls?

Q. Are calls dispatched and recorded by priority?

Q. Is response time measured by time of day, day of week and season?

Q. Do they always check for bad data?

Q. Do they rack long response times for high priority calls and find out why?

Key Patrol Questions

Q. Is deployment aligned with workload variations by season, day of week, hour of day?

Q. Are same number of patrol units assigned around the clock? – rarely good idea

Q. Are problem areas such as shift change identified?

Q. Do shift start times, schedules & CBAs limit deployment flexibility and alignment?

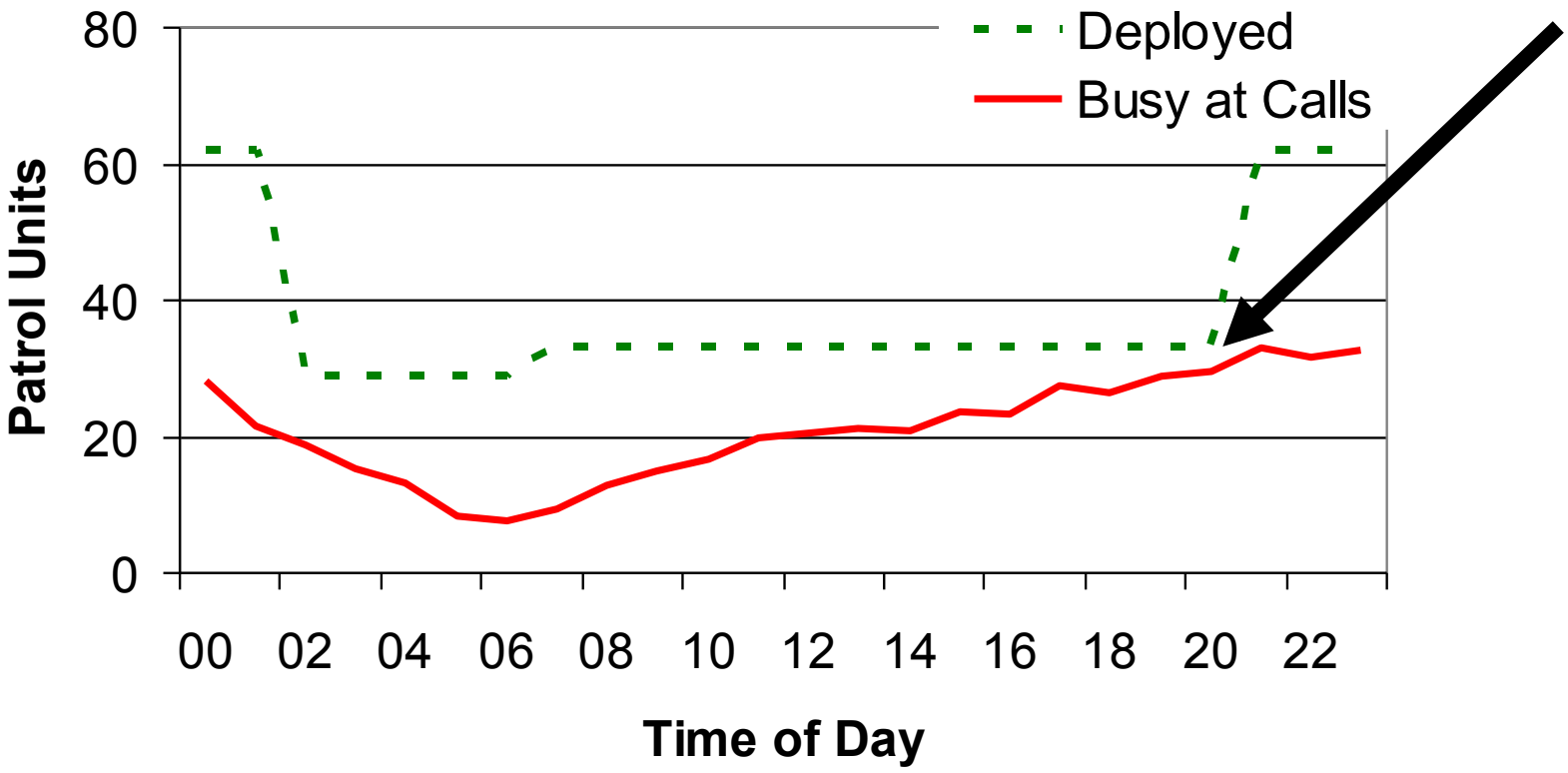
Police - City of 275,000
3 start times/10-hour overlapping shifts

	0200 to 0700	0700 to 1600	1600 to 2100	2100 to 0200
August 2002	29	33	33	62
January 2003	32	34	32	64

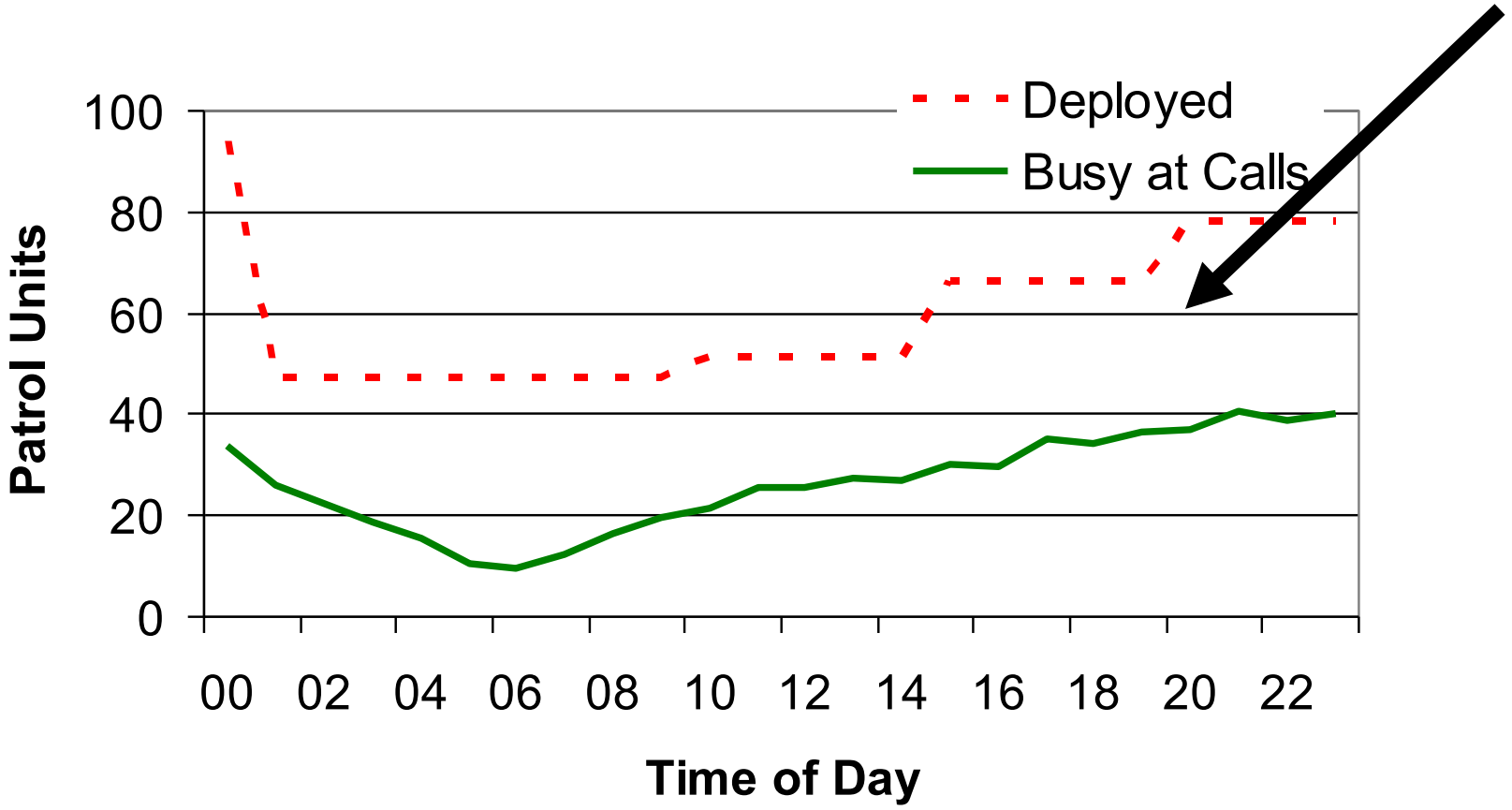
Daily Average Call Rate

- August 34% higher than January
- Priority 1 & 2: 50% more calls per hour in August

Misaligned Patrol Force - City of 275,000
3 start-times/10-hour shifts



Aligned Patrol Force – City of 275,000
5 start-times/10-hour shifts



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The Police Foundation

Shift Length Experiment

ICMA

Shift Length Experiment

Limitations:

- Self Reporting
- Not Random Sample – Officers selected shifts.
- Officers were allowed to change shift in mid process.
- Limited to 3 Departments

Shift Length Experiment

Positives:

- Excellent bio data testing

10-hour shifts have self reported advantages over 8-hour shifts

- Officers working 10-hour shifts got more sleep per night (over half an hour) than those on 8-hour shifts and had a significantly higher quality of work life (self reported).

- 10-hour shifts worked the least amount of overtime of the three groups, potentially resulting in cost savings.

The benefits of 10-hour shifts may not extend to 12-hour shifts

- 10-hour shifts got more sleep than those on 8-hour shifts; not true for 12-hour shifts.
- 10-hour shifts had a higher reported quality of work life than those on 8-hour shifts; 12-hour shifts did not.
- 12-hour shifts worked a lesser amount of overtime than those on 8-hour shifts; they still worked more than those on 10-hour shifts.

8-hour shifts may be more costly than organizations realize

- Officers assigned to 8-hour shifts worked significantly more overtime than did those on 10- or 12-hour shifts.

- Those officers assigned to 8-hour shifts worked more than five times as much overtime per two-week period (5.75 hours) as those on 10-hour shifts (0.97 hours), and more than three times as much as those on 12-hour shifts (1.89 hours).

Shift length impact

- Shift length did not have a significant impact on any of our measures of performance, safety, work-family conflict or health

- Performance and safety measures (interpersonal interactions, shooting skills, risky driving behaviors, reaction time, fatigue, and self-initiated departmental activity) were not impacted by shift length.

- The groups did not differ with regard to work-family conflict.

Shift length impact

During the six-month period in which officers were assigned to the experimental conditions, did not detect differences across groups:

- sick leave taken
- stress experienced
- increased cardiovascular problems
- gastrointestinal problems.

Effects of Schedules

- 10-hour day is often a productivity killer due to overlap
- 8-hour day gives maximum assignment flexibility but can affect continuity of supervision and team effort
- 12-hour day with 4 platoons and 42-hour week average (36 /48) may be best alternative especially in smaller agencies.

12 Hour Schedule – 42 Avg. Hours

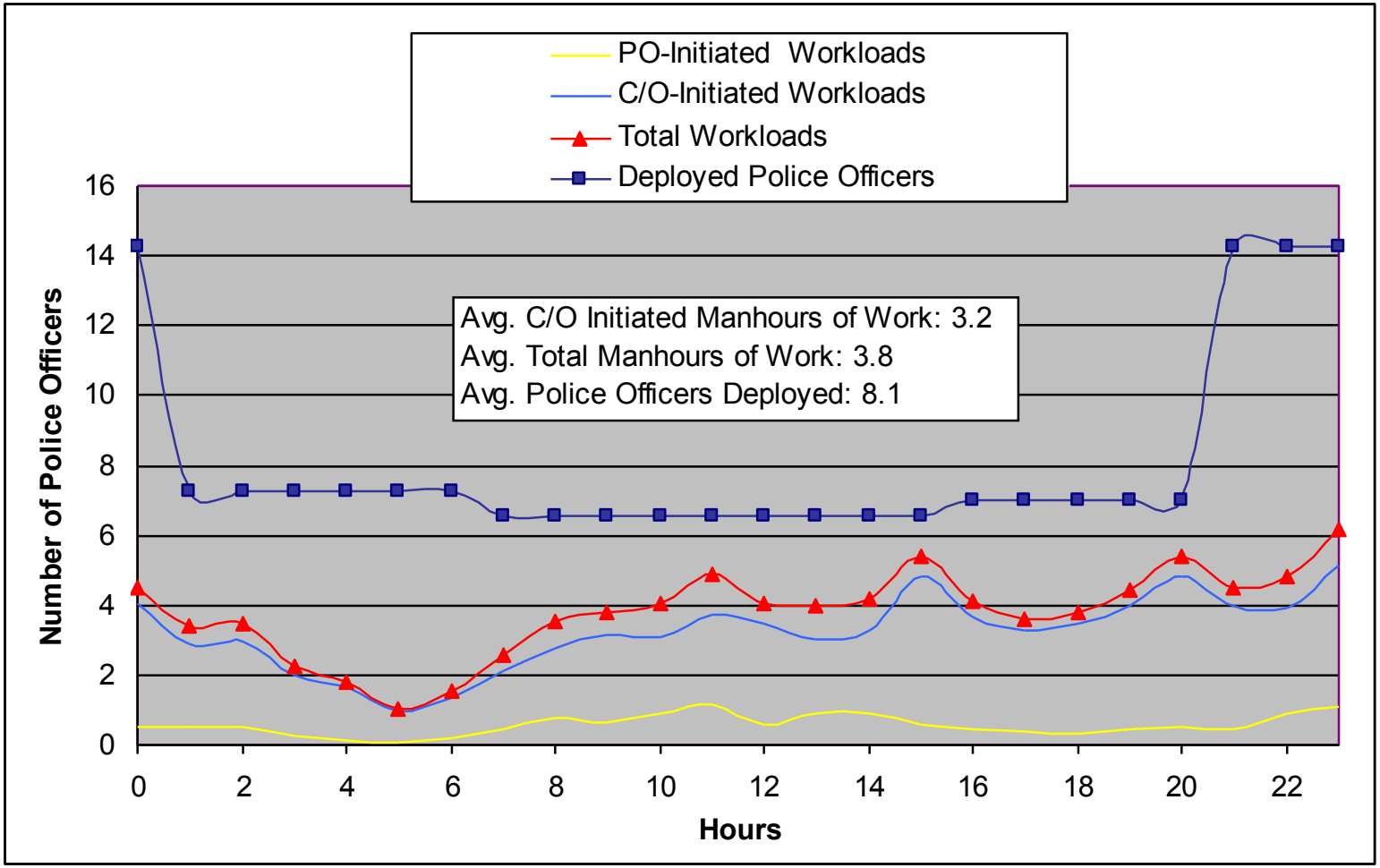
Week #		SUN	MON	TUE	WED	THU	FRI	SAT
1	Day Team	A	B	B	A	A	B	B
	Nite Team	C	D	D	C	C	D	D
2	Day Team	B	A	A	B	B	A	A
	Nite Team	D	C	C	D	D	C	C
3	Day Team	A	B	B	A	A	B	B
	Nite Team	C	D	D	C	C	D	D
4	Day Team	B	A	A	B	B	A	A
	Nite Team	D	C	C	D	D	C	C

