Department of Family and Community Medicine
Healthy Families in Healthy Communities

Cost Acknowledgement Decreases Test Ordering in Physicians

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INTRODUCTION:

- Health care spending has increased steeply and may be unsustainable [1]
- ~80% of spending is influenced by physicians decisions[2]
- Therefore, physician ordering behavior has become a target for cost containment
- Prolific area of research with multiple methodologies [3-15]
  - Audit and feedback
  - Inservices on cost and test appropriateness
  - Reminder messages for appropriateness
  - Discussion of cost and appropriateness criteria
  - Publishing cost
  - National efforts such as Choosing Wisely
  - Etc.
- Presenting cost at the time of ordering has shown promise and may be be cheap, simple and "exportable" practice. [15]
- However, no systematic review has been performed to assess its reproducibility.

PURPOSE:

To evaluate the influence of cost acknowledgement on laboratory test ordering behavior.

METHODS:

Systematic search:

- EMBASE, Medline, Pubmed, and Web of Science on (date).
- Search designed by a research librarian

Review Process:

- 2 reviewers independently reviewed articles
  - 3rd reviewer available for disagreement
- Pre-determined inclusion and exclusion criteria:

Data Collection:

- 2 reviewers independently reviewed articles
  - 3rd available for disagreements
- Data collected in a standardized manner
  - Study characteristics
  - Study methods
  - Outcomes
  - Quality of methods using EPOC guidelines [16]
  - Bibliography was reviewed for pertinent studies

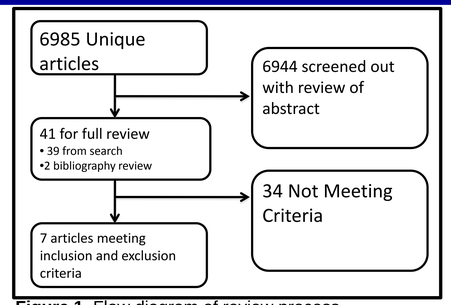

Figure 1. Flow diagram of review process.

RESULTS:

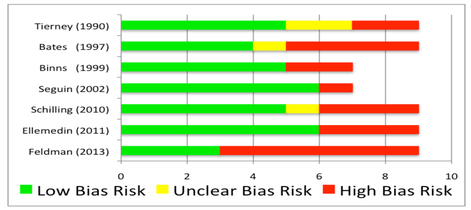

Figure 3. Risk of bias measurements of included studies

Author (year)	Study Type	Setting	Aca-demic	Coun-try	Charge, fee or cost?	Display type	N (Intervention)	N (Control)	% Change # of labs (p)	% Change cost of labs (p)
Feldman (2013)	RCT / CBA	Hospital-Wide	Y	USA	Fee	CPOE	18276	NA	- 8.59 (<0.001)	9.6 (<0.001)
Ellemedin (2011)	CBA	Inpatient Internal Medicine	Y	South Africa	Cost	Flyer (99% wrote cost on order form)	217	260		
Schilling (2010)	CBA	Medicine / Ortho ED	Y	Sweden	Cost	Poster (+e-mail) at work station	1637	1585		- 21 (0.12)
Seguin (2002)	ITS	Adult Surgical ICU	Y	France	Price	Paper order form	159	128	- 18.9 (0.12)	- 22 (<0.05)
Binns (1999)	ITS	Pediatric ED	Y	USA	Charge	CPOE	2414	2467		- 36.8 (<0.01)
Bates (1997)	RCT	Adult Inpatient med/surg	Y	USA	Charge	CPOE	3536	3554	- 5.4 (0.18)	- 4.9 (0.29)
Tierney (1990)	CBA	Oupatient Internal Medicine	Y	USA	Charge	CPOE	4254	4138	14.3 (<0.005)	- 12.9 (<0.05)

RCT (Randomized controlled trial); CBA (Controlled Before -After trial); CPOE (Computer Physician Order Entry); ED (Emergency Department); ITS (Interrupted Times Series trial); ICU (Intensive Care Unit)

Table 1. Study characteristics and outcomes of included studies.

