Using small bowel and colon video capsule endoscopy to optimize Crohn's disease therapy may improve patient quality of life

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BACKGROUND

- Pan-intestinal Video Capsule Endoscopy (VCE) is capable of assessing both small bowel and colon in a single procedure
- VCE is a widely accepted technology that has application for the management of patients diagnosed with Crohn's disease (CD) [1]
- Due to the chronic nature of CD, using endoscopic monitoring to optimize treatment may have a considerable impact on both care costs and patient's quality of life (QoL) [2,3].
- This study aims to identify patient subgroups who may benefit from the use of VCE

METHODS

Model

- Published, patient-level, care pathway model that is specific to CD [4]
- Considers patient characteristics such as:
  - Age, gender, ulcers, Crohn's disease activity index, disease location, co-morbidities, etc.
- Check up every 3 months can but does not necessarily include monitoring [1]
- Treatments include immunomodulators, anti-inflammatories and biologic agents
- Treatment and monitoring can influence the onset, progression, or remission of CD flares, fistula, abscess, bowel resection, and death [5,6]
- QoL measured in quality adjusted life years (QALYs) through the EQ-5D
- Costs in 2016 USD
- QALY and costs discounted at 3.5% yearly [7]
- Compares outcomes with VCE to the current common monitoring practice of colonoscopy ± MRE or CTE [8]
- Data for VCE were derived from PillCam (Medtronic Inc)

Analysis

- 40,000 simulated patients over 20 years were assessed

Table 1. Definition of subgroups

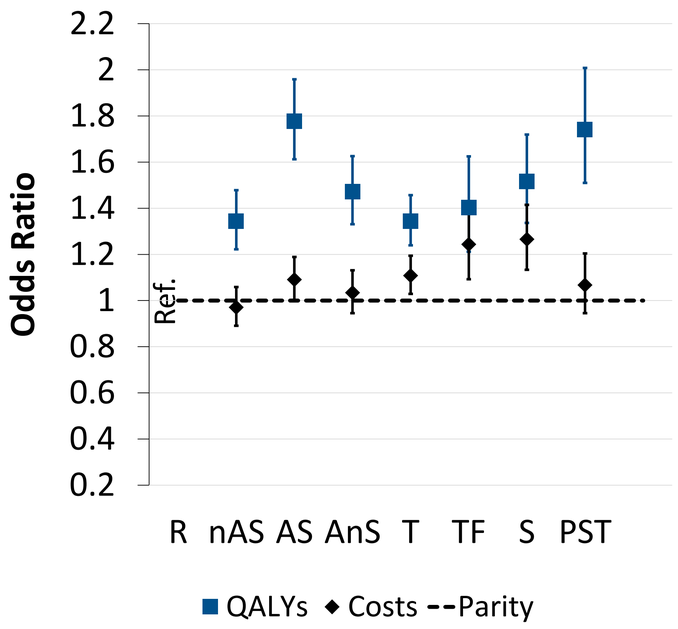
Abbreviation	Subgroup	Size of subgroup
R	Remission	3,323
nAS	Non-active symptomatic	5,365
AS	Active symptomatic	5,601
AnS	Active non-symptomatic	4,456
T	Treatment	16,433
TF	Treatment failure	1,264
S	Surgery	2,023
PST	Post-surgical treatment	1,535

- Cost of care and patient QoL were compared between monitoring options and stratified by patient subgroup
- Subgroups (**Tab. 1**) were mutually exclusive and based on the patient's initial health state in the model
- Differences between groups were quantified by the Wilcoxon-signed rank and the odds ratio (OR) with significance at the 95% level ($p<0.05$)
- Costs and QoL changes were averaged among subgroups separately
- Likelihood of a positive and negative outcome were calculated for both costs and QoL

RESULTS

- On average patients had significantly lower costs ($p<0.001$) and higher QoL ($p<0.001$) with use of VCE compared to common monitoring practice
- The degree of this effect varied by the initial state of patients (**Fig. 1**)

Figure 1. Odds ratio of a positive outcome compared to starting the simulation in remission