12-Hour Schedule Benefits

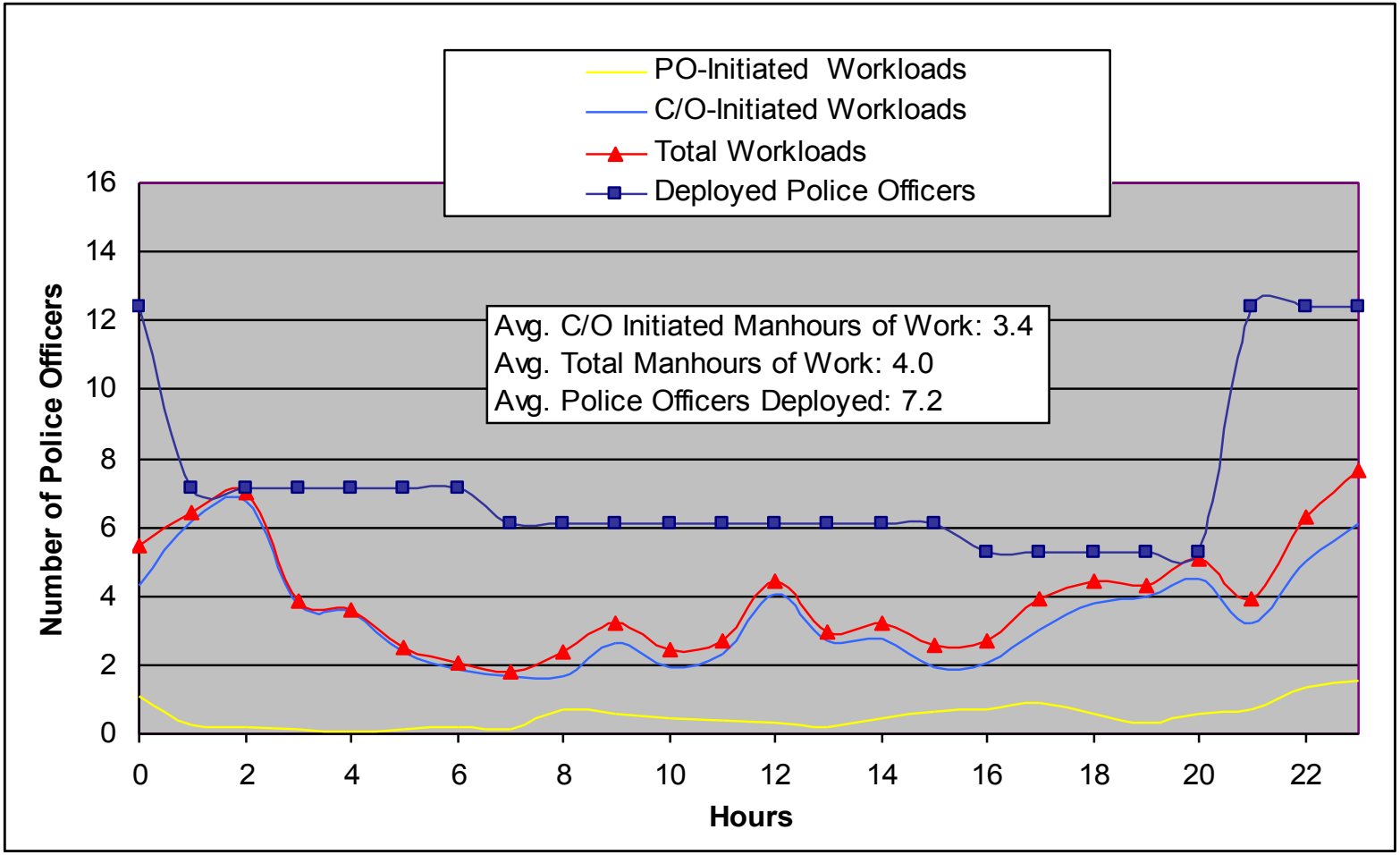
- Schedule repeats every 4 weeks.
- Each team gets Friday, Saturday and Sunday off every other week.
- Teams work 36 hours one week and then 48 hours the following week, averaging 42 hours per week. This is within FLSA requirements and the extra hours can be paid at straight time.
- These extra 2 hours per week contribute the equivalent of one additional officer for every 21 officers.

Have you done a Deployment vs. Workload Analysis?

10-Hour Schedule: Weekdays



10-Hour Schedule: Weekends

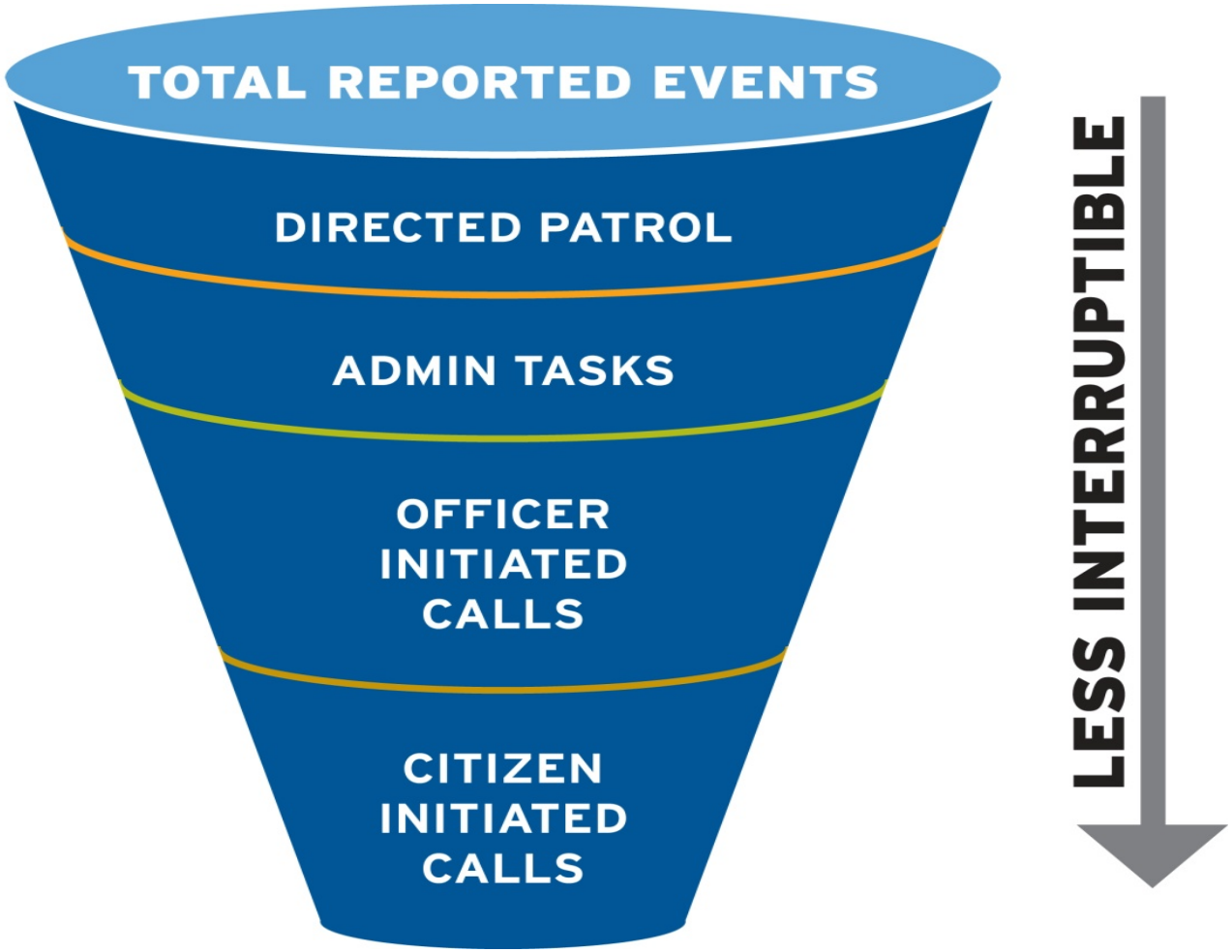


How many police do we need?

"Officers per 1,000 and other urban myths"
by Joe Brann

- Policy issue driven by % of non-committed (free) time
- Function of work schedule
- What they do with the time is more important than how much they have!

Workload vs. Events

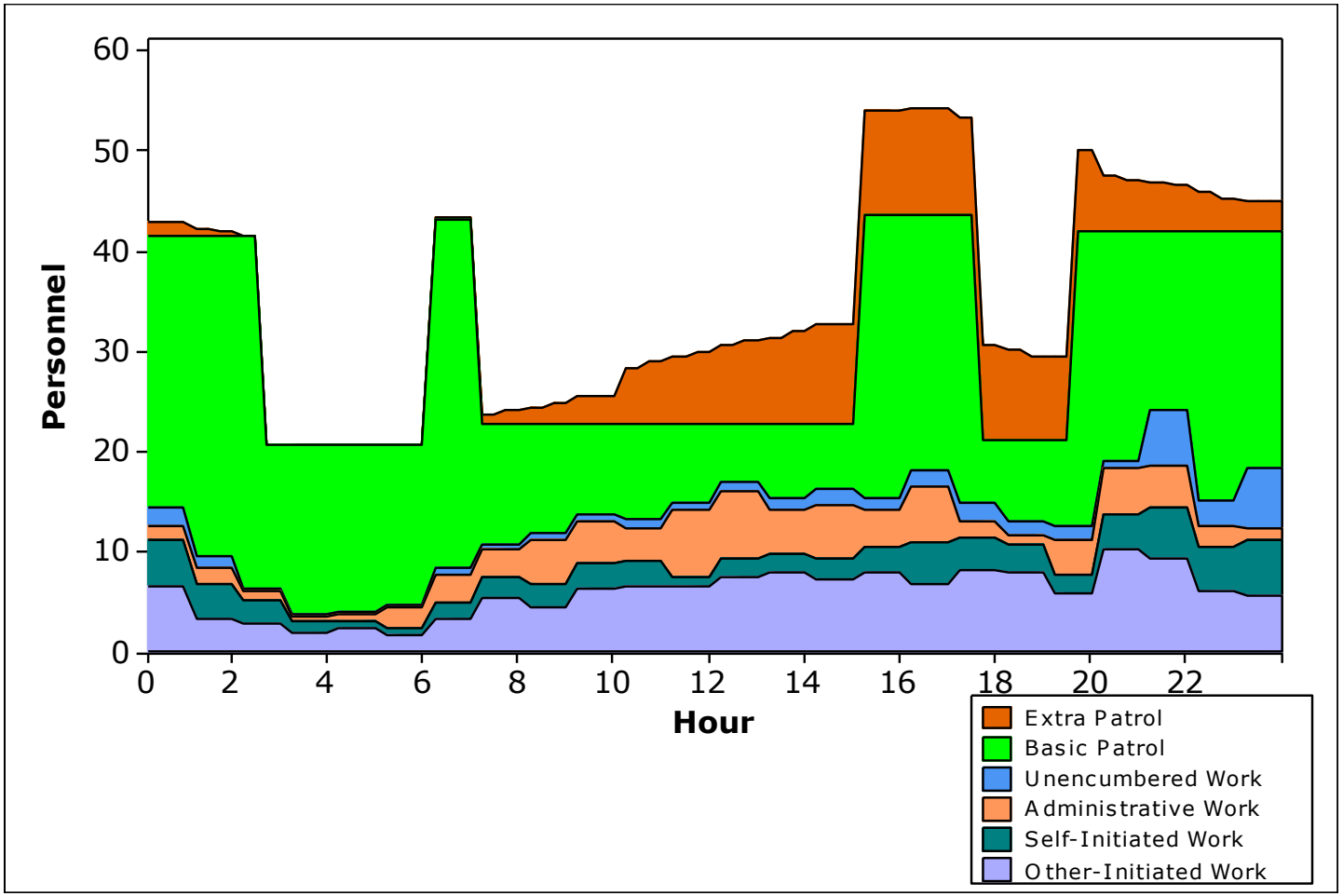


Rule of 60 – Police Allocation

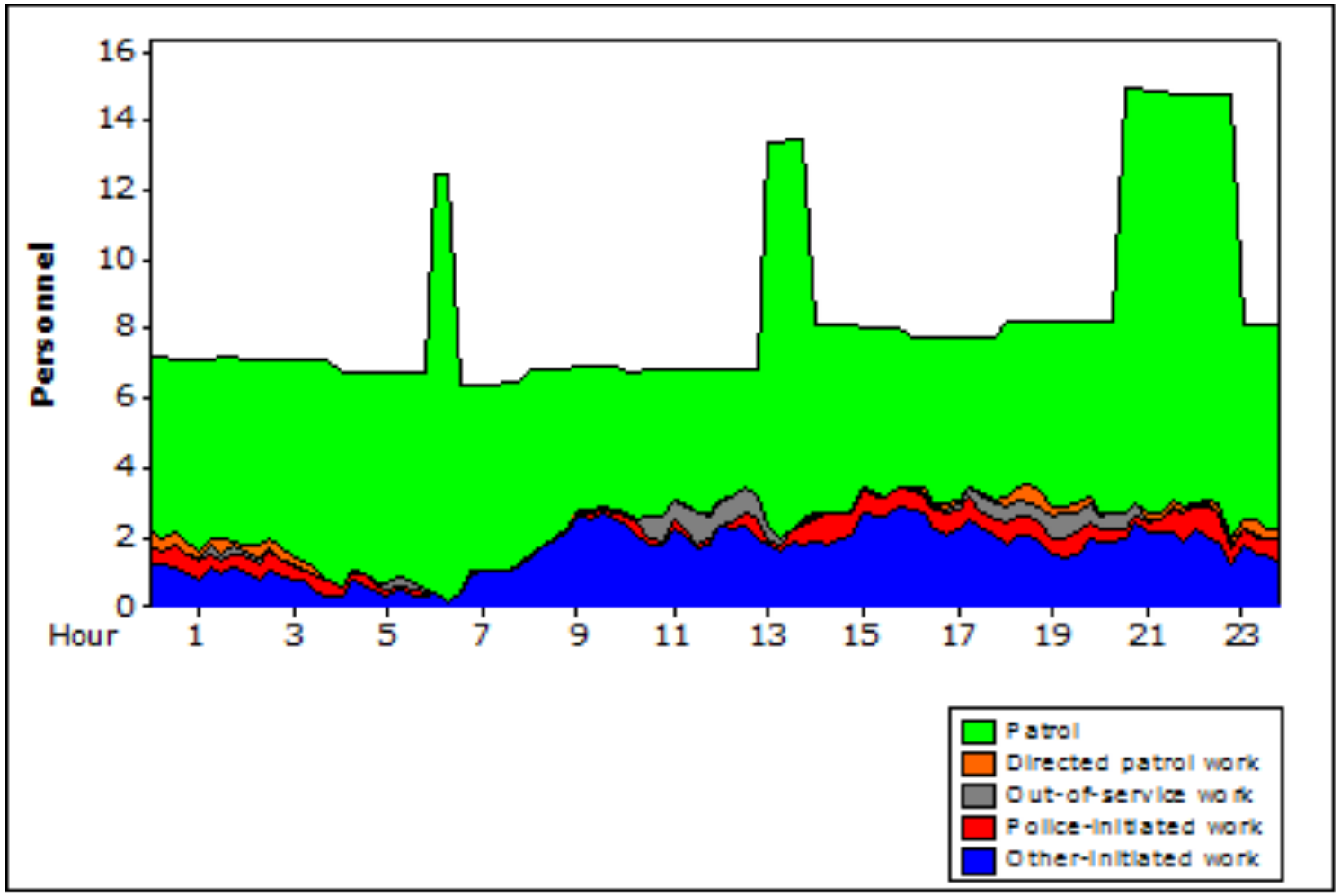
- 60% of the Total Number of Sworn Officers should be assigned to Patrol

