

GH SPC Model Solutions

Fall 2022

1. Learning Objectives:

1. The candidate will understand how to evaluate healthcare intervention programs.

Learning Outcomes:

- (1a) Describe, compare and evaluate programs.

Sources:

GHS-129-21: Effects of a Population Health Community-Based Palliative Care Program on Cost and Utilization

Managing and Evaluating Healthcare Intervention Programs, Duncan, Ian G., 2nd Edition, 2014, Ch. 3: Care Management Programs and Interventions

Commentary on Question:

Commentary listed underneath question component.

Solution:

- (a) Describe care management methods used to control health care utilization.

Some of the methods include:

Prior authorization, requiring approval before performing certain procedures to ensure medical necessity.

Concurrent review, examining how physicians provide services on site to evaluate their services. Many physicians are annoyed by this.

Disease management, identifying and targeting specific population, conditions to managed and achieved outcome improvement and savings. Usually chronic disease.

Case management, managing care for high-cost patients through care coordination to hopefully achieve better outcome and lower cost.

Demand management, passive intervention program such as nurse call lines to provide lower cost options for members seeking services.

Specialty management, specific experts in certain field of case management. Such as biosimilar drugs usage.

Population health management, examine the risk profile of the total population and introduce programs such as wellness program to achieve overall better health.

Gaps in care and quality improvement opportunity, identifies where services deviate from best practice and has room for improvement.

1. Continued

Telemedicine, telehealth, automated categorization system. Uses technology to provide services from remote area and tracks member status automatically to lower costs and increase service options.

Accountable Care Organizations, provider or hospital-based group to manage care of Medicare members with the desire to improve quality and lower per capita cost.

Federally Qualified Health Clinics, provide services for underserved or uninsured, sponsored by the government.

Non-tradition care managers, pharmacists and clinicians to help manage utilization.

Bundle payment initiatives, use of bundle payments to improve the reimbursement structure and more efficient utilization.

- (b)
- (i) Define “serious illness” in the context of population health community-based palliative care programs.
 - (ii) Describe events near the end of life that would be considered an over-medicalized death.

Commentary on Question:

For part (i), most candidates only wrote the first bullet for serious illness. For part (ii), candidates received credit for the events if they made specific references to duration such as “within the last one month or two of life” rather than match the exact duration below.

- (i)
- Palliative care programs target 3 kinds of serious illnesses:
- There is a high chance of death (high risk of mortality) in the near future due to the illness
 - The illness has a large negative impact on the quality of life
 - The illness is burdensome to the patient or the patient’s caregivers
- Events near the end of life would include –
- (ii)
- Chemotherapy for cancer patients within 28 days of death
 - Unplanned hospitalization with 60 days of death
 - More than one emergency department visit within 30 days of death
 - ICU admission within 30 days of death
 - life-sustaining treatment within 30 days of death

1. Continued

- (c) List the main components of population health community-based palliative care programs.
- proactive identification (aka patient identification through predictive analytics)
 - multidisciplinary team care management
 - (specialty trained palliative nurses and social workers performing) phone and home visits
 - emphasis on care coordination (aka caregiver support)
 - collaboration with physicians and health plans
 - leveraging a mobile platform to support workflows and reporting
 - goals of care discussions and documentation of advanced care plans
- (d) Describe how population health community-based palliative care programs help the United States health care system move towards value-based payment models.

Commentary on Question:

Most candidates had difficulty answering this part of the question.

Community-based palliative care programs not only focus on the quality and affordability of the care provided to the patients, but also facilitate a care process that truly values the experience of patients and their family.

For patients eligible for community-based palliative care programs, the priority should no longer be treating and healing and recovering, but more so respected, painless and individualized final stage of life.

The experience of the caregivers should also be valued.

Therefore, the community-based palliative care programs, different from traditional care management programs who focus more on utilization and affordability of care, is more value-based.

2. Learning Objectives:

3. The candidate will understand how to apply risk adjustment in actuarial work.

Learning Outcomes:

(3a) Describe and compare risk adjustments based on commonly used clinical data and grouping methods.

Sources:

Healthcare Risk Adjustment and Predictive Modeling, Duncan (2nd edition): Chapter 4

Healthcare Risk Adjustment and Predictive Modeling, Duncan (2nd edition): Chapter 5

Healthcare Risk Adjustment and Predictive Modeling, Duncan (2nd edition): Chapter 14

Commentary on Question:

Commentary listed underneath question component.

