

Using Hierarchical Models to Attribute Sources of Variation in Consumer Ratings of Health Plans

Alan M. Zaslavsky
Harvard Medical School

12/7/01

CAHPS

1

Outline

- CAHPS overview
- Standard CAHPS analyses
- Sources of variation in CAHPS
- Dimensions of consumer assessments

12/7/01

CAHPS

2

Goals of CAHPS

- Develop questionnaires that assess consumer experiences with their health plans and services
- Develop report formats

12/7/01

CAHPS

3

Goals of CAHPS (continued)

- Assess value of information
 - to consumers
 - to sponsors and other stakeholders
- Promote a standard methodology

12/7/01

CAHPS

4

CAHPS Design Principles

- Core items applicable across care delivery systems and populations
- Supplemental items for specific systems and populations

12/7/01

CAHPS

5

CAHPS Global Ratings

- Overall rating of health plan
- Overall rating of health care
- Overall rating of doctors and other health professionals
- Overall rating of specialists

(0-10 scale)

12/7/01

CAHPS

6

CAHPS Report Composites

- Getting needed care
- Getting care quickly
- Health provider communication
- Office staff courtesy and helpfulness
- Customer service

12/7/01

CAHPS

7

CAHPS Analysis

- Standard analysis program (SAS macro)
- Means for each item
- Case-mix adjustment (age, health status, education) via linear regression (Analysis of Covariance)

12/7/01

CAHPS

8

CAHPS Analysis

- Global test of differences among plans
- Test each plan against mean of plans in a comparison area (nation, region, state)
- Reports on
 - response distributions
 - tests of significance

12/7/01

CAHPS

9

Medicare Managed Care (MMC) Implementation

- Medicare managed care is growing
- May affect quality efforts of country's largest purchaser of health care (HCFA)
- Largest single national study of consumer assessments (c. 200,000 respondents/year, now 4 years of data)

12/7/01

CAHPS

10

Structure

- Geography:
 - Region, State, MSA, County, Zip code
- Organizational:
 - Health plan
 - Delivery system, provider group, provider
- Time
- Patient subgroups
- Content domains

12/7/01

CAHPS

11

Main analyses

- Geography by plan
- Health plan by time, within geography
- Content domains and beneficiary subgroups by plan

12/7/01

CAHPS

12

Levels of variation

- Attribute variation to plan, market area, and regional contributions
- Relevant to
 - validating measures
 - assessing discriminating power of measures
 - understanding quality variation
 - action to improve health services

12/7/01

CAHPS

13

Methodology

- 4 years of data, >500,000 responses
- Analyze rating variables
- Assign each response to plan and MSA within state
- Variance component models:
 - how much variation is attributable to state, MSA, plan?

12/7/01

CAHPS

14

Plan X geography % variance components

| | Plan | Doctor | Care |
|----------|--------|--------|--------|
| Region | 1 | 4 | 11 |
| State | 22 | 28 | 23 |
| MSA | 7 | 14 | 18 |
| Plan | 53 | 33 | 35 |
| Plan*MSA | 17 | 21 | 13 |
| Total | (.171) | (.045) | (.045) |

12/7/01

CAHPS

15

State & MSA effects

- Substantial state variation, some regional
- Biggest share of variance attributable to plan is for rating of plan
- Modest plan X MSA interaction, reasonable to report statewide for plans (usually)

12/7/01

CAHPS

16

(State, Plan) X Time % variance components

| | Plan | Doctor | Care |
|--------------|------|--------|------|
| State | 24 | 37 | 36 |
| State * Year | 1 | 1 | 0 |
| Plan | 60 | 56 | 59 |
| Plan * Year | 15 | 7 | 5 |

12/7/01

CAHPS

17

Time effects

- State effects extremely stable for every favorable
- Plan effects also quite stable for all except rating of plan
 - Few significant changes from year to year (except for rating of plan)

12/7/01

CAHPS

18

Conclusions (variation)

- Consumer experiences affected by a variety of influences:
 - Interactions with the health plan are more specific to the plan
 - Direct care interactions affected by features of local care system impinging on all plans.
 - May be less readily changed by plans

12/7/01

CAHPS

19

Levels of variation (below plan)

- New research (Solomon, Cleary, et al. 2001):
 - Based on G-CAHPS (group) development
 - Focus on interactions at office, access to care
 - Regional units, groups and sites of care within integrated care delivery organization
 - Most variation attributable to lowest level (site), for most dimensions
 - Little effect of plan on any aspect

12/7/01

CAHPS

20

Dimensions of Consumer Assessments

- Question: how do items group (correlate) at the *plan* level?
- May be different from person-level (psychometric) analyses
- Relevant to reporting, incentives, case studies, research on determinants of quality

12/7/01

CAHPS

21

Analytic approach

- Correlate all report items, correcting for sampling variability
- Rotated principle factor analysis
- Use rating items as criterion variables (regress on report composites)

12/7/01

CAHPS

22

Previous results (Year 1 data)

- Four-factor solution
 - Delivery (16 items): care and interactions at doctor's office
 - Customer (5 items): customer service from plan
 - Access (8 items): access to special services
 - Advice (diet/exercise, smoking cessation)

12/7/01

CAHPS

23

New Data: Years 2-3 MMC CAHPS

- 381 reporting units (risk contracts or parts)
- 290,739 respondents (duplicates removed)
- Items analyzed include:
 - 4 global ratings (plan, doctor, care, specialist)
 - 30 report items

12/7/01

CAHPS

24

Subgroups by health status

- General health status (among 78% who respond):
 - Excellent, very good, good = 70%
 - Fair, poor = 30%
- Condition interferes w/ independence: 14%
- Condition lasting 3 months: 48%