- No more than 60% of available man-hours should be dedicated to workload

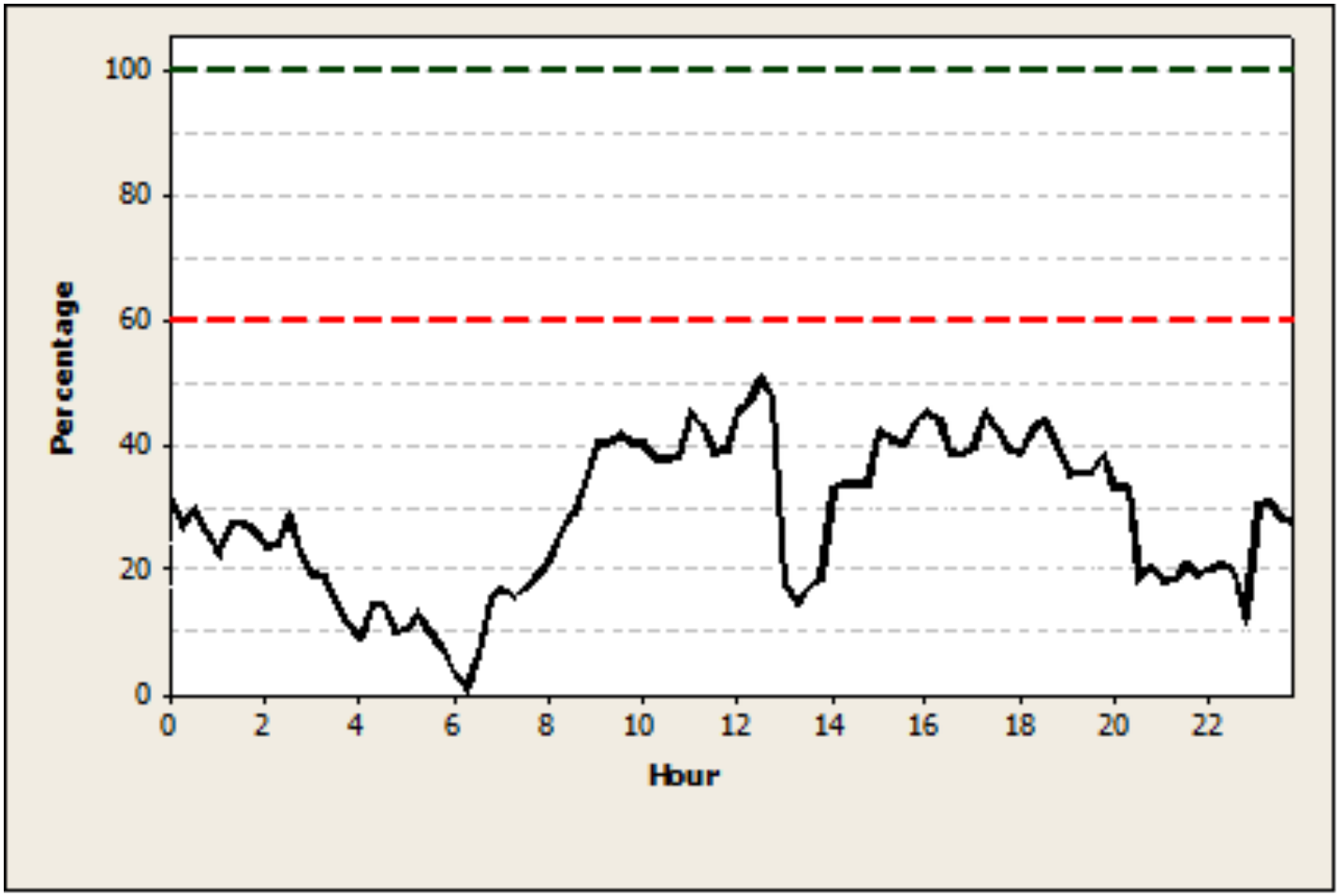
Deployment vs. Workload



A. Deployment and Main Workload, Weekdays, Summer



A. Workload Percentage by Hour, Weekdays, Summer

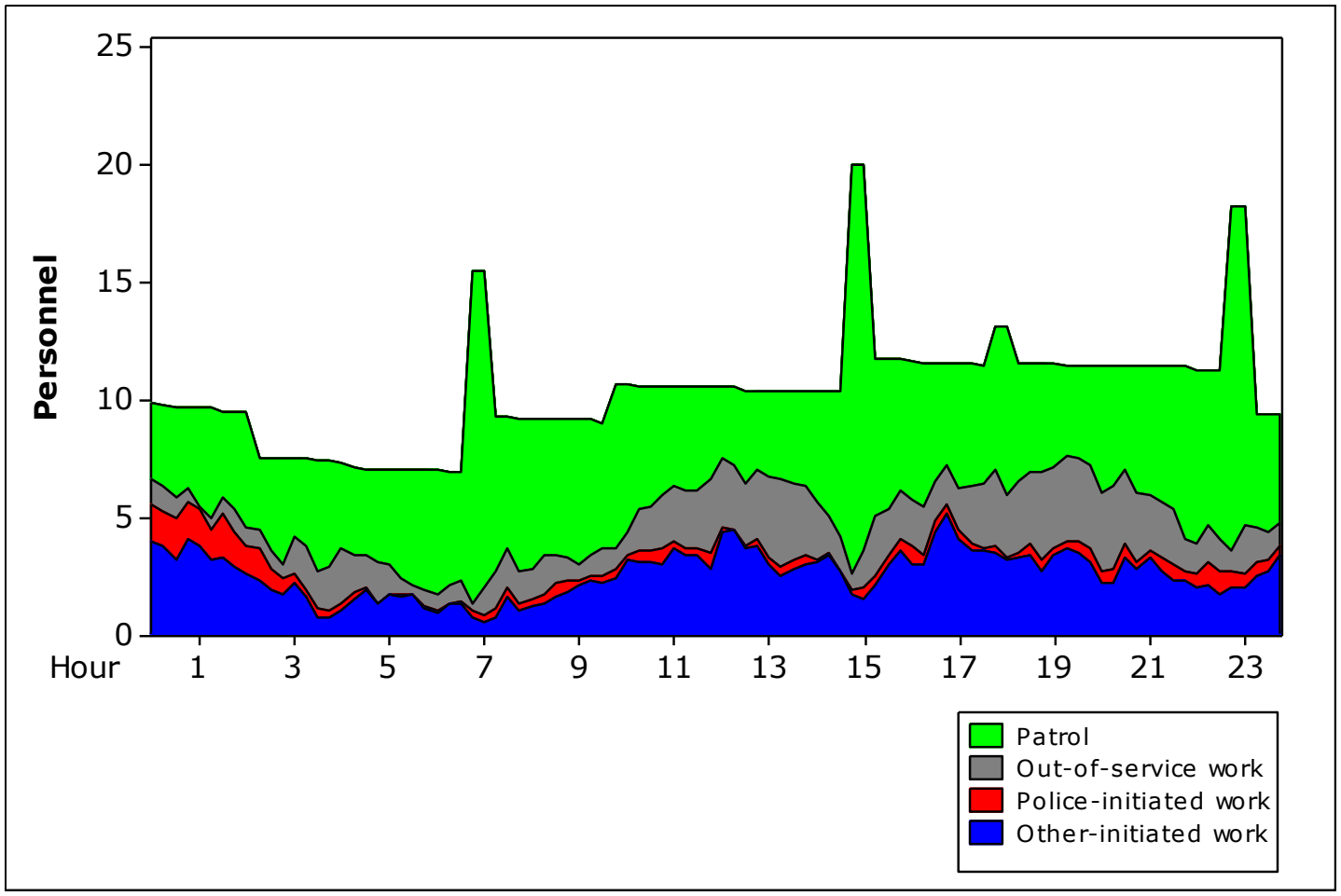


Department A

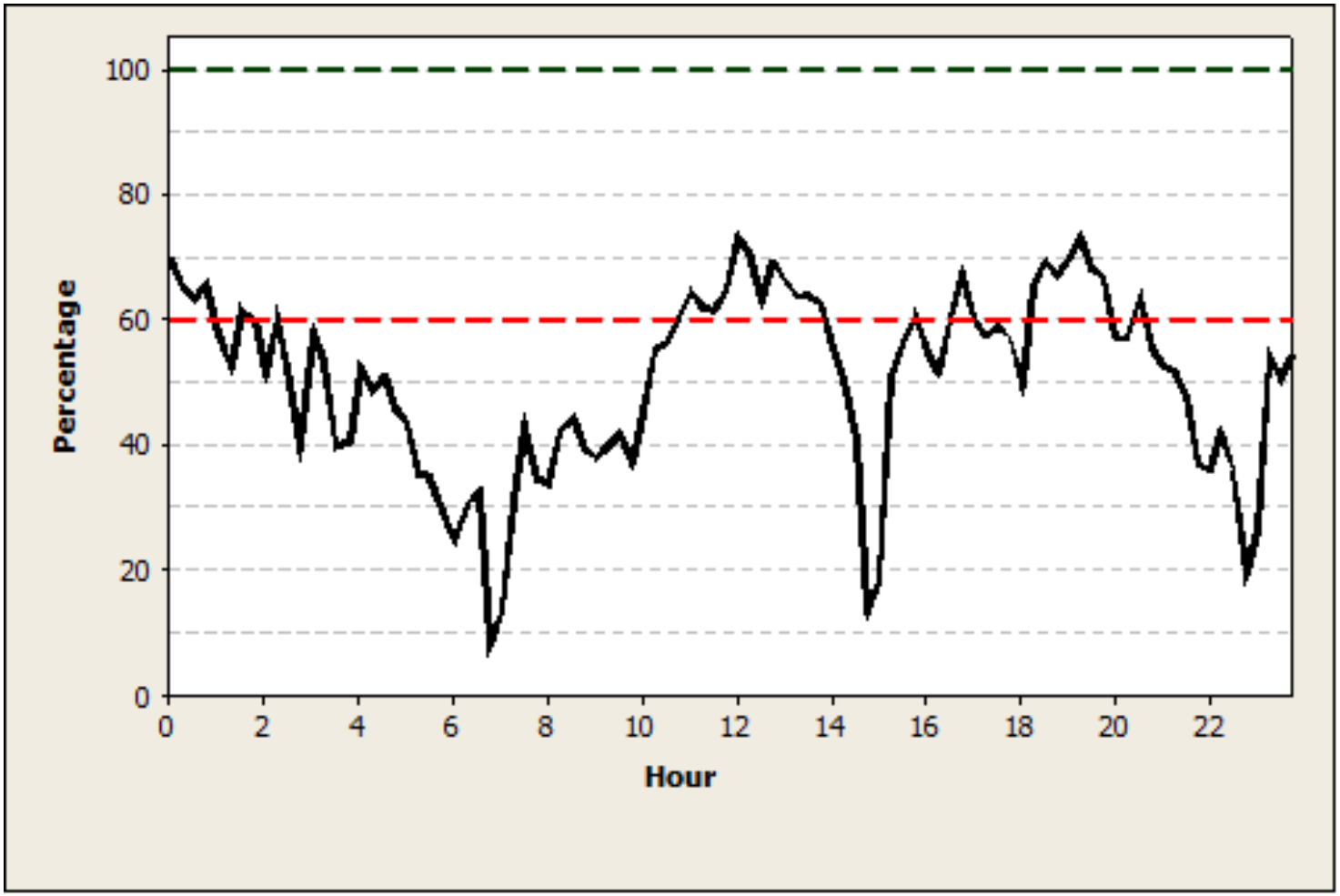
Workload vs. Deployment – Weekdays, Summer

Avg. Workload:	2.3 officers per hour
Avg. % Deployed (SI):	27 percent
Peak SI:	50 percent
Peak SI Time:	12:30 p.m.