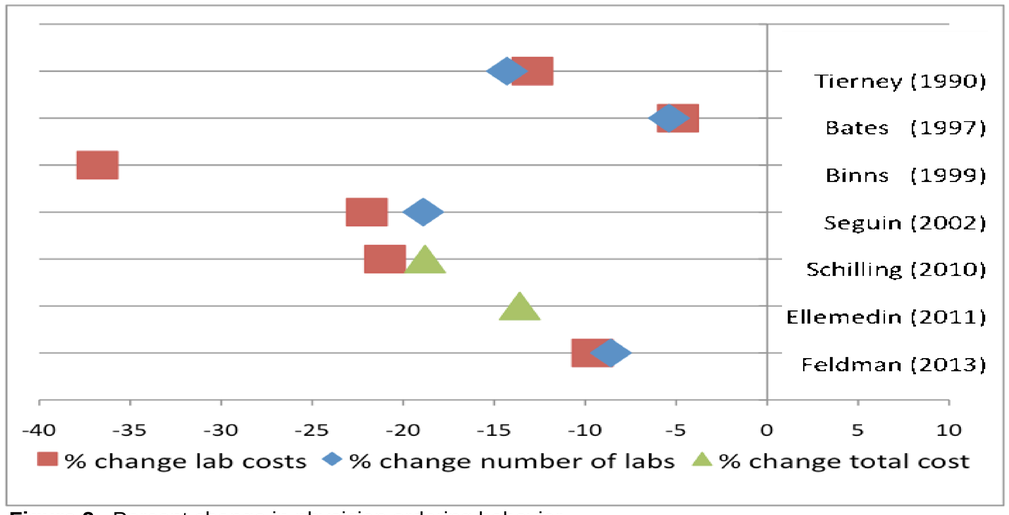

Figure 2. Percent change in physician ordering behavior.

CONCLUSIONS:

Reproducible decrease in labs use / costs despite:

- Varied methodologies, settings and demographics
- Different media (paper vs. computer)

Limitations:

- Inherent weakness of methodologies
- Hawthorne effect risk high (Goldfish study)
- Homogenous (such as all academic centers) limiting external validity

Areas of Future Research:

- Comparable outcome reporting
- Cost Shifting
- Morbidity
- Mortality
- Radiology Ordering Behavior
- Therapeutics Ordering Behavior

REFERENCES:

1.Hartman M, et al. National healthcare spending in 2011: overall growth remains low, but some payers and services show signs of acceleration. Health Affairs 2013; 32: 57-99
2.Harris JS: Why doctors do what they do: determinants of physician behavior. J Occup Med 1990; 32: 1207Eccles M, et al. Effect of audit and feedback, reminder messages on primary radiology referrals: a randomised trial. Lancet 2001; 357: 1406-9
3.Verstappen WHJM, et al. Effect of a practice-based strategy on test ordering performance of primary care physicians: a randomized trial. JAMA 2003; 289(18): 2407-12.
4.Winkens RAG, et al. Randomised controlled trial of routine individual feedback to improve rationality and reduce number of test requests. Lancet 1995; 345:498-502
5.Verstappen WHJM, et al. Comparing cost effects of two quality strategies to improve test ordering in primary care: a randomized trial. Int J for Quality in Health Care 2004; 16(5): 391-398
6.Billi JE, et al. The effects of a cost education program on hospital charges. J Gen Intern Med 1987; 2: 306-11
7.Blackstone ME, et al. Lowering Hospital Charges in the trauma intensive care unit while maintaining quality of care by increasing resident and attending physician awareness. J of Trauma: Injury, Infection and Critical Care 1995; 39(6): 1041-1044.
8.Sachdeva RC, et al. Effect of availability of patient-related charges on the practice patterns and cost containment in pediatric intensive care unit. Crit Care Medicine 1996; 24(3):501-6
9.Pugh JA, et al. Effect of daily charge feedback on inpatient charges and physician knowledge and behavior. Arch Int Med 1989; 149:426-29
10.Tierney WM, et al. The effect on test ordering of informing physicians of the charges for outpatient diagnostic tests. New England Journal of Medicine 1990; 322:1499-504
11.Bates DW, et al. Does the computerized display of charges affect inpatient ancillary test utilization. Arch Int Med 1997; 157:2501-8
12.Tierney et al. Physician inpatient order writing on microcomputer workstations. JAMA 1993; 269:379-83
13.Cohen DI, et al. Does cost information availability reduce physician test usage: a randomized clinical trial with unexpected findings. Medical Care 1982; 20(3): 286-92
14.Perrin JM, et al. The effect of price information on test ordering behaviour and patient outcomes in pediatric emergency department. J of Amb Ped Association 1999; 103:877-82
15.Feldman LS, et al. Impact of providing fee data on laboratory test ordering. JAMA Intern Med 2013;
16.Effective Practice and Organisation of Care (EPOC). Suggested criteria for risk of bias for EPOC reviews. EPOC Resources for review authors. Oslo: Norwegian Knowledge Centre for the Health Services; 2015. Available at: http://epoc.cochrane.org/epoc-specific-resources-review-authors

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