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# Cost Savings of Removing Diminutive Polyps without Laboratory Histology

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MEDICAL DECISION MODELING

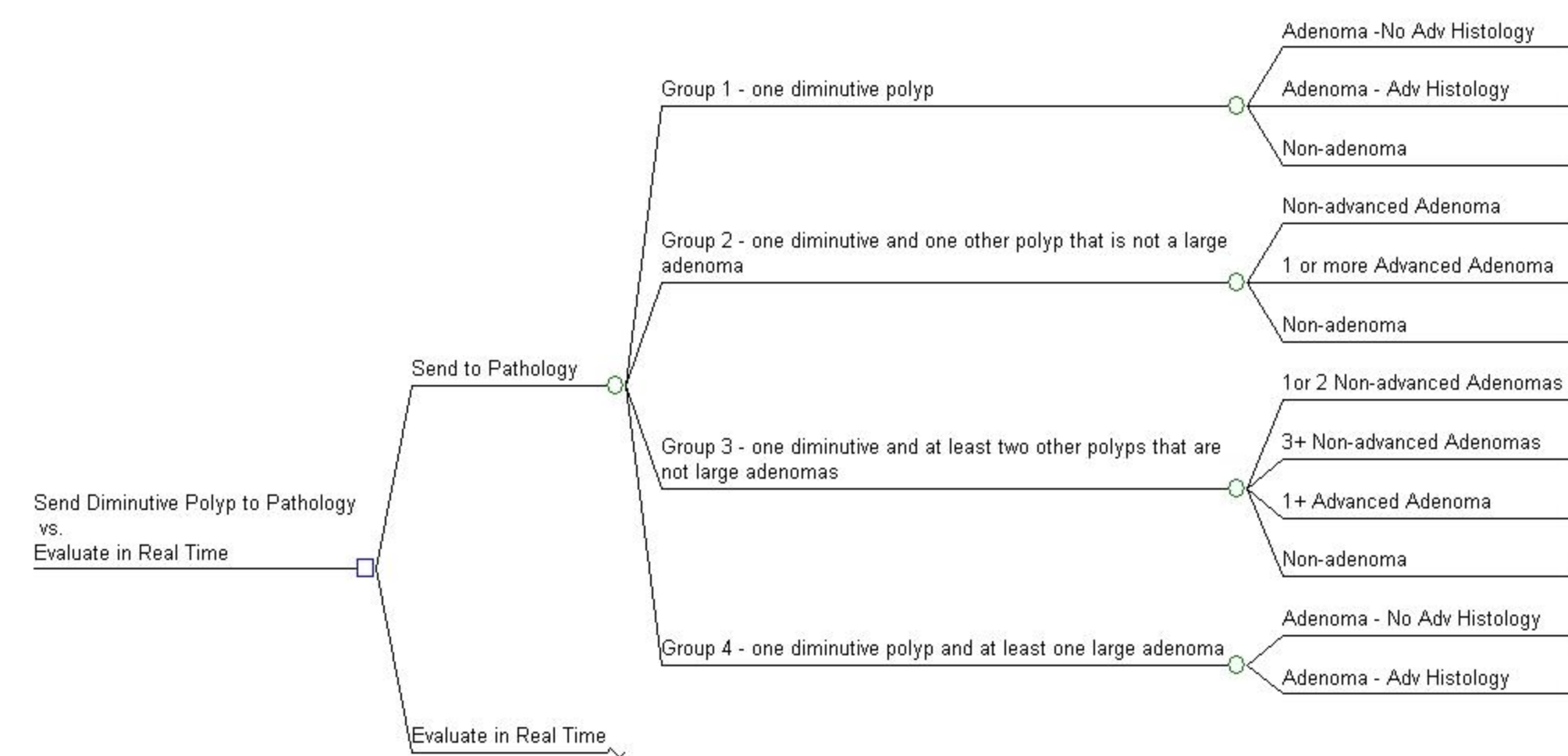
## BACKGROUND

- Nearly 46 million US citizens lack health insurance<sup>1</sup>. Federal unfunded obligations for current Medicare participants total \$12.4 trillion<sup>2</sup>. There is an urgent need to identify cost savings in current medical practice.
- Colorectal cancer (CRC) is the second leading cause of cancer-related death in the United States<sup>3</sup>.
- Colonoscopy with polypectomy has been proven to decrease the risk of colorectal cancer<sup>4</sup>.
- An estimated 14.2 million colonoscopies were performed in 2002<sup>5</sup>.
- Since 1999 Medicare has covered preventive colonoscopy<sup>6</sup>.
- Immediate evaluation of polyp histology has become increasingly accurate<sup>7</sup>.
- The standard of care is to send diminutive ( $\leq 5\text{mm}$ ) polyps detected via colonoscopy to pathology. They rarely contain advanced histology<sup>8</sup>. We estimated the savings and consequences to patients of discontinuing this practice.