B. Deployment and Main Workload, Weekends, August 2012



B. Patrol Saturation Index, Weekends, August 2012

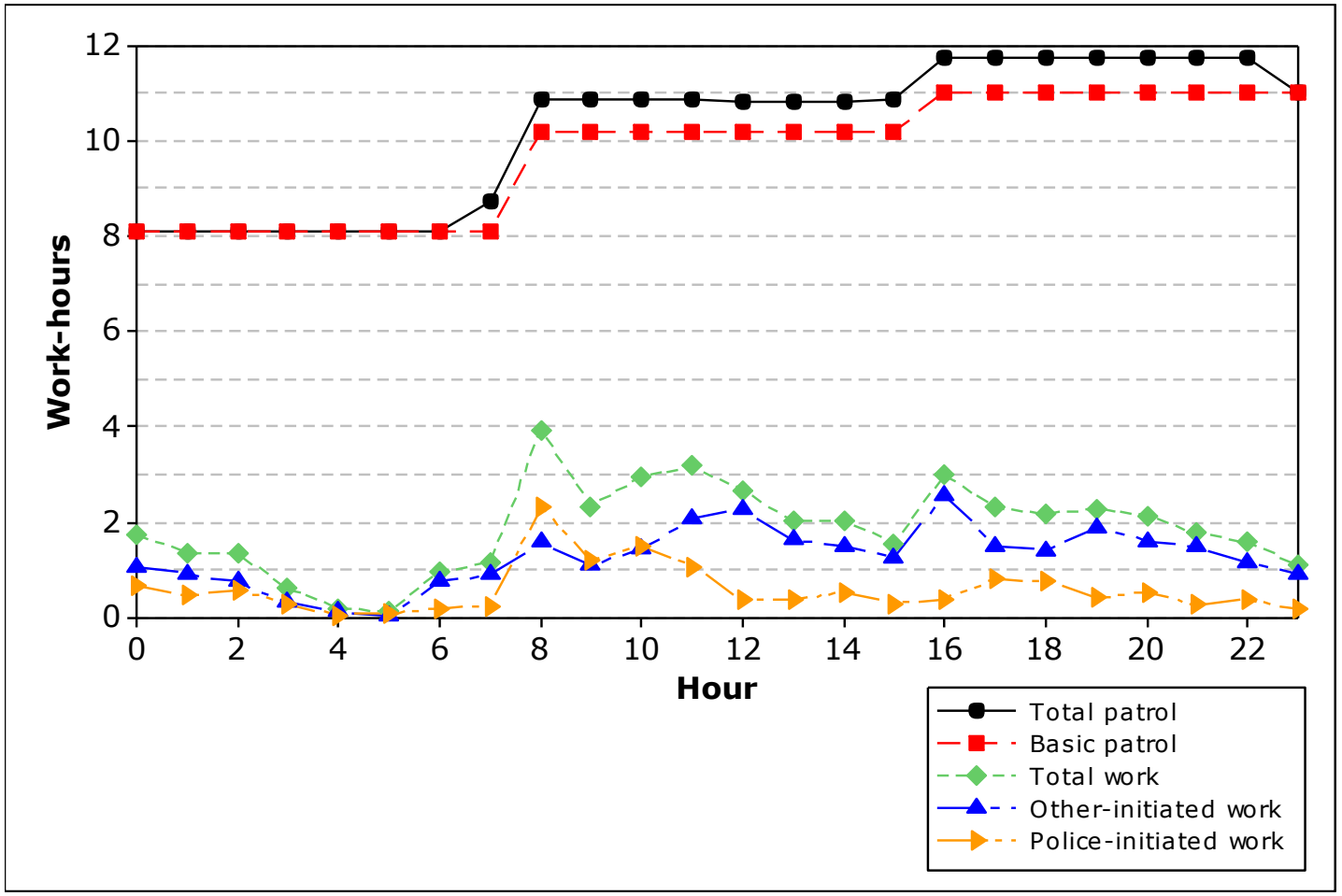


Department B

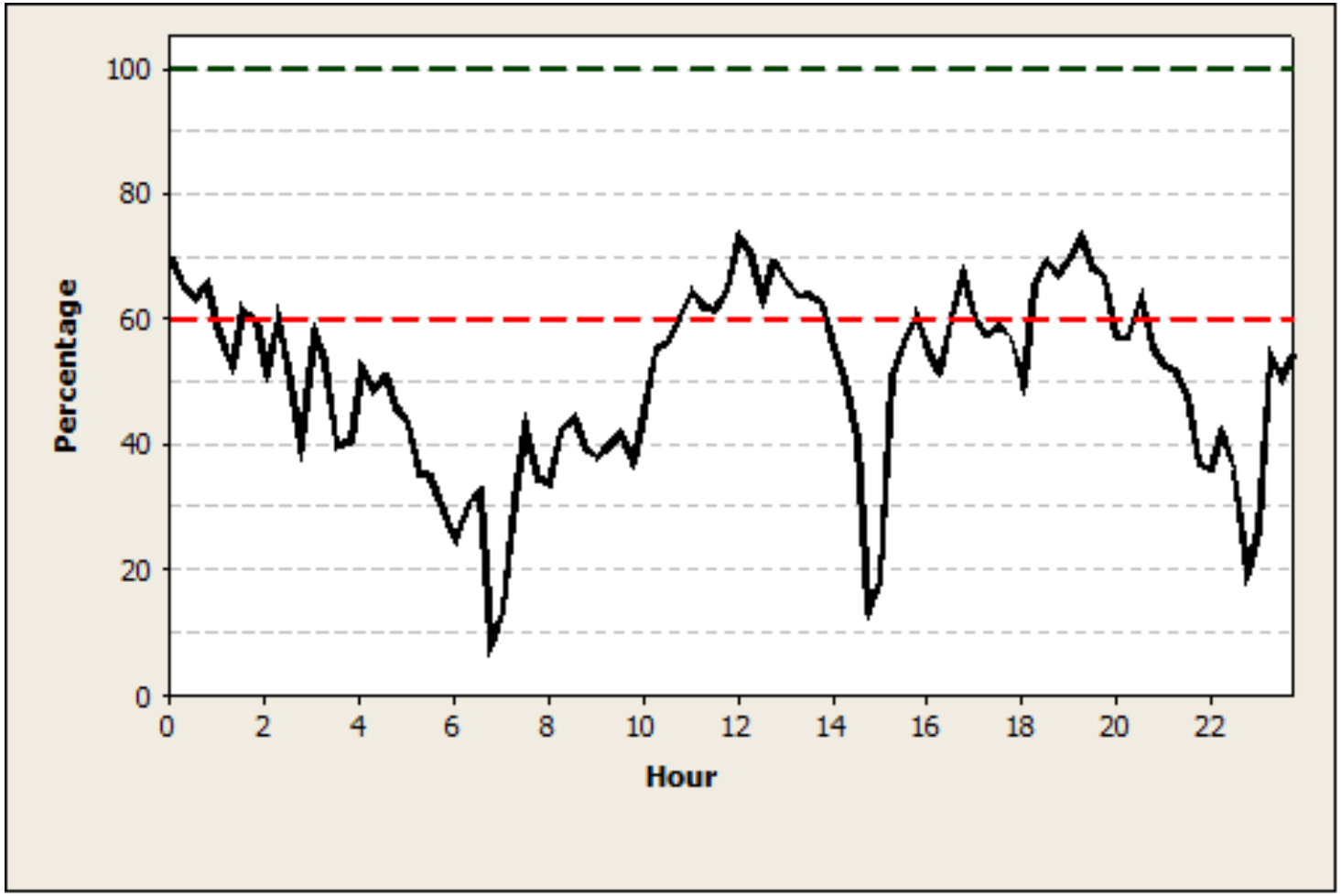
Workload vs. Deployment, August 2012, Weekends:

Average workload:	4.9 officers per hour
Average % deployed (SI):	47%
Peak SI:	71%
Peak SI time:	12:00 p.m.

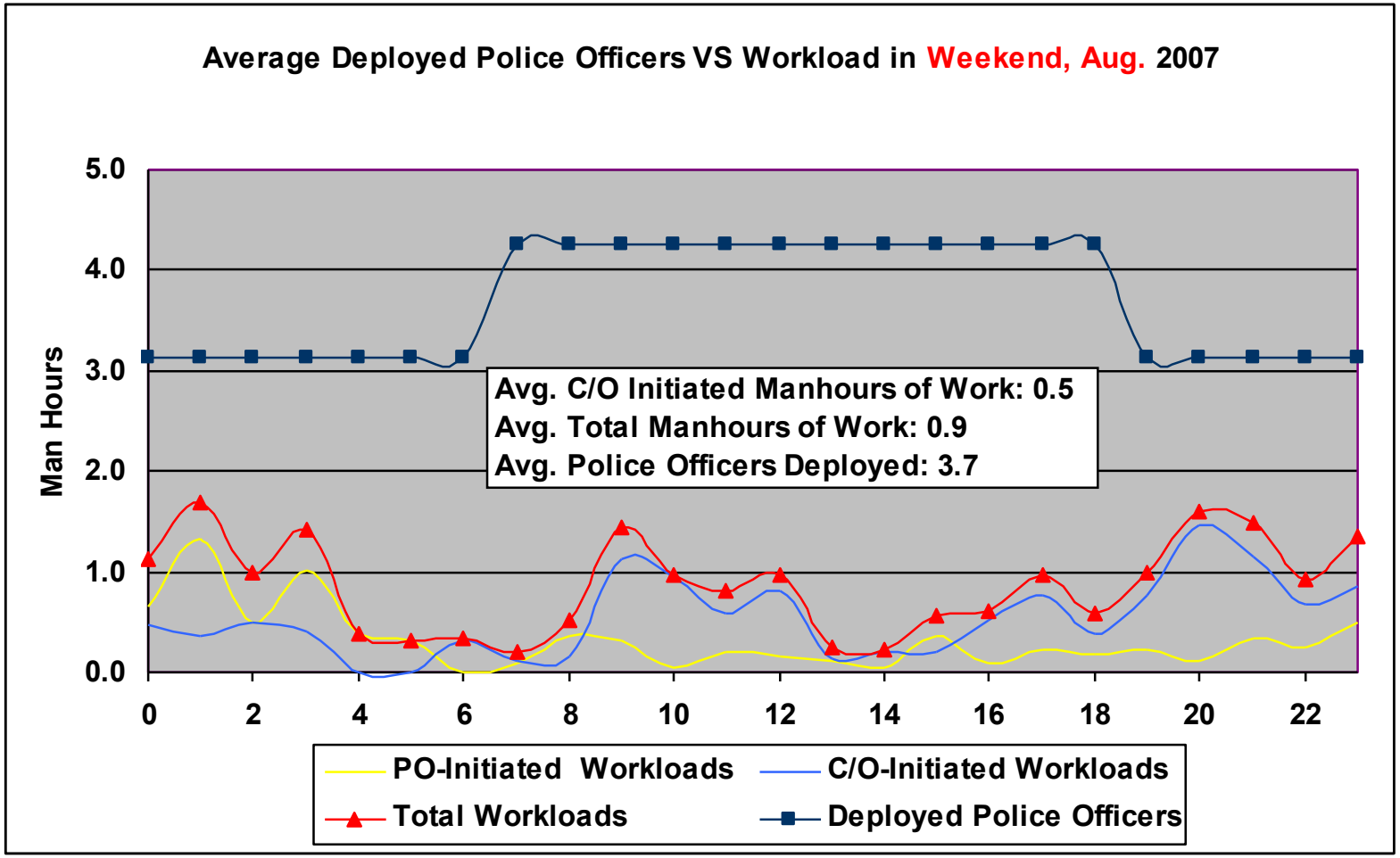
Percentage of Patrol Time Busy



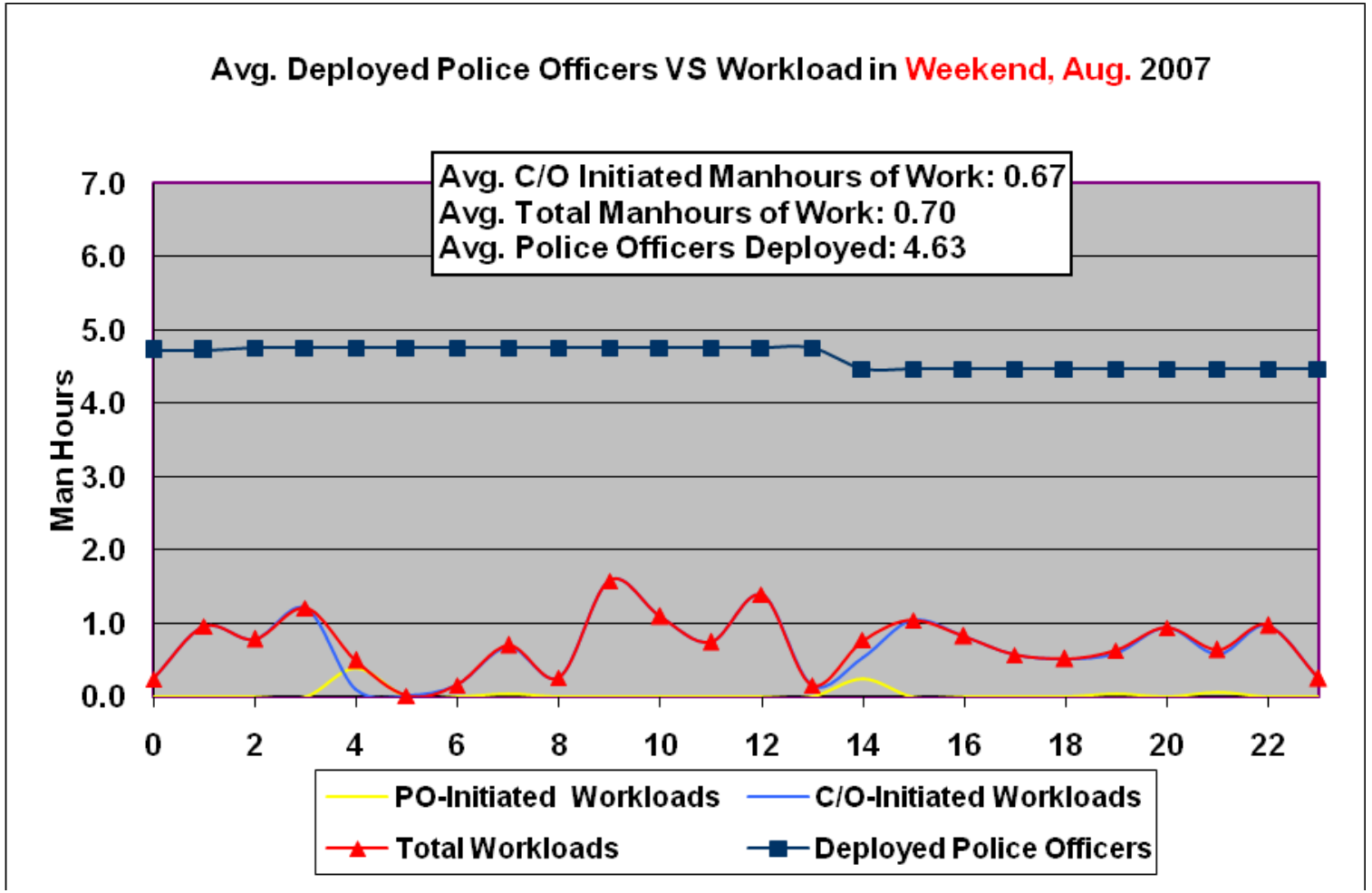
Patrol Saturation Index, Weekends, August 2012



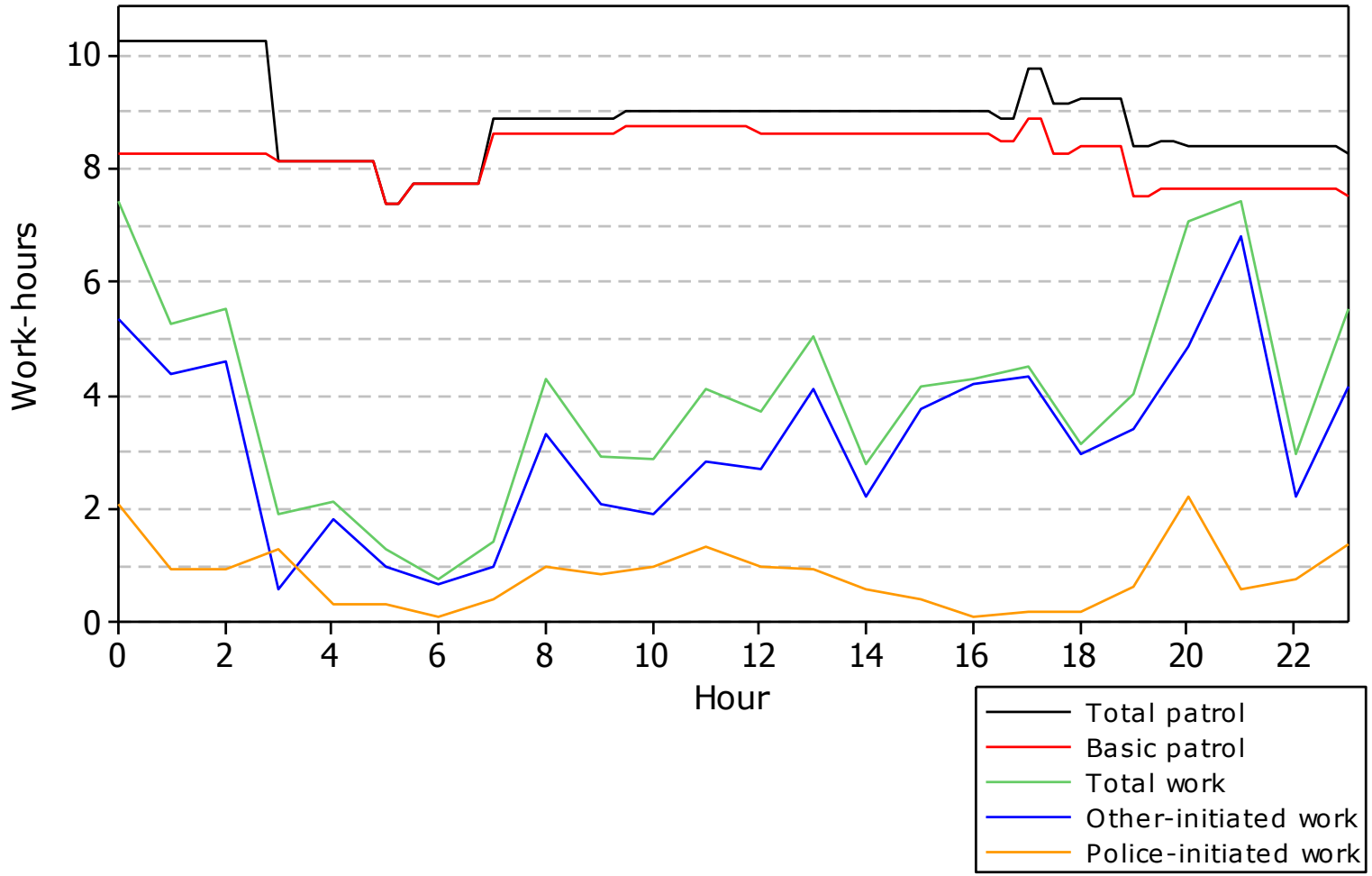
We need more!