Error bars: 95% confidence interval, QALY: Quality adjusted life years

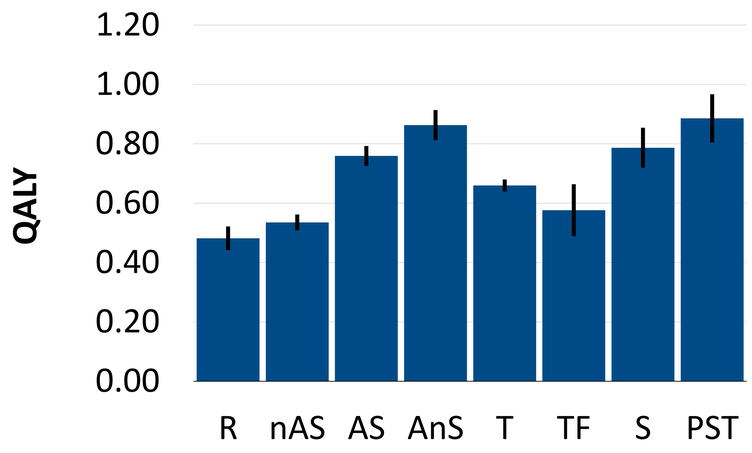
Quality of Life

- Mean QoL with VCE was 0.68 ± 0.01 greater than with common monitoring practice
- Remission displayed the smallest QoL benefit with VCE (0.48 ± 0.04, **Fig. 2**)
- Even patients in remission saw QoL improvement in 68% of cases
- All groups displayed a significantly higher chance of QoL improvement over patients starting in remission (**Fig. 1**)
- Patients in an active symptomatic (79%) or post-surgical state (79%) were the most likely to experience QoL improvement (**Fig.1**)
- Starting the model in active non-symptomatic (0.86 ± 0.05) and post-surgical treatment (0.89 ± 0.08) states yielded the highest average QoL gains (**Fig. 2**)

Costs

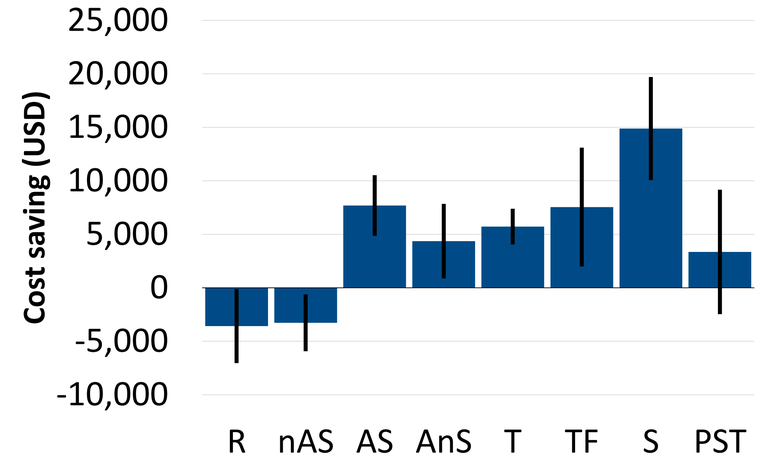
- The likelihood of cost-savings with VCE was significantly higher starting in treatment (OR:1.11, 1.03–1.19), treatment failure (OR: 1.24, 1.09-1.42) and surgery (OR: 1.27, 1.13–1.41) as compared to remission (**Fig. 1**)
- Patients beginning in the surgery state display the highest average savings with VCE ($14,886 ±4,818, **Fig. 3**)

Figure 2. Mean effect on QoL for a switch to VCE



Error bars: 95% confidence interval, QALY: Quality adjusted life year

Figure 3. Mean effect on costs for a switch to VCE



Error bars: 95% confidence interval

CONCLUSIONS

- **Assessing the extent of active CD with pan-intestinal VCE is likely beneficial for patient QoL and may also help reduce care costs**
- **Targeting certain subgroups may amplify the advantages of pan-intestinal VCE**
- **Patients in need of more frequent follow-up, such as those on biological treatment, post-surgery, or with active symptoms, may be especially benefited by pan-intestinal VCE**

ACKNOWLEDGMENTS

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