EMC 445 EMS SYSTEMS MANAGEMENT

Overview of System Costs

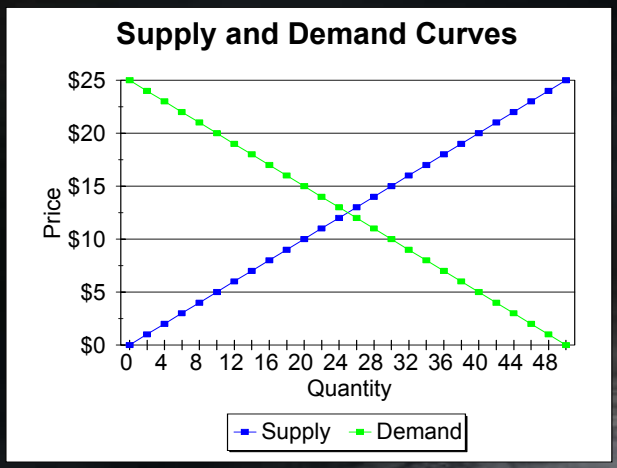
Unit Objectives

- Upon completion of this unit, you should be able to:
  - Discuss the general economic concepts of supply and demand curves.
  - Describe price elasticity of demand.
  - List and explain some of the economic properties that are unique to EMS.
  - Compare and contrast fixed (overhead) and variable costs and provide examples of each.
  - List and explain factors that negatively affect system cost and effectiveness.
  - Calculate fixed, variable, labor and first responder costs for an EMS system.
  - Calculate the unit hour cost, cost per transport, cost per call, and total system cost for an EMS system.
  - Calculate the break-even user fee with and without tax subsidy.
  - Calculate some measures of efficiency and effectiveness, including U:UH ratio and unit hour utilization.
  - Describe the price-subsidy tradeoff.

Economics

- The principles of microeconomics apply to all business enterprises, including EMS, regardless of their profit motive (for profit, not-for-profit, or government).
- Some of these principles include:
  - Supply
  - Demand
  - Revenue
  - Costs

Economics continued



Economics continued

- EMS demand has a few peculiarities:
  - EMS consumers tend to demand the very best services without respect for their ability to pay for it.
  - EMS consumers tend to have relatively "inelastic demand".
    - Price elasticity of demand = Δ quantity / Δ price
    - Example: When an ambulance service increases its fee from $250 $350, its demand declines from 2000 calls per month to 1950 calls. The price elasticity of demand is 0.076.
    - A good or service is said to be price inelastic if its price elasticity of demand is less than 1. It is price elastic if it is greater than one.
    - The price elasticities of demand have never been calculated for EMS, though it is probably perfectly inelastic for the emergency market. It is probably less inelastic for the non-emergency market, though still relatively inelastic. For wheelchair services, demand is probably more elastic.
  - Government regulatory authorities will not allow EMS to have unmet demand.

Economics continued

- THE BOTTOM LINE ON DEMAND
  - The demand for ambulances services will probably be constant for emergency services regardless of price. The demand for non-emergency services will probably be less price inelastic than the emergency market. The demand for wheelchair services is probably price elastic.
  - You must serve all emergency and non-emergency requests for service regardless of ability to pay.
  - Even though the emergency and non-emergency markets would bear high prices, government regulations will probably limit your fees.
  - Even though you could charge higher prices in the emergency and non-emergency markets, it doesn't necessarily mean you will generate higher revenues.
  - Remember: Not everyone pays, and of those who do, not everyone pays full price, especially the federal government.
  - You must therefore control costs and make the best of the revenue you have.

System Costs

Even though the demand for EMS is largely beyond the control of the EMS manager, the manager has greater control over system costs. By controlling the quantity and quality of unit hours deployed, system costs are controlled.

- **Fixed Costs**
  - Personnel
    - salaries
    - unemployment tax
    - FICA
    - Workmen's compensation
    - benefit time
    - uniforms
    - educational time
    - health insurance
    - retirement
  - Administrative staff
  - Vehicles
  - Utilities
  - Rent
  - Insurance (vehicle, malpractice)
  - Communications
  - Replacement costs
  - Medical Control
- **Variable Costs**
  - Fuel
  - Medical supplies
  - Bad debt
  - First Responder services
  - Vehicle Maintenance
  - Equipment Maintenance
  - Billing Services

System Costs continued

- Cost per unit hour = total system costs/unit hours produced
- Total system costs are controlled to a large extent by minimizing excess unit hours
- 60%-80% of total system costs are direct labor costs
- Purchasing the very best equipment available accounts for only about 20% of total system costs.
- In a 2000 survey, unit hour costs ranged from $75 in very large systems to $134 in smaller systems.