Average Deployed Police Officers VS Workload in Weekend, Aug. 2007
Man Hours
5.0
4.0
3.0
2.0
1.0
0.0
0
2
4
6
8
10
12
14
16
18
20
22
Avg. C/O Initiated Manhours of Work: 0.5
Avg. Total Manhours of Work: 0.9
Avg. Police Officers Deployed: 3.7
PO-Initiated Workloads
C/O-Initiated Workloads
Total Workloads
Deployed Police Officers

We need LOTS more!



Who's watching the store?



Questions to Determine if you have a well managed patrol force

Complete and Accurate Records

- Are all activity times recorded including stops & arrests?
- Are Daily logs reviewed by supervisors?
- Does Final Record reflects final call disposition?
- Do Data on activities & effectiveness of Community Oriented Policing?

Data Analysis

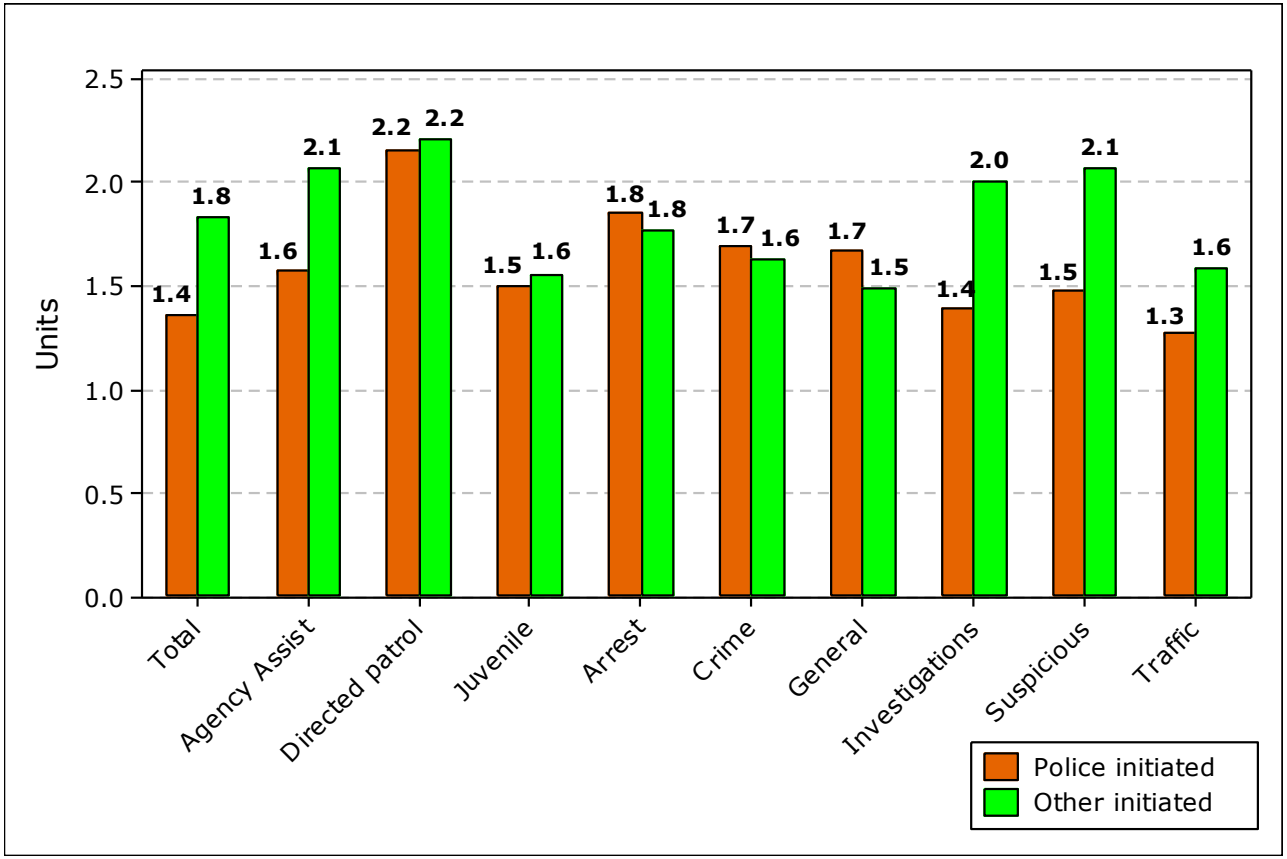
- Is workload type and variations reported: daily and seasonally & supervisors know this information?
- Are response times recorded by call priority & do supervisors know this information?
- Is there a comparative analysis of performance across patrol sectors?
- Is Field Interrogation (FI) information recorded properly and readily accessible?

Actively Managed

- Are vacation days controlled?
- Is multiple unit dispatching controlled?
- Are unusually long on-scene times noted?
- Are unusually long response times reviewed?
- Do you have a meaningful false alarm ordinance and is it enforced?
- Do patrol levels vary according to workloads by time of day and season of year?

Command & Control of Field Units

- **Average Number of Responding Units**



How about technology?

- Is there a deferred CFS management system (DPR)?
- Are there AEDs in patrol units and are police simultaneously dispatched to cardiac calls??
- Do you have Automatic LPRs?
- Is report writing electronic and can officers write reports from vehicles?
- Are there In-car AV systems? How is record captured and stored?

Actively Managed II

- Is Time between calls not just random patrol?
  - Intelligence data support focused patrol & COPS
  - Activities reviewed regularly
- Does patrol interact regularly with detective division and special operations units e.g. attend roll calls?
- Does patrol interacts with other city agencies?
- Are there strategies for locations with large numbers of repeat calls?

How about crime prevention?

- What kind of crime prevention programs does your department participate in?
  - Residential and commercial security?
  - Auto theft prevention?
  - Personal safety?
  - Block watchers?
  - Anything?

Signs of a well-managed investigative function

Actively Managed Investigations

- Is there a case management system?
- What is the caseload?
- Are clearance rates recorded and tracked? By unit, by investigator?
- What kind of intelligence gathering is conducted?
- What is the relationship between the investigators and patrol officers?

Do You Have High Liability Policies?

- Use of force?
- Vehicle pursuits?
- Emotionally Disturbed persons?
- Biased policing?
- Employee Assistance Programs?
- Domestic violence?
- Prisoner processing?
- Property processing?
- Professional standards integrated?

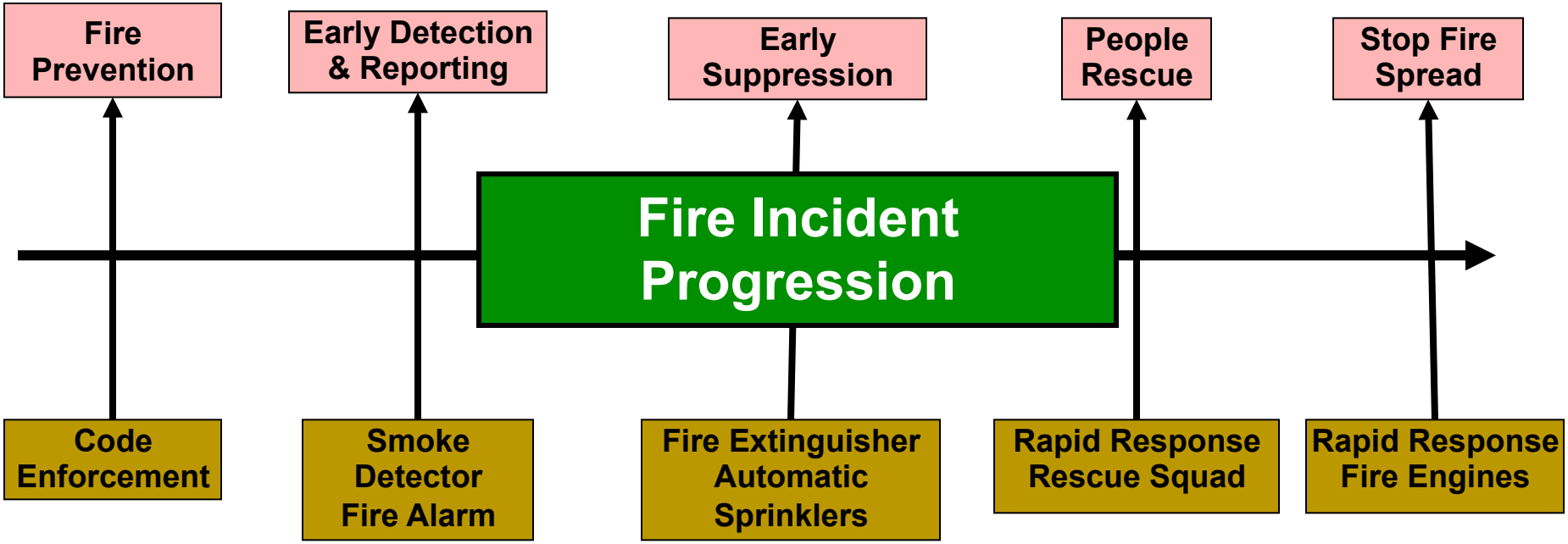
Are You Accredited?

- CALEA?
- State?

- If not, why not?

Fire Issues

Fire Challenges



FIRE DEPARTMENT ACTIONS

Fire Service (Insurance)

Do you really need that many fire fighters and that much equipment?

- Workload is **NOT** a factor except biggest cities
  - High: Two hours of call for service work per 24 hours
  - Workload per firefighter – Need to adjust for number of FF sent to each call – All firefighters do not go to each call.

- Response time of **FIRST** firefighters with some extinguishment capability is critical

Are you staffing for the "Worst Case Scenario"?

- There is **NO LIMIT** to the amount of Fire Insurance in terms of manpower and equipment
- You can **NEVER** fund or support resources for the worst case, rare event!
- There is **ALWAYS** a "worser" case scenario!

Do you know your community's real historical worst case scenario?

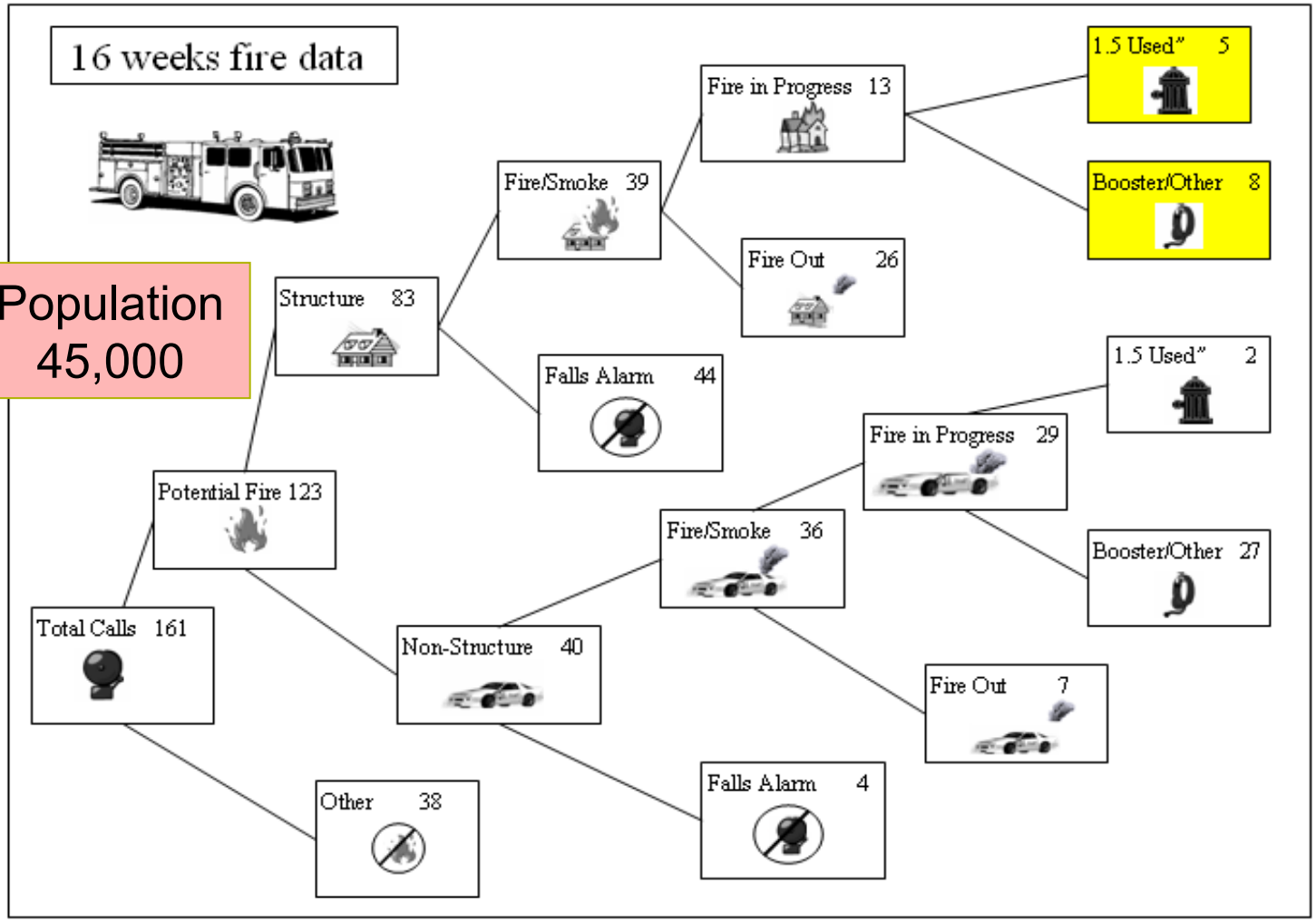
Frequency distribution of the number of calls

Number of calls in an hour	Frequency
0-5	6,397
6 - 10	2,263
11 – 15	98
16 or more	2

In a city with 17 pieces of apparatus, in the busiest 5 minutes of the year there were still 7 units available!