## METHODS

- Two strategies for the management of diminutive polyps were modeled for cost-effectiveness:
  - Endoscopic resection of all polyps followed by submission for pathologic evaluation.
  - Endoscopic determination of histology and resection of all polyps followed by submission of polyps  $\geq 6\text{mm}$  for pathologic evaluation and discarding polyps  $\leq 5\text{mm}$ .
- A database of 10,060 consecutive colonoscopies from a tertiary care, open access endoscopy unit provided data for the model.
- Patients with diminutive polyps were categorized in four groups based on number, size, and histology of polyps.
  - Group 1: Only one diminutive polyp.
  - Group 2: One additional polyp. Not a large ( $\geq 10\text{mm}$ ) adenoma.
  - Group 3: Two or more additional polyps. None a large adenoma.
  - Group 4: All combinations with at least 1 large adenoma.
- A decision tree was created in TreeAge 2007<sup>9</sup>.
  - Probabilities based on frequencies in the database were assigned to each branch. (See tables to right.)
  - Probabilities of accuracy of gastroenterologist and laboratory assessments were taken from the literature and expert opinion. (See table below.)
  - Costs (2007 Medicare reimbursement rates) were assigned to each branch.
- Cost savings and correct assignment of surveillance intervals were estimated with TreeAge.

## METHODS



Decision tree fragment showing twelve states of nature for selecting correct follow-up interval.

