Cost-Benefit Analysis of Bedside Delivery Service from a Health-System Perspective

Timothy Wu, PharmD, Carla Williams, PharmD, BCPS, Kathy Vranek, PharmD,
T. Joseph Mattingly II, PharmD, MBA
University of Maryland Medical Center; University of Maryland School of Pharmacy

Background

- Currently, The University of Maryland Medical Center (UMMC) is one of the few hospitals in the University of Maryland Medical System (UMMS) with an in-house bedside delivery program.
- Bedside delivery is currently offered to 9 units and is serviced by 4 bedside delivery technicians
- No official financial Cost-Benefit analysis (CBA) completed on the bedside delivery service at UMMC
- C-suite requests for a CBA to be completed to determine feasibility of the service throughout UMMS hospitals

Purpose

The purpose of this research study is to determine the financial benefits of our current medication bedside delivery units and to determine the net benefit of expanding bedside delivery service to all areas of UMMC.

Hypothesis

H_1: Current bedside delivery units produce a positive financial net benefit to UMMC

H_2: Expansion of bedside delivery service throughout UMMC would produce a positive financial net benefit

Study Methods

- Gather data from each current bedside delivery unit to act as our model of implementation throughout UMMC
- Collect all costs and benefits to find the net benefit
- Costs include both variable and fixed costs
- Gross profit directly from prescription sales is the only benefit included in this model
- Point estimates and distributions will be used as inputs into a decision analytic model to allow Monte Carlo simulation of a hypothetical cohort to determine net benefits
- Monte Carlo simulation will be run 1000 times to determine average net benefit with computed confidence intervals.

Results

Table 1: Model parameters for costs and benefits.

Benefit	Base Case	Standard Deviation	Reference
Average Prescription Count	939	297	5
Average Prescription Gross Margin	$35.17	$13.49	5
Costs			
Cost to dispense	$14	$2	6
Equipment (Ipads, Heartland Device, WOW)	5885	$120	6
Bedside Technician Wage	$15.26	$4.99	7
Training Costs	$244.16	$122.08	6

Table 2: Current Bedside Delivery Cost Benefit Analysis Results

Monthly Cost-Benefit Variables	Base Case	95% Confidence Interval
Prescription Count	$939	[$917 - $1,003]
Profit Margin	$33,024	[$31,797 - $35,169]
Cost to Dispense	$13,146	[$12,738 - $14,077]
Technician Wages	$8,546	[$8,431 - $8,932]
Marginal Benefit	$11,333	[$10,323 - $12,160]
Total Fixed Costs	$21,452	[$21,256 - $22,447]
Net Benefit in First Month	($10,119)	[($11,452) - ($10,287)]

Table 3: Expansion of Bedside Delivery Cost Benefit Analysis Results

Monthly Cost-Benefit Variables	Base Case	95% Confidence Interval
Prescription Count (50% Capture)	$13,526	[$12,747 - $13,617]
Profit Margin	$475,709	[$440,644 - $474,984]
Cost to Dispense	$189,364	[$176,788 - $189,806]
Technician Wages	$73,389	[$70,367 - $75,500]
Marginal Benefit	$212,956	[$190,196 - $209,676]
Total Fixed Costs	$184,229	[$177,269 - $189,590]
Net Benefit in First Month	$28,727	[$8,300 - $20,087]

Discussion / Limitations

- Current bedside delivery data demonstrates a marginal benefit of $11,333 on average with a 95% confidence interval above $0.
- Current bedside delivery analysis also demonstrates a positive profit net benefit after two months of operations.
- For the expansion of bedside delivery, an assumed 50% capture rate of discharge prescriptions gives an average monthly marginal benefit of $212,956.
- Expansion of the bedside delivery service demonstrates positive cash flow of $28,727 within the first month of service.
- Therefore the expansion of our current medication bedside delivery program will generate more revenue making it financially feasible to continue.
- This simulation would apply to large 800+ bed hospitals that have 340B status
- The simulation also assumes an outpatient pharmacy is already up and running
- Standard deviation of technician wage was reduced to reflect more realistic wages
- Replacement of fixed costs were not accounted for in the simulation

Conclusions

- Current bedside delivery service at UMMC demonstrates a net benefit of the service being provided.
- Expansion of the bedside delivery service shows a financial benefit in expansion to all areas of UMMC
- Further investigation needs to be conducted to apply to other system hospitals without current operating outpatient pharmacies or 340B status.

References

1. Drummond MF, Sculpher MJ, Torrance GW, O'Brien BJ, Stoddart GL. Cost-Benefit analysis. In: Methods for economic evaluation of health care programmes. Oxford University Press: New York. 2005;7:211-245.
2. Fernando et al, Acad Ermerg Med. 2012(19):102-105;Campbell et al. Acad Emerg Med 2008.15:932-938.; Kripalani et al. J Hosp Med. 2008.3(1):12-9.; Kripilani et al. Mayo Clin Proc. 2008.83(5):529-35
3. Wang SJ, Middleton B, Prosser LA, Bardon CG, Spurr CD, Carchidi PJ, Kittler AF, Goldszer RC, Fairchild DG, Sussman AJ, Kuperman GJ, Bates DW. A cost-benefit analysis of electronic medical records in primary care. Am J Med. 2003 Apr 1;114(5):397-403.
4. Caro JJ, Briggs AH, Siebert U, Kuntz KM; ISPOR-SMDM Modeling Good Research Practices Task Force.. Modeling good research practices--overview: a report of the ISPOR-SMDM Modeling Good Research Practices Task Force--1. Value Health. 2012 Sep-Oct;15(6):796-803.
5. Data from University of Maryland Medical Center, Baltimore, Maryland
6. Data from K. Vranek, PharmD, University of Maryland Medical Center, written communication, 2016
7. U.S. Bureau of Labor and Statistics. (2016) State Occupational Employment and Wage Estimates Maryland. Retrieved from http://www.bls.gov/oes/current/oes_md.htm