Are your using aggregate data to make staffing decisions?

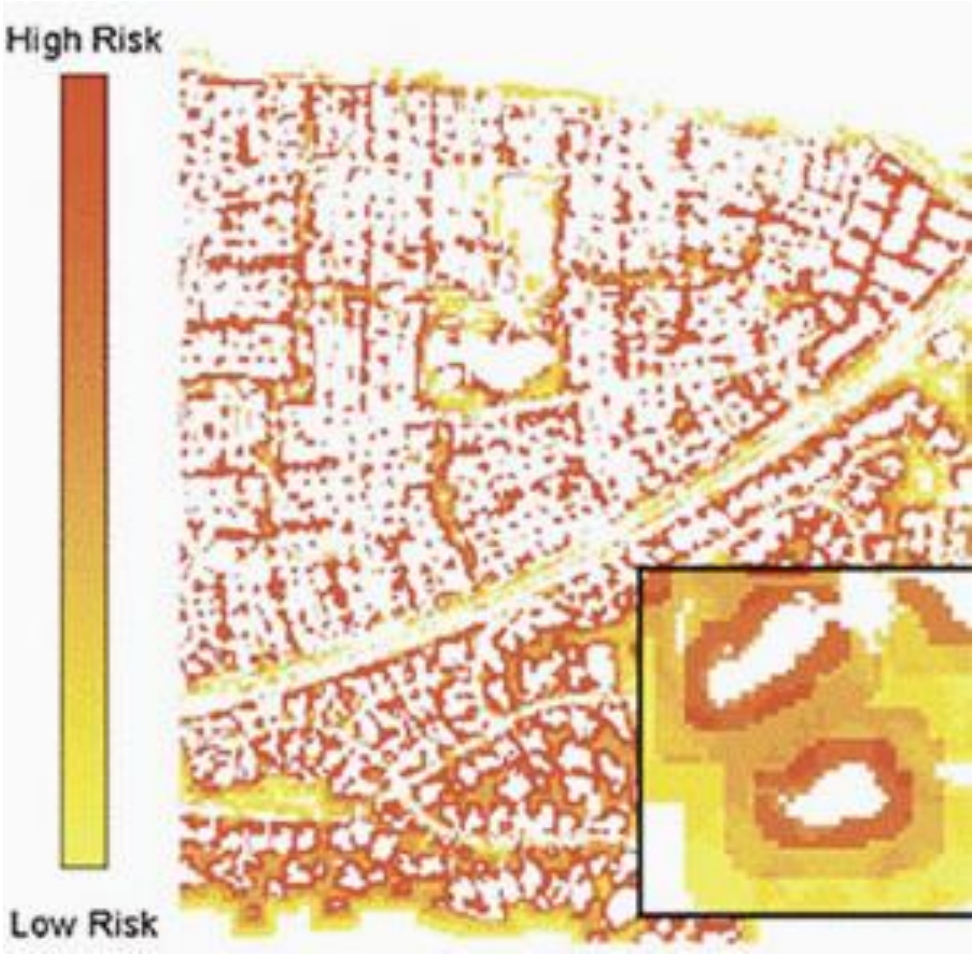
16 Week Total Calls (161) = 10 per week
➔**Fire Structure Calls (39)** = 2.5 per week
➔**Structure + Use Hydrant (5)** = Once per 3 weeks



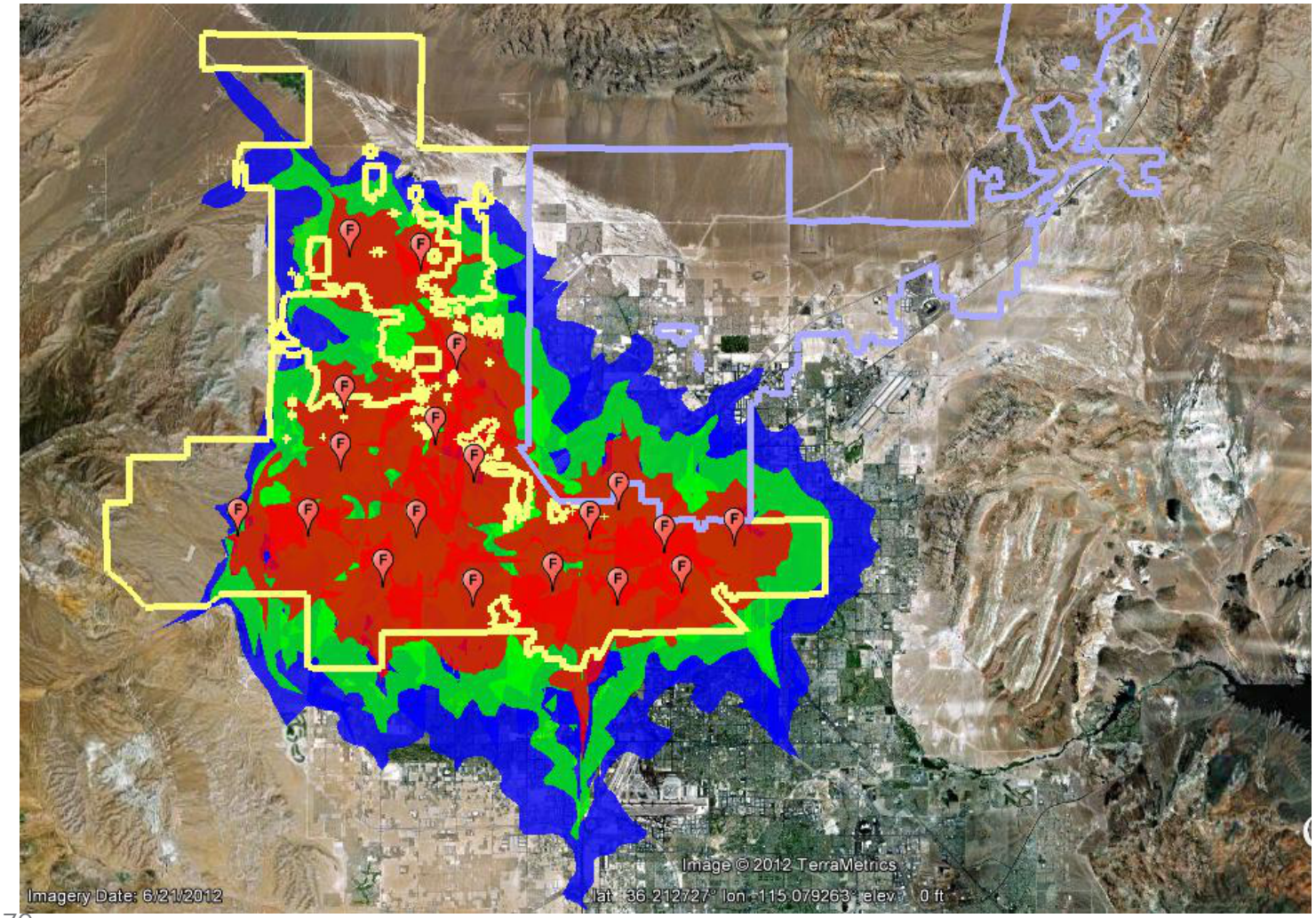
Is your Staffing and Deployment of Fire Services based on:

- Community Risk Assessment and Vulnerability Study—identifies community fire risk-rates the risk-maps the risk
- Workload of fire units/stations
- Call Demand
- Response Time
- Critical Tasking on Fire And EMS Calls
- Available Funding

Risk Analysis Mapping



Travel Time Mapping

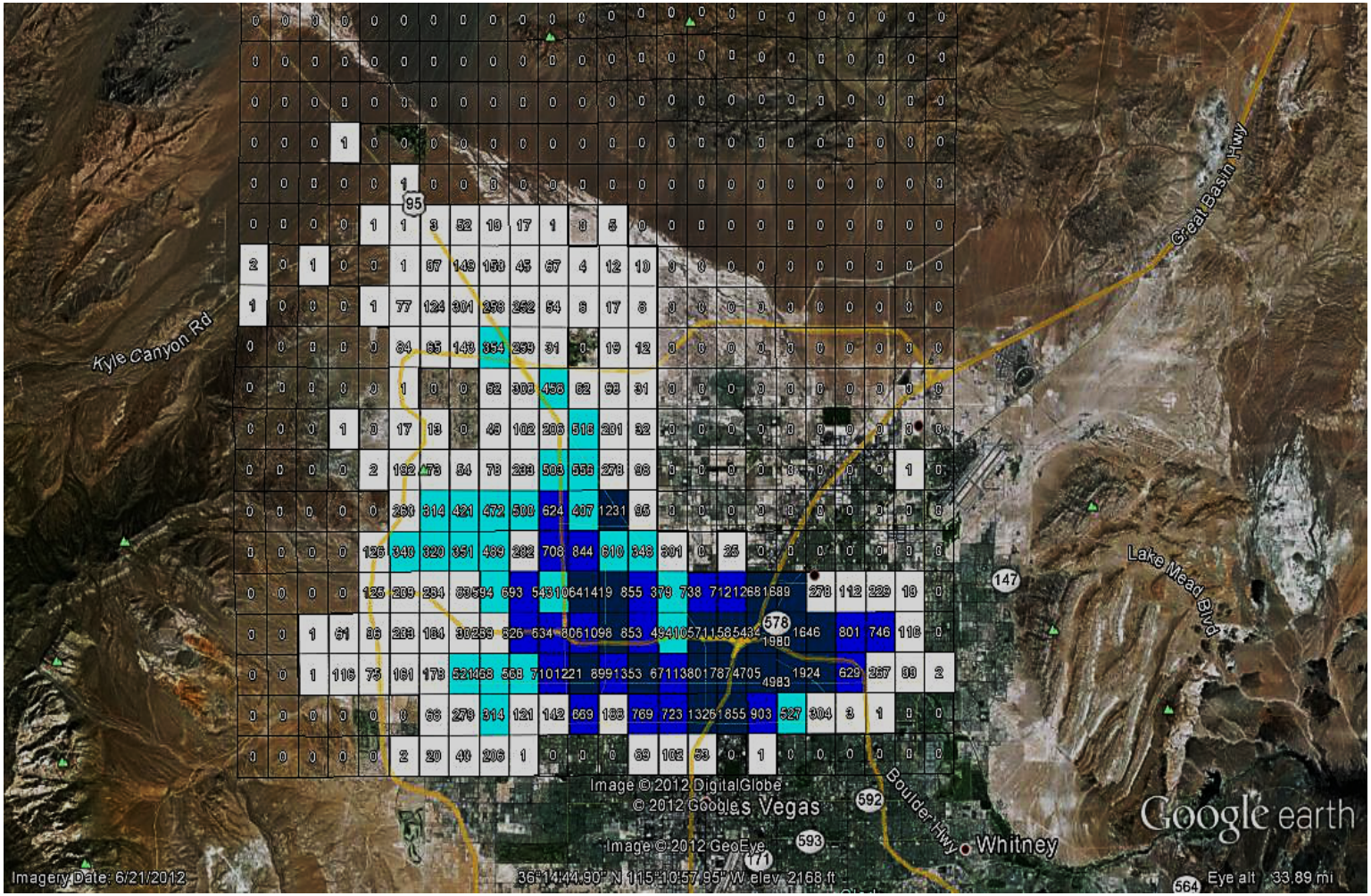


Red=240 seconds

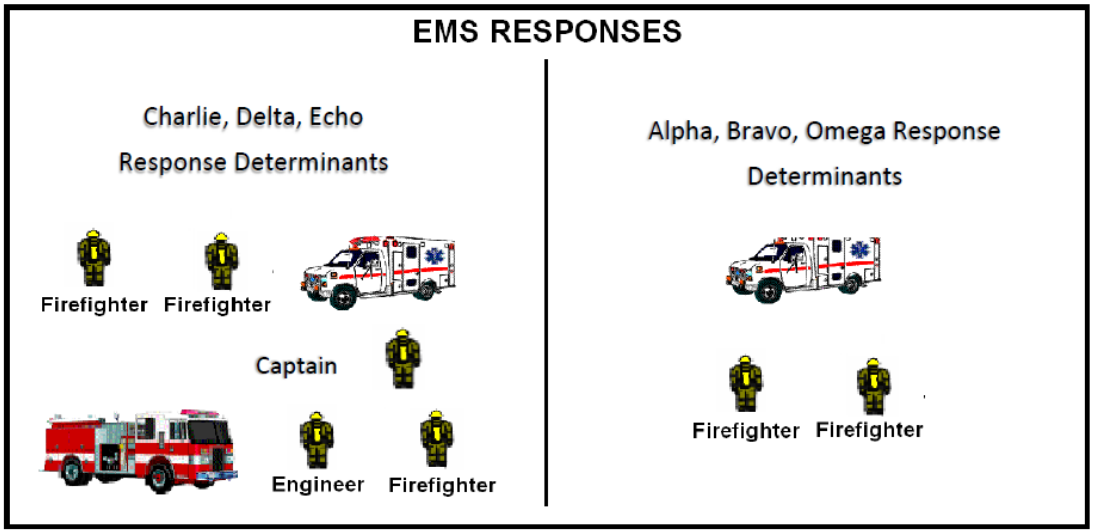
Green=360 seconds

Blue=480 seconds

Demand Mapping

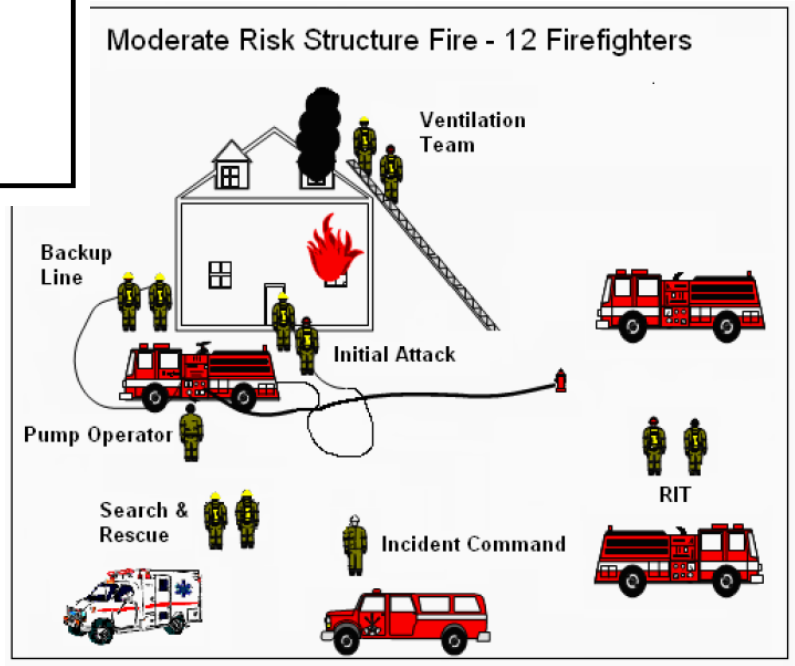


Critical Tasking



EMS Critical Tasking

Fire Critical Tasking



NIST

Report on Residential

Fireground Field Experiments

Sponsors

NIST
National Institute of Standards and Technology
U.S. Department of Commerce

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NIST Conclusions

- **Overall Scene Time:** The four-person crews completed the same number of fireground tasks (on average) 5.1 minutes faster — nearly 25 % — than the three-person crew.