System Costs continued

- **Factors negatively affecting System Costs and Effectiveness**
  - High unit hour costs
  - Poor management of unit hours
  - Specialized production strategies
  - Poor "turn around" times
  - Excessive down time
  - High percentage of non-transport calls
  - Long transport times
  - Geography and population density

System Costs continued

- **Measures of Efficiency Using the Unit Hour Concept**
  - U:UH ratio (U:UH) = number of patient transports/number of unit hours deployed
    - Example: During a given month, 870 patients were transported and 2350 unit hours were deployed. The U:UH = 870/2350 = .37.
    - An efficient range of U:UH is .35 to .45.
  - Utilization = total time spent servicing calls/total unit hours produced
    - Example: The total time spent servicing calls during a given month was 36,000 minutes and 2350 unit hours were produced. The utilization rate is (36,000/60)/2350 = .26. In other words, the ambulances were busy servicing calls an average of 26% of the time.
  - Cost per patient transport = Total system cost/total number of patient transports
    - Example: The cost for operating an EMS system during a given month totalled $125,000 and they transported 800 patients. The cost per patient transport is ($125,000/800) = $156.25.

Calculating System Costs

- All ALS system with fire department first response. Operates under PUM structure. Response time standard is 8 minute 90% fractile. Substantial penalty for each minute beyond 8 on emergency calls. Responsible for emergency and non-emergency market. The Fire Department charges the EMS system for first responder services on a per call basis. Space is rented from local fire departments to house the ambulances and medical control is paid by the EMS system on a contractual basis. The county provides a tax subsidy of $300,000 per year.

Calculating System Costs continued

• Population:	500,000
• Land Mass:	200 miles^2
• Call Volume:	35,000 calls per year
• Transport rate:	88%
• Fire Department responses:	33% of all calls
• Revenue collection rate:	60% of total billed
• Unit hours deployed:	87,500 per year
• Average service time (minutes):	45
• Variable Costs (per call)	
– Maintenance	$4
– Fuel	$6
– Supplies	$67
– Labor Costs per unit hour:	$40
– First responder services	$30 (per call)
• Fixed Costs (annual)	
– Administrative staff	$300,000
– Vehicle replacement fund	$250,000
– Utilities	$4,800
– Rent	$50,000
– Insurance	$20,000
– Communications	$75,000
– Replacement costs (equipment)	$80,000
– Medical Control	$80,000

Calculating System Costs continued

A. To calculate total system cost:

1. Calculate total overhead (fixed costs):

administrative staff:	300,000
vehicle replacement fund:	250,000
utilities:	4,800
rent:	50,000
insurance:	20,000
communications:	75,000
replacement costs (equipment):	80,000
medical control contract:	+80,000
TOTAL:	$859,800

2. Calculate first responder services:

total calls:	35,000
percentage requiring first response:	x .33
Total first responder calls:	11,550
Cost per first responder call:	x $30
TOTAL:	$346,500

Calculating System Costs continued

3. Calculate total labor cost:

total unit hours deployed:	87,500
total labor cost per unit hour:	x $40
TOTAL:	$3,500,000

4. Calculate total variable costs:

maintenance per call:	4
fuel per call:	6
supplies per call:	+67
total variable cost per call:	$77
total calls run:	x 35,000
TOTAL:	$2,695,000

5. Add costs together for total system cost:

overhead:	859,800
first responder:	346,500
labor:	3,500,000
variable costs:	+2,695,000
TOTAL SYSTEM COST:	**$7,401,300**

Calculating System Costs continued

B. To calculate cost per unit hour:

Divide total system cost by the number of unit hours deployed:

Total system cost	$7,401,300
Total Unit Hours deployed	⍁87,500
Cost per UH:	$84.59

C. To calculate unit hour utilization:

Multiply the number of calls run by the average time required to complete a call and divide by the number of unit hours deployed:

Total calls run:	35,000
Time per call (minutes):	x 45
Total minutes on calls:	1,575,000
Convert minutes to hours:	⍁ 60
	26,250
Total unit hours deployed:	⍁ 87,500
	.30

Calculating System Costs continued

D. To calculate cost per call:

Total system cost:	7,401,300
Number calls run:	⍁ 35000
Cost per call:	$211.47

E. To calculate cost per transport (i.e., the people who are billed for services):

Number of calls run:	35,000
Transport ratio:	x .88
Number of transports:	30,800
Total system costs:	$7,401,300
Number of transports:	⍁30,800
Cost per transport:	$240.30

F. To calculate break-even user fee without subsidy:

Divide cost per transport by the collection rate:

Cost per transport:	$240.30
Collection rate:	⍁ .60
User fee:	$400.50

Calculating System Costs continued

G. To calculate break-even user fee with subsidy:

1. Subtract subsidy from total system cost:

Total system cost:	7,401,300
Less subsidy:	-300,000
Net system cost:	$7,101,300

2. Determine cost per transport:

Number of calls run:	35,000
Transport ratio:	x .88
Number of transports:	30,800

Net system cost:	$7,101,300
Tumber of transports:	⇙ 30,800
Cost per transport:	$230.56

3. Divide cost per transport by the collection rate:

Cost per transport:	$230.56
Collection rate:	⇙ .60
User fee:	$384.27

User Fee-Tax Subsidy Tradeoff