Solution:

- (a)
- (i) Define a clinical identification algorithm.
 - (ii) Explain why a clinical identification algorithm is important for a health insurance company.
 - (iii) List necessary factors to be considered when building a clinical identification algorithm.
- (i) A set of rules that, when applied to a claims data set, identifies the conditions present in a population
- (ii)
- a. medical conditions are correlated with claims costs
 - b. knowing about an individual's or population's conditions could help to predict that individual's or population's costs and utilization of medical services.

2. Continued

(iii)

- a. Diagnoses
 - b. The source of the diagnosis (claims, laboratory values, medical charts, self-reported, etc.)
 - c. If the source is claims, what claims should be considered? Which services will be scanned for diagnosis? One issue with diagnoses is their credibility (e.g., a diagnosis reported by a patient's primary care physician is likely to be more credible than a self-reported diagnosis). Diagnoses can be derived from various services (inpatient, outpatient, etc.), all of which generate medical claims
 - d. Diagnoses may be inferred from other data sources, including self-reported (survey) data and drug claims. If the claim contains more than one diagnosis, how many diagnoses will be considered for identification?
 - e. Over what time span, and with what frequency, will a diagnosis have to appear in claims for that diagnosis to be incorporated in the algorithm?
 - f. What procedures may be useful for determining the level of severity of a member's diagnosis?
 - g. What prescriptions drugs may be used to identify conditions?
- (b) Explain reasons why the use of commercially-available grouper models are preferred to constructing a model from scratch.

Commentary on Question:

Most students responded with the first four bullets, though there are other reasons contained in the text.

- There is a considerable amount of work involved in building algorithms from scratch, particularly when this has to be done for the entire spectrum of diseases.
- Adding drug or laboratory sources to the available data increases the complexity of development.
- Regulatory uses-CMS decrees the use of specific grouper models for risk adjustment in Medicare Advantage and ACA plans.
- Providers and plans, whose financial stability relies on payments from a payer, often require that payments be made according to a model that is available for review and validation.
- While the development of a model may be within the scope and resources of the analyst who is performing research, use of models for production purposes (e.g., for risk adjustment of payments to a health plan or provider groups), requires that a model be maintained to accommodate new codes.

2. Continued

- New medical codes are not published frequently, but new drug codes are released monthly, so a model that relies on drug codes will soon be out of date unless updated regularly.
 - Commercially-available clinical grouper models are used extensively for risk adjustment, and episode groupers are used for provider evaluations, so a consistent model, accessible to many users, is required.
 - Such a model should preferably be open-source so that users are able to understand its implications.
 - The predictive accuracy and usefulness of commercially available models has been studied extensively by the Society of Actuaries, which has published four comparative studies in the last 20 years.
- (c) The projection of a Medicare Advantage plan's risk scores from the base period to the bid contract year includes several factors.
- (i) Describe each factor.
 - (ii) Identify the source of each factor.

Commentary on Question:

Most candidates listed factors but did not describe them. Candidates knew the terms normalization factor and coding adjustment, but struggled to clearly articulate what they were.

- **Risk Score Trend** accounts for expected changes in the plan's risk score
- It is applied twice (squared) for the two-year period from the base year to the bid contract year.
- Improvements in coding accuracy and completeness have been a major driver of risk score trend
- CMS has determined that nationwide, Medicare Advantage risk scores have trended upward at about 1.4%.
- A mortality factor may be included because the impact of mortality has a greater impact on a Medicare Advantage population than under 65 population.
- Source: The risk score trend is developed by the Medicare Advantage Organization (MAO)
- **Annual Population Change** accounts for expected risk profile of the expected population in the bid projection year.
- It is applied twice (squared) for the two-year period from the base year to the bid contract year
- It affects both revenue and claims projections on a PMPM basis, as well as risk score.

2. Continued

- Source: annual population change is developed by the Medicare Advantage Organization (MAO)
- **CMS Normalization Factor** accounts for the underlying FFS trend in risk scores and the effect of that trend on average risk score. It is designed to bring the average risk score back to 1.0.
- Source: Provided by CMS
- **CMS Coding Adjustment** accounts for coding differences between Medicare Advantage and traditional Medicare FFS.
- Source: Provided by CMS

3. Learning Objectives:

1. The candidate will understand how to evaluate healthcare intervention programs.

Learning Outcomes:

- (1b) Estimate savings, utilization rate changes and return on investment.
- (1c) Apply the actuarially adjusted historical control methodology.

Sources:

Duncan chapters 8, 12, 13; GHC-125-19

Commentary on Question:

Commentary listed underneath question component.