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NIST Conclusions

- **Time to Water on Fire:** There was a 6% difference in the "water on fire time" between the three- and four-person crews (i.e., 16% difference between the four and two-person crews). There was an additional 6% difference in the "water on fire'" time between the four- and five-person crews.

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NIST Conclusions

- **Ground Ladders and Ventilation:** The four-person crew operating on a low-hazard structure fire can complete laddering and ventilation (for life safety and rescue) 30% faster than the two-person crew and 25% faster than the three-person crew.

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NIST Conclusions

- **Primary Search:** The three-person crew started and completed a primary search and rescue 25% faster than the two-person crew. In the same structure, the four- and five-person crews started and completed a primary search 6% faster than the three-person crews and 30% faster than the two-person crew. A 10% difference was equivalent to just over one minute.

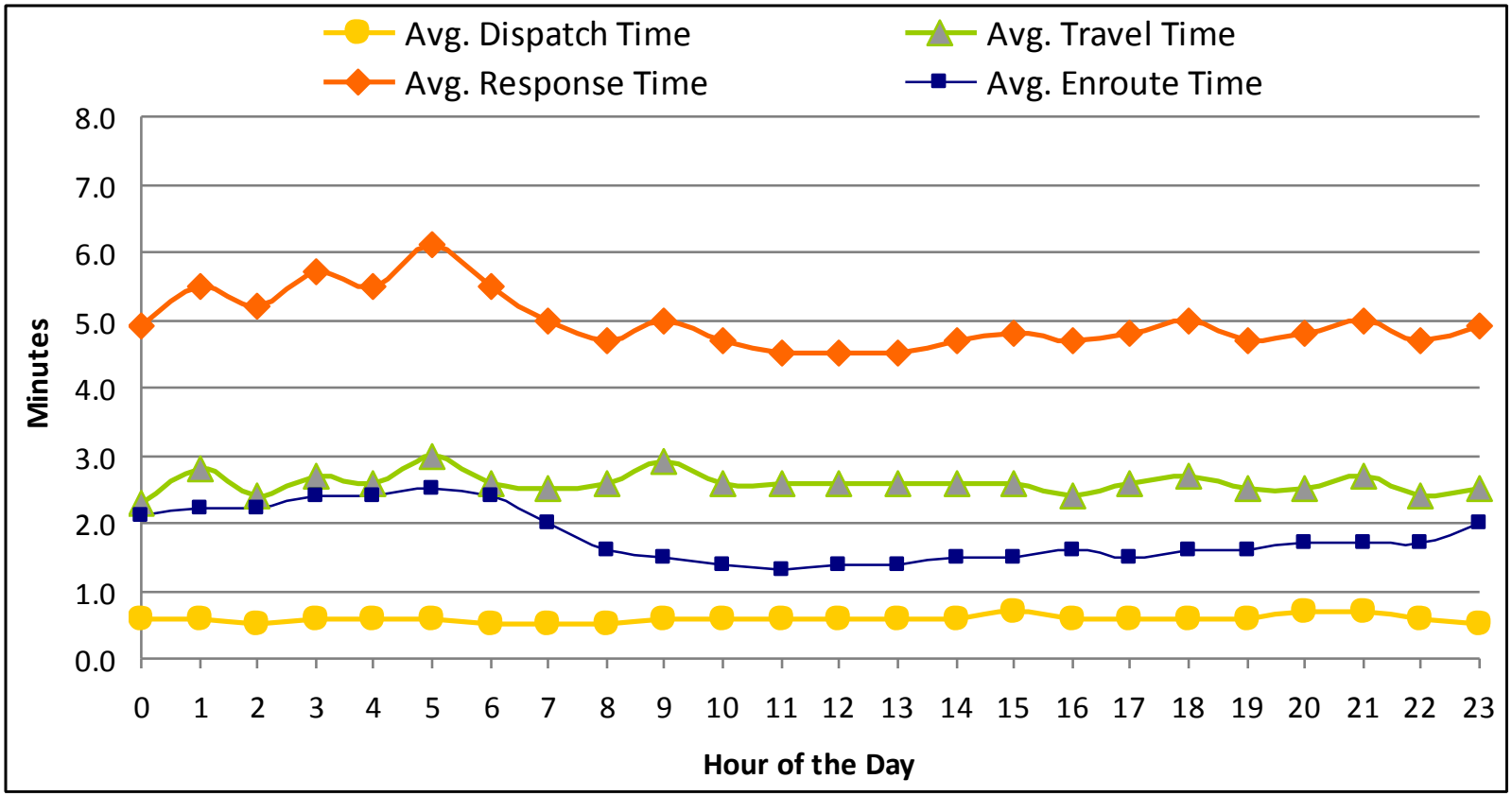
Why do firefighters work a 24-hour schedule?

- Historical to days of horse drawn steam engines
- Less costly (if full week worked)
- Allows for significant time off – limited days reporting for work (7-8)
- "Third rail" of labor issues
- Expensive in OT to replace absentees
- Limits dynamic staffing opportunities

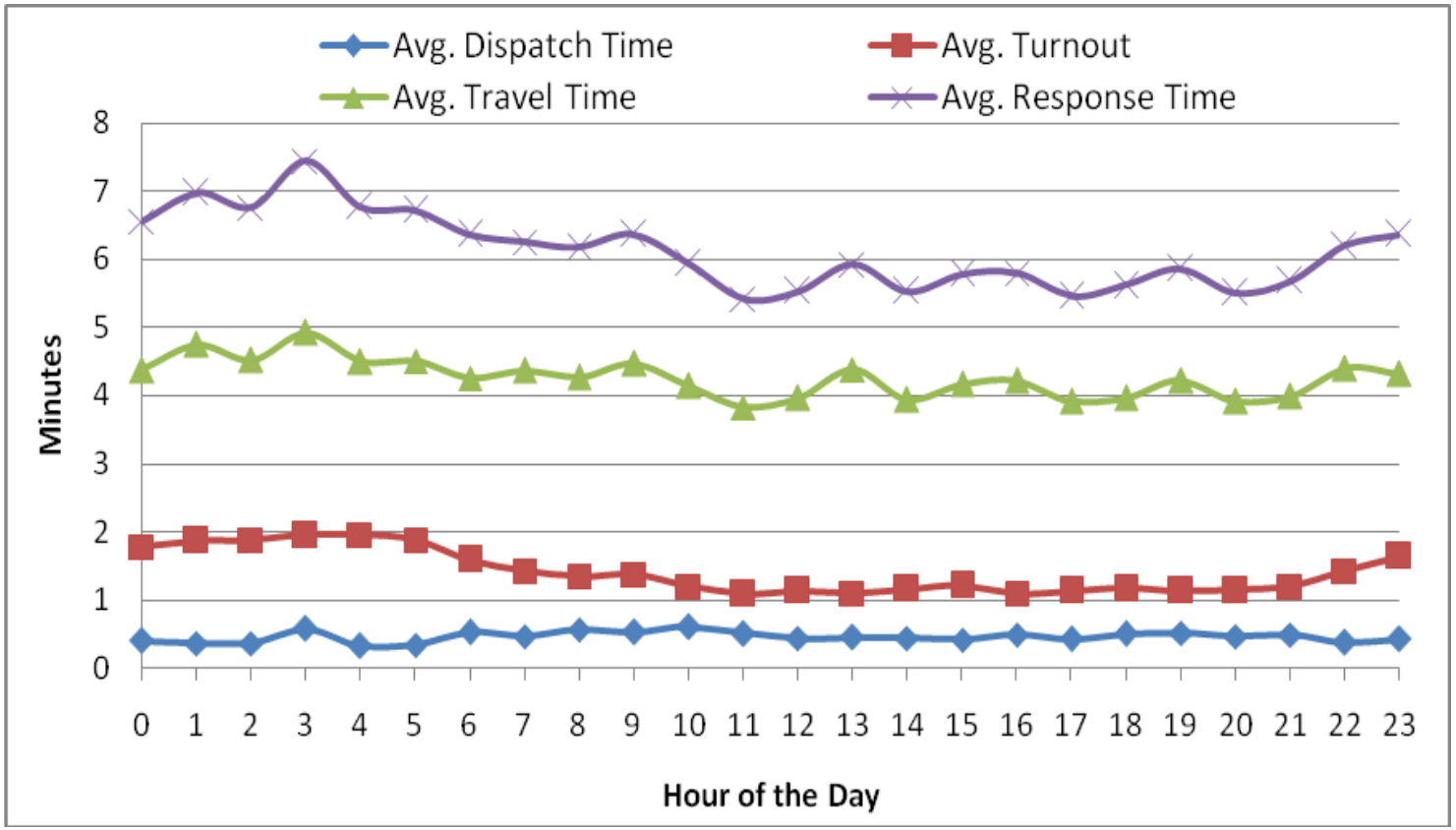
Schedules

- 24-hour shifts – used to be extensive hours – no longer with “Kelly Days” often 40 hours
- Work limited to 8 a.m. - 4 p.m. weekdays only typically
- 10 /14 allows for even more sleep time on duty
- 12-hour day optimum

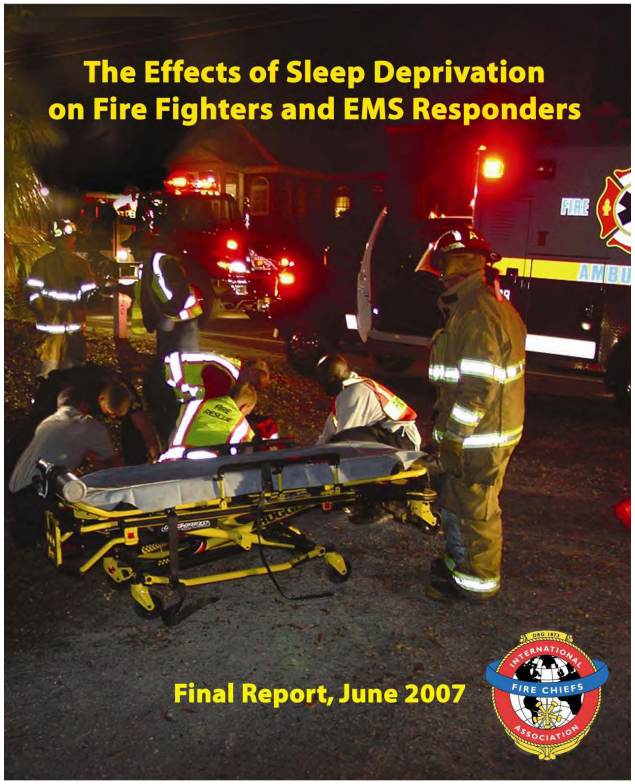
Response Times – 24-Hour Shift



Response Times – 24-Hour Shift



Are you dealing with Sleep Deprivation Issues?



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Exploring Alternative Strategies?

- Police / Fire Mergers - Public Safety Consolidation
- Paid on Call – Night time Manning
- Students – Auburn, AL

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Dealing with Low Firefighter Utilization?

Firefighters Between Calls for Service?

- Training, Maintenance, Prevention activities are valuable but take only a few hours day
  - Code Enforcement
  - Building codes and functioning smoke detectors critical
  - Company Inspections?

- Take on interruptible activities
  - mini-Public Safety Station?
    - Handle walk-in reports
    - Data collection and analysis

Are you exploring alternative Service Delivery?

- Cost-effective approach for response to those incidents that do not require a traditional heavy fire apparatus with full crew

- Utilizes lighter vehicles such as SUVs equipped and staffed to handle non life-threatening EMS incidents and non-property threatening public service/good intent calls

CAFS Quick Attack Vehicle

CAFS Quick Attack Vehicle

Fire Intervention Technology

DSPA

- breaks down and interrupts flames
- works volumetrically
- prevents backdrafts or flashovers
- re-ignition does not occur immediately
- reduces fire seat temperature
- non toxic to humans and animals
- does not damage property

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Quints

Combine two units into one: Engine/ Ladder

EMS Transport-Fire Suppression Vehicle

Combines two vehicles into one

- Traditional Engine Apparatus
- Traditional Ambulance

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Fire-EMS Transport Unit

Alternative Service Delivery

Cost Effectiveness ?

SUV with a crew of
1 or 2

OR

Heavy fire apparatus
with a crew of 3 or 4

Have you done Workload Analysis by station /apparatus?

Workload Analysis Station 1

Unit ID	Unit Type	Busy Min. / Run	# of Runs	# of Runs / Day	Busy Min. / Day	Total Busy Hours
2741	Engine	17.4	1775	4.9	84.6	515
2751	Reserve Engine	15.7	401	1.1	17.2	105
2771	Truck	16.5	551	1.5	24.9	152
2790	Reserve Ambulance	39.8	476	1.3	51.8	315
2791	Ambulance	41.3	1589	4.4	179.8	1094
Station 1	TOTAL	27.3	4792	13.1	358.3	2180

Workload Analysis Station 2

Unit ID	Unit Type	Busy Min. / Run	# of Runs	# of Runs / Day	Busy Min. / Day	Total Busy Hours
2742	Engine	19.2	1522	4.2	80.2	488
2772	Truck	16.4	600	1.6	26.9	164
2792	Ambulance	45.9	1459	4.0	183.6	1117
2796	Reserve Ambulance	43.4	310	0.8	36.9	224
Station 2	TOTALS	30.7	3891	10.7	327.5	1993

Workload Analysis Station 3

Unit ID	Unit Type	Busy Min. / Run	# of Runs	# of Runs / Day	Busy Min. / Day	Total Busy Hours
2743	Engine	19.1	1183	3.2	61.8	376
2753	Reserve Engine	10.7	55	0.2	1.6	10
27F3	Fire Boat	5.1	4	0.0	0.1	0
Station 3	TOTAL	18.7	1242	3.4	63.5	386

Workload Analysis Station 4

Unit ID	Unit Type	Busy Min. / Run	# of Runs	# of Runs / Day	Busy Min. / Day	Annual Total Busy Hours
2744	Engine	21.1	647.00	1.8	37.4	228
2754	Reserve Engine	17.5	74	0.2	3.5	22
2793	Reserve Ambulance	42.4	90	0.2	10.5	64
2794	Ambulance	48.9	711	1.9	95.2	579
Station 4	TOTAL	35.2	1522	4.2	146.6	892