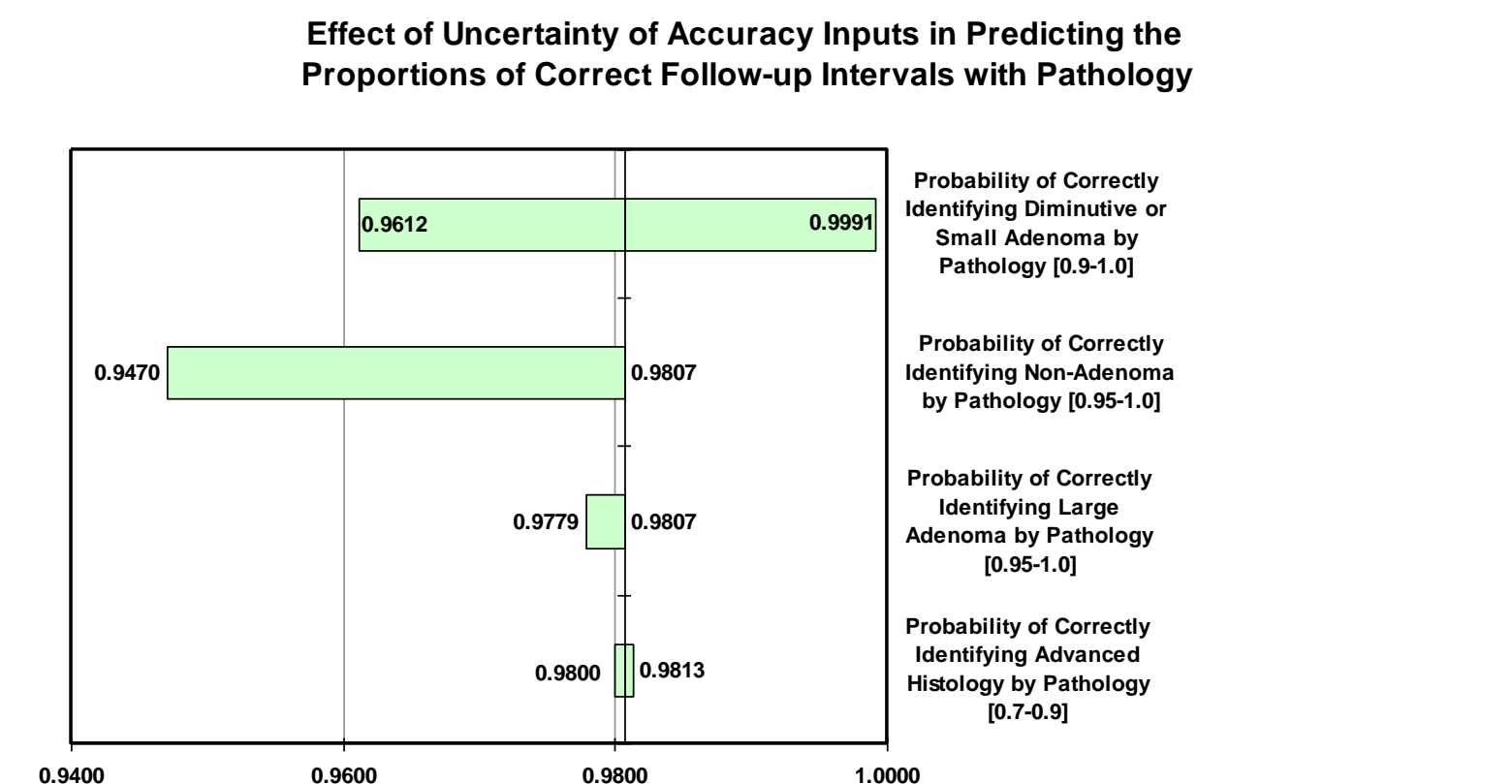
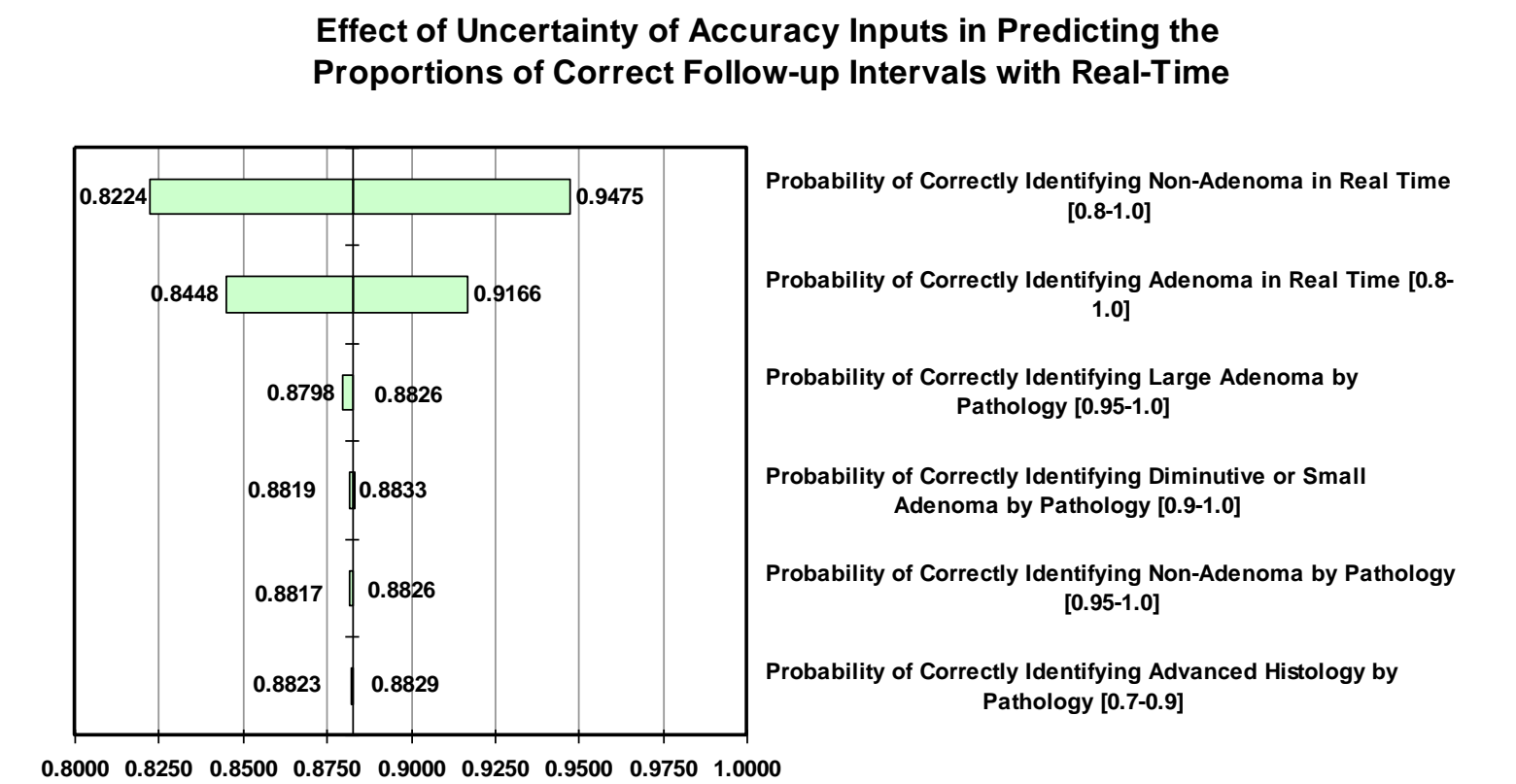
## RESULTS