12/7/01

CAHPS

25

Sick patients report more problems

| Item | Mean rating for: Healthy Sick | |
|-------------------------------|-------------------------------|------|
| Rating of plan (0-10) | 8.81 | 8.31 |
| Rating of care (0-10) | 8.94 | 8.63 |
| Doctor listens carefully(1-4) | 3.73 | 3.58 |
| Cust service helpful(1-4) | 3.51 | 3.36 |

12/7/01

CAHPS

26

Some items apply generally, some especially to sicker patients

| Item | Completion rate for: Hlthy Sick | |
|------------------------------|---------------------------------|-----|
| Rating of plan | 96% | 96% |
| Rating of personal doctor | 76% | 79% |
| Doctor explains things | 71% | 82% |
| Doc understands health probs | 11% | 48% |
| Plan provided help | 6% | 37% |

12/7/01

CAHPS

27

Hence different items represent different populations

- Rating of plan
 - Healthy = 96% X 70% = 67% of all
 - Sick = 96% X 30% = 29% of all
- Plan provided help
 - Healthy = 6% X 70% = 4.2% of all
 - Sick = 37% X 30% = 11.1% of all

12/7/01

CAHPS

28

“Sick” and “healthy” rate plans similarly, but not identically

- For each item, calculate correlation between plan means for “sick” and “healthy”
- Mean correlation (across items) of these means is **0.64**

12/7/01

CAHPS

29

Defining health-status specific measures

- For 25 items, calculate *separate* means for sick and healthy subgroups at each plan
- For 5 items, too few responses to split up responses
- Altogether, 55 “*subitem*” means for each plan to bring to analysis

12/7/01

CAHPS

30

Analysis of subgroup-specific measures

- Apply factor analysis to 55 measures
- Questions:
 - How do items group *together*?
 - For which items do responses from sick and healthy group *separately*?

12/7/01

CAHPS

31

Why hierarchical model?

- Plan-level measures are of varying reliability
 - Include component of individual-level variation
- We are interested only in *plan-level* relationships

12/7/01

CAHPS

32

Modeling approach

- Observation: $y_p \sim [q_p, S_p]$
 - y_p is plan-level observed mean
 - S_p is variance of this mean (survey-sampler's formulae)
 - q_p is underlying (population) plan mean
- Structural: $q_p \sim [q_p, S]$
 - Structure of S is what we are interested in!

12/7/01

CAHPS

33

Simple estimation!

- Method of moments approach
- $\text{Var}(y) = \Sigma + S$
- Problems
 - Inefficient
 - Small plans, low response items
 - Current research: quasilielihood approaches

12/7/01

CAHPS

34

Factor analysis results (8-factor solution)

- Interactions with doctor / doctor's office for healthy members (11 subitems)
- Interactions with doctor / doctor's office for sick members (9 subitems)
- Finding satisfactory doctor, getting needed care/referrals for sick members (6 subitems)

12/7/01

CAHPS

35

Factor analysis results (continued)

- Customer service for all members (10 subitems)
- Getting plan-provided services for all members, getting doctor/referral for healthy members (9 subitems)

12/7/01

CAHPS

36

Factor analysis results (continued)

- Getting vaccinations, waiting over 15 minutes in doctor's office for all members (6 subitems)
- Prescription drugs for all (4 subitems)
- Advice to quit smoking

12/7/01

CAHPS

37

Conclusions on report items

- Relatively few dimensions of quality
- Customer service interactions, preventive care, waits similar for healthy, sick .
- Different needs in direct care:
 - Plans/areas where healthy get good care not necessarily best for sick patients.

12/7/01

CAHPS

38

Conclusions on report items

- Getting care/referrals more distinct issue for sick patients.
- Reporting by *subpopulation* may be more informative than fine division of *items*

12/7/01

CAHPS

39

Implications

- For measurement:
 - Analyze health information on CAHPS to define subgroups better (and possibly collect more).
 - Define skip patterns so information can be collected for all relevant subgroups.

12/7/01

CAHPS

40

Implications (continued)

- For reporting:
 - Report separately for sick, healthy on direct care composites
 - Consumers want to hear about experiences of “people like me”

12/7/01

CAHPS

41

Implications (continued)

- For analysis and research:
 - Distinguish health-status subgroups in analyses of determinants of quality
 - Research needed on how to define subgroups (conditions, health status, functional limitations, utilization)

12/7/01

CAHPS

42

Risk selection among plans

- Do some plans get sicker/healthier members?
- Critical issue for Medicare: adversely selected plans might be driven out
- Penalizes plans for good services to sick

12/7/01

CAHPS

43

Methodology

- Condition, health status measures from CAHPS survey
- Predicted costs from model fit to MCBS
- Analyses similar to assessment items
 - Factor analysis
 - Variance components

12/7/01

CAHPS

44

Selection dimensions (3)

- Chronic: heart disease, stroke, COPD, diabetes, ADL, IADL, self-assessed general health status
- Cancer
- Smoking (*COPD*)

12/7/01

CAHPS

45

Variance components

- Almost all variance is plan level
- SD of plan effects on cost about 11% of mean
- Area effect on COPD, smoking
- Conclusions: substantial policy issue!

12/7/01

CAHPS

46

General conclusions

- Measurement of quality must consider
 - Aspects of care (items): traditional focus
 - Differing subpopulations
 - Appropriate levels of organization
- Many challenges for data collection, analysis, reporting

12/7/01

CAHPS

47

END

12/7/01

CAHPS

48