Workload Analysis Station 5

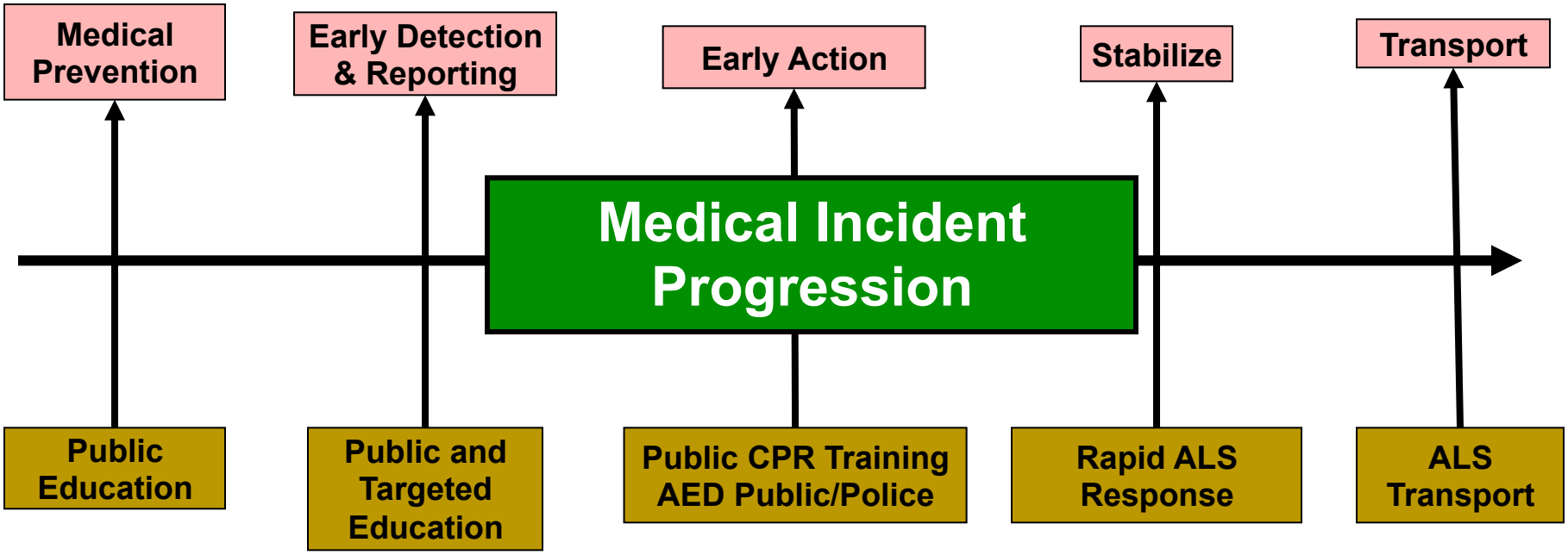
Unit ID	Unit Type	Busy Min. / Run	# of Runs	# of Runs / Day	Busy Min. / Day	Total Busy Hours
2745	Engine	18.2	459	1.3	22.9	139
2755	Reserve Engine	16.4	127	0.3	5.7	35
2795	Reserve Ambulance	0.5	4	0.0	0.0	0
Station 5	TOTAL	17.7	590	1.6	28.6	174

Are You Accredited?

- CPSE?
- If not, why not?

EMS Issues

EMS Challenges



EMS Department Actions

EMS – First Response & Transport

Impact of delays in dispatch and responding are easiest to measure response time

Citizen delay in reporting + Emergency service responder's = True response time

Workload – can affect availability of nearest unit

- Call for service breakdown by type = types of training needed

Broad based civilian training critical – CPR & AED's

- vital link in the "Chain of Survival"

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Are you familiar with this ground breaking research?

Emergency medical services

Evidence-based system design

White paper for EMSA

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ICMA

The EMS Reality

"The reality is that most EMS systems today were developed in a piece-meal fashion, driven more by politics, the influence of labor unions, and past practice, as opposed to an efficient, patient-centered, evidence-based system."

- Marc Eckstein, MD, MPH, FACEP

Paramedic Staffing

"Staffing every ambulance with paramedics in an EMS system where it is known that the majority of patients only require BLS transport is about as efficient as staffing an urgent care center with cardiothoracic surgeons."

- Marc Eckstein, MD, MPH, FACEP

Do You Limit High-Speed Responses?

- **"Limiting lights and siren use in an EMS system, also based upon scientifically-driven matrices, will similarly be of ultimate service to a community as its emergency medical demands can be met in a clinically appropriate manner, yet safer to all involved."**

Faster does not usually make a difference

- "EMS leaders should better match anticipated clinical conditions with response time standards, rather than forcing the spectrum of patient acuities into a response time standard derived solely from cardiopulmonary arrest data. The widely espoused beliefs of "more is better" and "faster makes a difference" applied to all EMS system clinical encounters are historically enabled and must be addressed with precision."

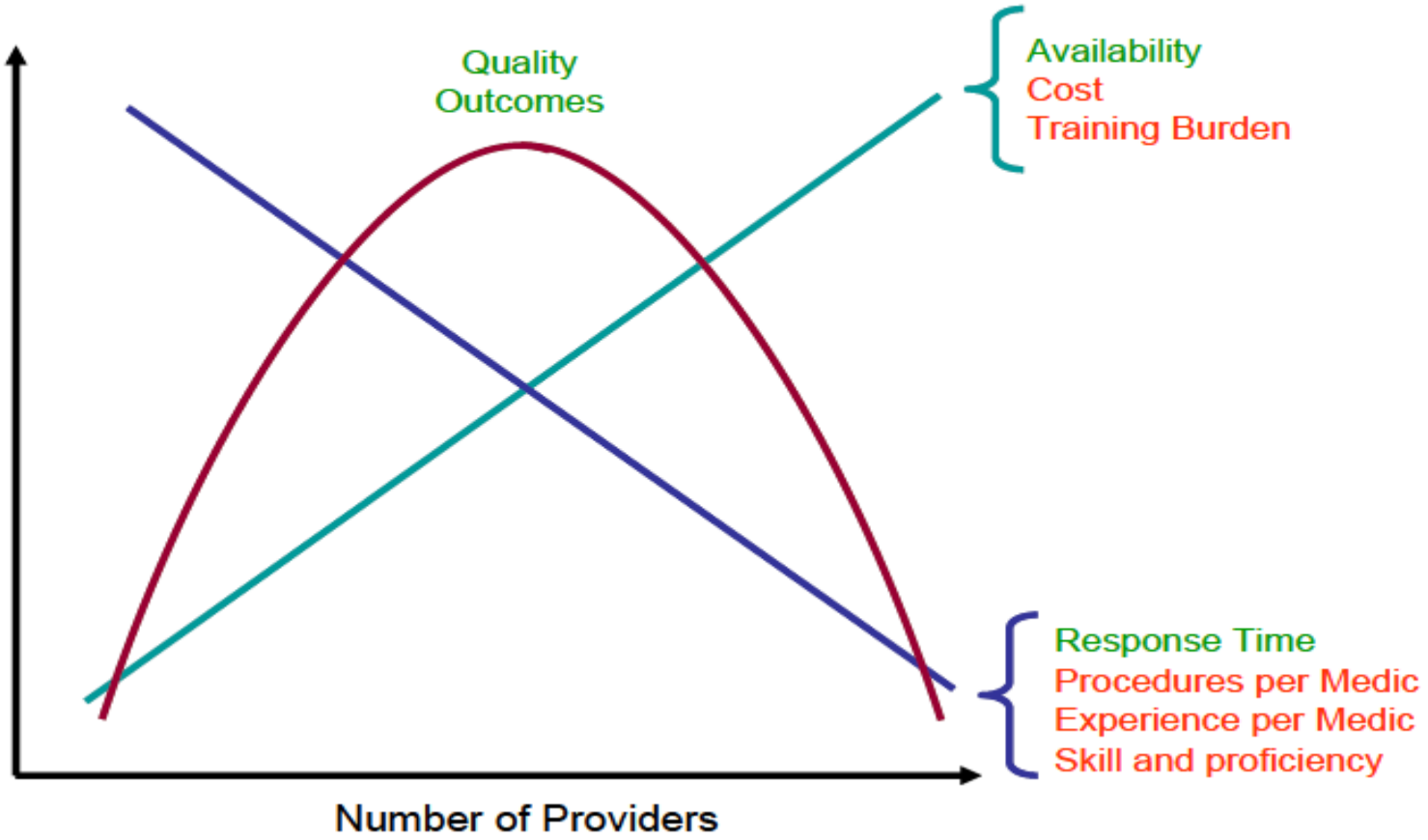
More paramedics not necessarily needed

- "Many clinical developments introduced into EMS solely available for paramedic application are now widely provided by all levels of EMS professionals, and in some situations, the lay public itself. Changes in the scopes of practices compel EMS systems to question use of traditional staffing models - questioning the utility of increasing paramedic staffing disproportionally to the increases in paramedic-required clinical service volume."

Is more better?

- This fallacy is a common error made by many EMS systems. More paramedics, more ambulances, more personnel on scene, more medical devices, more medications, etc., equal better outcomes. Nothing could be further from the truth.

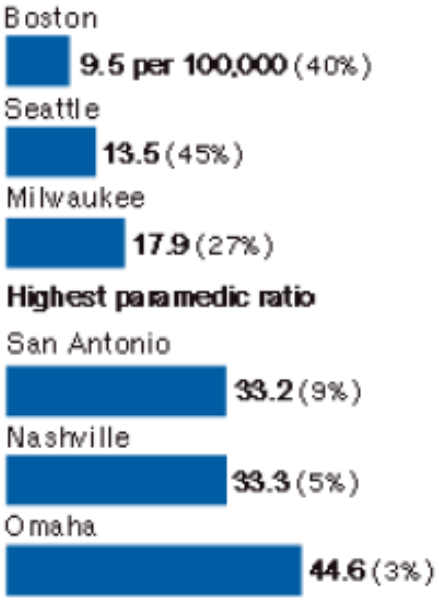
Volume vs. Outcome Theory



Fewer paramedics better?

Some cities opt to use fewer paramedics than others, reasoning that their crews get more experience and keep their skills sharper. Paramedic ratios per 100,000 population in the three cities that save the most lives and the three that save the least[1]:

Lowest paramedic ratios
(Survival rate in parentheses)



1 – Among those cities that measure V-fib survival with the Utstein method.

Source: USA TODAY survey of emergency medical services in the nation's 50 largest cities

Graphic: Karl Gelles, USA TODAY

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24-Hour Shifts

- "For modern, high-volume, urban EMS systems, the 24-hour ambulance shift finds itself occupying a prominent place on the stage of ideas appropriate for times past. Significant efforts should be directed to successfully transitioning to the shortest clinical shifts possible when factoring the myriad of internal and external variables applied to EMS systems."

Multi-tier systems

- Studies clearly support the need for paramedic care, but the results are far from suggesting an unlimited number of paramedics best serve communities. Findings lead to conclusions that multiple-tier EMS systems, fully utilizing the EMT in the scope of practice for many patient encounters, may prove clinically advantageous.

What do you send and why?

- Ambulance?
- Ambulance and Engine?
- Ambulance and Truck?
- Fly Car?
- Constant Staffing?
- System Status Management?

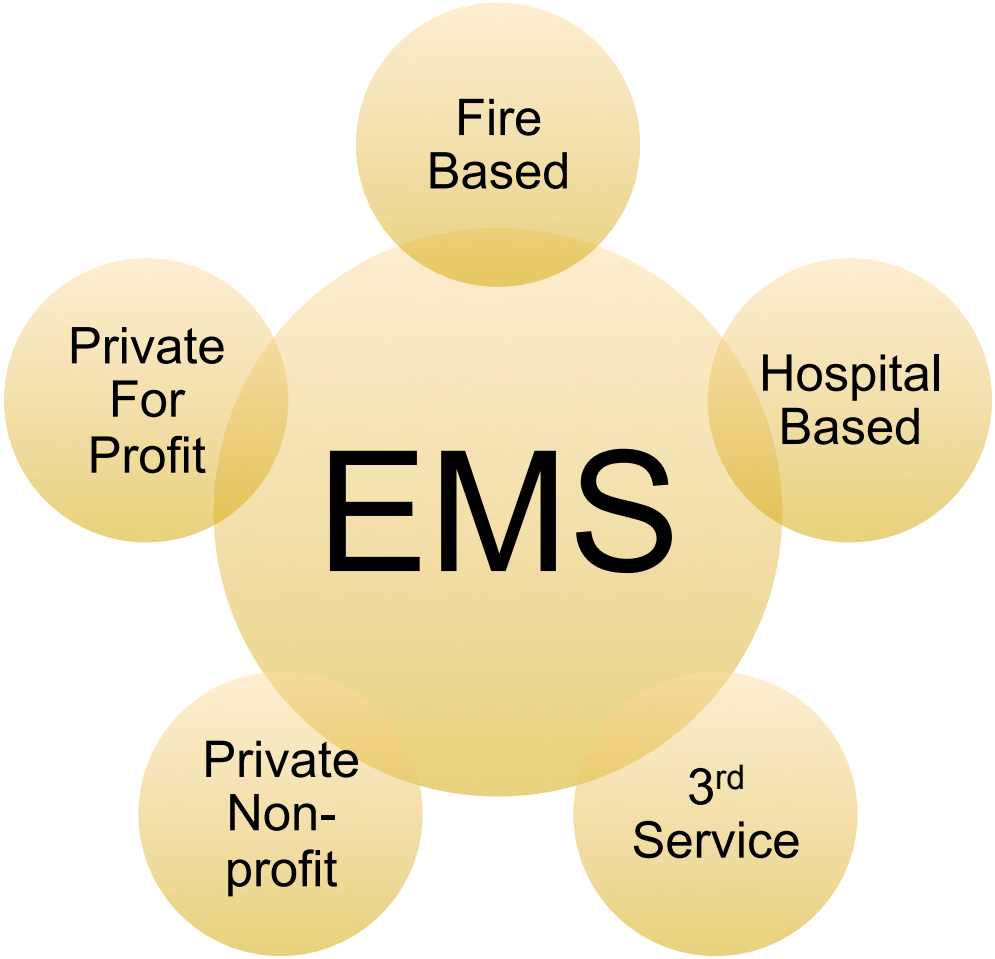
How much "stored capacity" can you afford?

- Why do we send an ambulance and a fire engine to a medical call?
- If you use it once a week or once a year?

What if you got out of EMS?

- Staffing requirements for fire suppression and EMS may be in conflict.
- One or two-tiered system? Should you be in the transport business?
- Do you "over qualify" EMS responders? BLS/ALS
- Are you duplicating services?

Alternative Delivery Systems



Are you Measuring Outcome – Not Inputs?

Do we know how what the survival rate is coming OUT of hospital?

Are we doing medical prevention activities?

- **Seniors Trip and Fall**

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Are you doing the No. 1 thing you can do to increase SCA survival?

Comprehensive AED Program

Police Response with simultaneous dispatch
Public Access with CPR / AED Training

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Key Issues – ALL City Services

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Do you do Regular Performance Measurement?

Are you using Correct and Valuable Measures?

- NOT just Annual reports – Monthly? Weekly?
- NOT just Manpower Inputs
- NOT just Aggregate totals
- Are Data Accurate

- Is there Accountability to insure regular review?

- Continuous Improvement Philosophy
  - Goals - Measurable
  - Performance problem identification → Solution strategies
- MAKE Tough Decisions
- Or Become Consultants

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Questions?

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