Solution:

- (a) Explain features of the actuarially-adjusted historical control methodology for evaluating care management outcomes.

Commentary on Question:

Candidates generally scored well on this part of the question. Additional responses from the source material that are not shown in the model solution were also accepted for credit.

- Objective criteria are used to assign members to index and intervention populations. The populations don't have to be the same in each period (open group method).
 - An appropriate trend derived from an index group is applied to evaluate the intervention group.
 - Baseline period costs for the intervention group are multiplied by the trend from the index group. This is compared to intervention period costs for the intervention group and the difference between the two is considered savings due to the program.
 - Baseline period does not have to be adjacent to intervention period.
 - It is important to consider the change in risk mix between baseline and intervention periods. For example, risk adjustment factors could be applied.
- (b)
 - (i) Calculate the per member per month (PMPM) gross savings and ROI for the first year of the program. Show your work.
 - (ii) Recommend whether the program should be continued. Justify your response.

3. Continued

Commentary on Question:

Most candidates failed to re-weight by the year 1 chronic enrollment mix, leading to an incorrect calculated ROI of 242%. Very few candidates received full credit for this section.

Calculate the before and after claims and membermonths of the baseline cohort by summing up all baseline member data.

Pre Total Spend	Pre MM	Post Total Spend	Post MM
\$3,884,647	1,630	\$4,433,881	1,671

Calculate the PMPM of the population.

$$\text{Pre PMPM: } \$3,884,647 / 1,630 = \$2,383$$

$$\text{Post PMPM: } \$4,433,881 / 1,671 = \$2,653$$

Calculate the trend factor: $\$2,653 / \$2,383 = 11.34\%$

Calculate the before and after claims and membermonths of the cohorts with COPD and/or diabetes, assigning each member in the cohort they are in at the time, and allow for switching between periods.

Chronic Conditions	Pre Total Spend	Pre MM	Post Total Spend	Post MM
Diabetes	\$1,107,662	429	\$1,156,102	337
COPD	\$1,773,055	559	\$1,449,064	405
Diabetes & COPD	\$2,380,265	673	\$3,211,365	966

Calculate the before and after PMPMs for the three cohorts.

Chronic Conditions	Pre PMPM	Post PMPM
Diabetes	\$2,582	\$3,431
COPD	\$3,172	\$3,578
Diabetes & COPD	\$3,537	\$3,324

Calculate the PMPM in aggregate for the before period, re-weighted with year 1 enrollment.

$$\text{Rewieghted Before PMPM} = (\$2,582 \times 337 + \$3,172 \times 405 + \$3,537 \times 966) / (337 + 405 + 966) = \$3,261.86$$

Calculate the PMPM in aggregate for the after period.

$$\text{After PMPM} = (\$3,431 \times 337 + \$3,578 \times 405 + \$3,324 \times 966) / (337 + 405 + 966) = \$3,405.46$$

3. Continued

Calculate the savings.

$$\text{Savings} = \$3,261.86 \times (1.1134) - \$3,405.46 = \$226.23$$

Calculate an ROI for the program.

$$\text{ROI} = \$226.23 / \$50 = 4.52:1 \text{ ROI}$$

The program should be continued, as it is generating positive savings. Furthermore, the ROI exceeds the 2:1 target. This is only the first year of the program, so performance may improve in future years.

4. Learning Objectives:

2. The candidate will understand how to evaluate health insurance organization risk and mitigation strategies.

Learning Outcomes:

(2c) Integrate reinsurance arrangements within an overall risk management strategy.

(2e) Apply applicable Actuarial Standards of Practice.

Sources:

GHS-127-22: The Risks of Pricing New Insurance Products: The Case of Long Term Care

ASOP 47: Risk Treatment in Enterprise Risk Management (excluding Appendices)

Commentary on Question:

Commentary listed underneath each question component.

Solution:

- (a) Identify why long-term care insurance assumptions have typically resulted in underpricing the product.

Commentary on Question:

Candidates generally performed well on this part of the question.

- It is a new product and insurers did not have sufficient experience on which to base their assumptions
- Basing assumptions on similar products was not always appropriate
- Claim events are typically in the distant future
- Companies used less margin of safety than prudent

- (b) Evaluate the accuracy of the following statements. Justify your response.

- (i) Higher than expected lapse rates contributed to the insolvency of some long-term care insurers.

- (ii) Lower than expected interest rates in the future can be problematic for long-term care insurers.