- 4474 patients (44.5%) had one or more diminutive polyp, averaging 2 diminutive polyps per patient.
- At the 2007 Medicare rate of \$89 per specimen, \$180 could be saved per patient by discarding diminutive polyps without pathology.
- Of patients with adenomas, 4.5% would be mislabeled using endoscopic assessment vs. 2% of patients with all polyps sent to pathology.
- Using endoscopic determination, 11.8% of patients with diminutive polyps would be scheduled for follow-up at a non-recommended interval. Of these, over half would be scheduled for a 5-year, rather than 10-year, follow-up.
- Using pathologic evaluation, 1.9% of patients with diminutive polyps would be scheduled for follow-up at a non-recommended interval.
- Fewer than 1 in 1100 patients with a diminutive polyp would have an undetected, although removed, cancer.

Patient Characteristics By Most Advanced Histology				
Group	Percent of Total	Non Adenoma	Non-Advanced Adenoma	Advanced Histology
1	44.6%	57.8%	41.6%	0.6%
2	23.8%	41.3%	56.4%	2.3%
3	26.0%	25.1%	70.5%	4.5%
4	5.6%	N/A	52.6%	47.4%
Overall	100.0%	42.1%	53.3%	4.6%

Characteristics of Diminutive Polyps				
Group	Percent of Total	Non Adenoma	Non-Advanced Adenoma	Advanced Histology
1	22.1%	57.8%	41.6%	0.6%
2	21.1%	55.7%	43.6%	0.6%
3	49.0%	52.1%	46.9%	0.9%
4	7.8%	28.9%	68.6%	2.5%
Overall	100.0%	52.3%	46.8%	0.9%

## ONE WAY AND PROBABILISTIC SENSITIVITY ANALYSES



Tornado diagrams indicate model sensitivity to inputs. Wider ranges indicate greater effect.

## CONCLUSIONS / LIMITATIONS

- A savings of \$180 in 44.5% of 14.2 million colonoscopies is over \$1 billion annually.
- Current practices should be examined for the possibility of savings. The tools of cost-effectiveness analysis can help assess such possibilities.
- Limitations:
  - Probabilities were derived from the activities of a single endoscopy unit.
  - Patient demographics may not be representative of the entire country.
  - Accuracies of prediction of polyp histology were derived from published reports and may not be reproducible in community settings.
  - Reimbursement rates may be reduced from 2007 Medicare rates.

## REFERENCES

- US Census. *Health Insurance Coverage: 2007*. Retrieved 10/8/08 from [www.census.gov/hhes/www/hlthins/hlthin07/hlth07asc.htm](http://www.census.gov/hhes/www/hlthins/hlthin07/hlth07asc.htm).
- Centers for Medicare and Medicaid Services. *2008 Annual Report of the Board of Trustees of the Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds*. Retrieved October 10, 2008 from [www.cms.hhs.gov/ReportsTrustFunds/downloads/tr2008.pdf](http://www.cms.hhs.gov/ReportsTrustFunds/downloads/tr2008.pdf).
- American Cancer Society. *Cancer Facts and Figures 2008*. Retrieved October 10, 2008 from [www.cancer.org/downloads/STT/2008CAFFfinalsecured.pdf](http://www.cancer.org/downloads/STT/2008CAFFfinalsecured.pdf).
- Winawer SJ, Zauber AG, Ho MN, O'Brien MJ, Gottlieb LS, Sternberg SS, Wayne JD, Schapiro M, Bond JH, Panish JF, et al. Prevention of colorectal cancer by colonoscopic polypectomy. The National Polyp Study Workgroup. *N Eng J Med* 1993;329:1977-81.
- Seeff LC, Richards TB, Shapiro JA, Manninen DL, Given LS, Dong FB, Wings LD, McKenna MT. How many endoscopies are performed for colorectal cancer screening? Results of CDC's survey of endoscopic capacity. *Gastroenterology* 2004;127:1670-77.
- US Code. *Balanced Budget Act of 1977*. Retrieved Oct. 8, 2008 from [frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=105\\_cong\\_public\\_laws&docid=f:publ33.105](http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=105_cong_public_laws&docid=f:publ33.105).
- East JE, Suzuki N, Saunders BP. Comparison of magnified pit pattern interpretation with narrow band imaging versus chromoendoscopy for diminutive colonic polyps: a pilot study. *Gastrointest Endosc* 2007;66:310-6.
- Butterly LF, Chase MP, Pohl H, Fiarman GS. Prevalence of clinically important histology in small adenomas. *Clin Gastroenterol Hepatol* 2006;4:343-8.
- TreeAge Pro Suite 2007, TreeAge Software, Inc., Williamstown MA.