- (iii) A long-term care insurer entering into rehabilitation can put a policyholder in a bind.

Commentary on Question:

Candidates did not earn points for merely stating True or False. The candidate needed to provide an explanation for each response to earn full credit.

4. Continued

i. This statement is inaccurate/FALSE

- Long-Term Care (LTC) is a “lapse-supported” product and is significantly prefunded
- It is expected that a portion of policyholders will discontinue their policy early without making any claims.
- The premiums collected from these policyholders subsidize those remaining
- If too few policyholders do not lapse then this “lapse support” does not materialize

ii. This statement is accurate/TRUE

- LTC insurers have difficulty buying assets with maturities long enough to match liabilities that extend many years into the future
- As assets mature sooner than liabilities, they will have to reinvested at lower than expected interest rates
- As a result, these assets reinvested at lower rates are not sufficient to fund future liabilities

iii. This statement is accurate/TRUE

- The policyholder has two choices – terminate their policy or continue paying premiums
- If the policyholder terminates the policy, they lose the value of prefunding from the premiums already paid and become uninsured.
- If the policyholder continues paying premiums and rehabilitation fails, the insurer might be liquidated and the policyholder only receives a fraction of the amount owed from assets remaining plus payment from the state guaranty funds

(c) Describe items, according to ASOP 47, an actuary should consider in performing services related to risk mitigation.

Commentary on Question:

Many candidates struggled to describe items, according to ASOP 47, an actuary should consider in performing services related to risk mitigation.

Information relating to qualitative aspects of the organization as appropriate to the actuary’s assignment. Such information may include the following:

- the resilience of the organization under duress caused by common fluctuations in experience as well as from extreme adverse conditions;
- the operational capabilities of the organization needed to implement the risk mitigation strategy;
- the potential risk to the organization’s reputation as a result of the risk mitigation strategy.

4. Continued

Information relating to the potential effectiveness of or constraints upon risk mitigation activities as appropriate to the actuary's assignment. Such information may include the following:

- the availability of risk mitigation instruments both in the current and future environments;
- the counterparty credit risk inherent in the risk mitigation instruments and the organization's ability to monitor and mitigate the counterparty risk over time;
- the nature and degree of the basis risk that is inherent in the risk mitigation instruments;
- the degree of confidence that the risk mitigation process can be maintained or repeated over time;
- the availability of data on current and potential future risk positions, before and after mitigation;
- the variability of outcomes after risk mitigation;
- the accounting treatment of the gross and net risk positions related to risk mitigation;
- regulatory constraints on risk mitigation options
- the granularity of modeling needed to capture the effects of the risk mitigation processes as well as the practicalities of achieving that granularity

5. Learning Objectives:

3. The candidate will understand how to apply risk adjustment in actuarial work.

Learning Outcomes:

- (3b) Apply risk adjustment to underwriting, pricing, claims and are management situations.

Sources:

Changing with the Times: The Past and the Future of ACA Risk Adjustment, Health Watch, June 2020;

Healthcare Risk Adjustment and Predictive Modeling, Duncan (2nd edition): Chapter 14

Commentary on Question:

Commentary listed underneath question component.

Solution:

- (a)
 - (i) Describe the prominent patterns in risk score changes that were observed and the significance of each pattern to issuers.
 - (ii) Describe the potential areas of improvement to the HHS-HCC risk adjustment model.

Commentary on Question:

Most candidates struggled with part (i) and oftentimes did not provide a description. Full credit was given if changes were provided along with a complete description and significance of each change.

Candidates generally performed well on part (ii).

- (i)
 - The “condition” component (i.e., HCC plus RxC) is an increasing proportion of the total.
 - This makes risk scores more responsive to documented conditions
 - Issuers have been able to increasingly influence their own risk transfers by focusing on 1) medical coding accuracy, 2) member pharmaceutical adherence and 3) EDGE submission practices.
 - It also implies conditions have become a larger predictor of claim costs and, therefore, will be the largest differentiator of risk scores among issuers.

5. Continued

- Composite risk scores have shrunk over time.
 - This suggests that the morbidity of the calibration population is moving closer to the average overall morbidity of ACA markets.
 - This shift affects each issuer to varying degrees, which can present challenges predicting average market-wide risk scores and transfers.

(ii)

- Changing HCC/RxC values and categorizations to leverage the precision of ICD-10 codes
- Refreshing the CSR-induced utilization factors
- Introducing a nonlinear model to the calibration process
- Reflecting additional factors in the transfer calculation, including issuer network characteristics or issuer premium levels, among others
- Incorporating other factors with predictive power, such as social determinants of health and other socioeconomic data (such as credit scores)
- Updating governance procedures to allow either the incorporation of more up-to-date information or more time for issuers to understand a model change
- Enhancing risk adjustment data validation to better align ultimate risk transfers with program goals and/or to minimize disruptive effects
- Incorporating network differences
- Incorporating nonlinearities in model plan liabilities
- Updating risk adjustment factors to include CSR-induced utilization
- China has explored use of a “social credit score,” used to track individuals’ trustworthiness, though privacy concerns in the United States could present roadblocks to adoption of any similar measure.

(b) Critique the analyst’s calculations. Show your work. Justify your response.

Commentary on Question:

Candidates performed well on this part of the question. The most common mistake was not trending for two years.

Member A Risk Score: $0.5 \text{ age/gender} + 0.1 \text{ diabetes without complications} + 0.7 \text{ multiple sclerosis} = 1.3$

Member B Risk Score: $0.5 \text{ Age/gender} + 0.0 \text{ Diabetes without complications} + 0.4 \text{ Diabetes with complications} + 0.7 \text{ Multiple sclerosis} = 1.6$

Justification: This calculation should use diabetes with complications and should not use diabetes without complications. Weights for condition categories are calculated hierarchically—this means that if a member has a diagnosis of uncomplicated diabetes as well as a diagnosis of diabetes with complications only the weight of the more severe HCC enters the calculation, and the weight of the less-severe HCC is superseded.

5. Continued

Member C Risk Score: $0.7 \text{ age/gender} = 0.7$

Sum the risk scores weighted by months in base year:

$$1.3*(12/12)+1.6*(12/12)+0.7*(6/12) = 1.3+1.7+0.3 = 3.25$$

The average risk score is the sum of the risk scores weighted by months in the base year divided by member months in the base period: $3.25/(12/12 + 12/12 + 6/12) = 3.25/2.5 = 1.3$

Part C Contract year risk score:

$$1.30 * 1.011^2 * 1.005^2 * 1/1.03 * .98 = 1.2769$$

Annual trend/population change should be squared because there are two years between the base and projection, and it is an annual trend.

6. Learning Objectives:

2. The candidate will understand how to evaluate health insurance organization risk and mitigation strategies.

Learning Outcomes:

- 2(a) Evaluate an enterprise risk management (ERM) system.

Sources:

Group Insurance, Skwire, Daniel D., 8th Edition, 2021 Ch. 41: Risk-Based Capital Formulas

Commentary on Question:

Commentary listed underneath question component.

Solution:

- (a) Describe regulatory actions based on Total Adjusted Capital to Authorized Control Level (TAC-to-ACL) ratios.

Commentary on Question:

Candidates performed very well on this part of the question.

150-200% Company Action Level – Company suggests changes to TAC/ACL. No regulator impact.

100-150% Regulatory Action Level – Regulator suggests changes, no potential for takeover.

70 -100% Authorized Control Level – Regulator suggests changes and may take control of the company.

<70% Mandatory Control Level – Regulator must take control of the company.

- (b)
 - (i) Calculate the TAC-to-ACL ratio for each company. Show your work.
 - (ii) Identify for each company what, if any, regulatory action needs to be implemented based on the TAC-to-ACL ratio.

Commentary on Question:

Most candidates did well on this part of the question. If candidates missed points, it was usually because they made a mistake on the calculation. A common error was forgetting the 3% load or transposing the ratio.

6. Continued

- Individual medical products – life RBC formulas have a 20% higher load for individual medical products due to the extra work needed to get regulatory approval for these products.
- Reserves-
 - Life RBC formula gets a 5% factor for all health related reserves whereas Health RBC formulas only get a 5% for LTC and disability reserves.
- Higher charges in life RBC formulas for life products than health formula.
- Higher charges in life RBC for LTC and disability products than health formula but similar after-tax consideration.
- Work Compensation is carved out for Health RBC formula.
- General formula differences:
 - In the life insurance formula, there are many more asset class risks
 - The biggest component of health is H2 or underwriting risk. For Life insurance it's interest rate and credit risks. This is because the nature of health is much more short term while life is long term so they face different risks.
 - Life insurance risk formula includes a catastrophic risk component
 - Health formula doesn't include reserves for the most part and assumes they are estimated properly
 - Life formula groups together some of the risks in the covariance portion of the formula (squares the sum of them)
 - Insurance risk is much bigger for health than life and includes management risk adjustment since risk can be reduced