GH ADV Model Solutions
Spring 2017

1. **Learning Objectives:**
   3. The candidate will understand and apply valuation principles for insurance contracts.

   Learning Outcomes:
   (3a) Describe the types of claim reserves (e.g., due and unpaid, ICOS, IBNR, LAE, PVANYD).

   (3c) Calculate appropriate claim reserves given data.

   (3g) Apply applicable standards of practice related to reserving.

   Sources:
   Group Insurance, Skwire, 7th Edition, 2016; Ch. 38 Claim Reserves for Long-Term Benefits

   Commentary on Question:
   Commentary listed underneath question component.

   Solution:
   (a) List the components of LTD reserves and describe the methodologies to evaluate each of them.

   Commentary on Question:
   Full credit was awarded to candidates who listed and described the methodologies to evaluate LTD reserves. Candidates who did not list the appropriate methodologies for LTD reserves received partial credit; the majority of candidates received partial credit

Open claims
- Claims that have benefits currently being paid.
- The largest component of claim reserves for LTD and LTC plans.
- Often called "tabular reserves," because the calculation method involves using tables of expected claim termination rates.
- Formula for a reserve at claim duration n may be written as:

$$V_n = \sum_{t=n}^{BP} Benefit_t \cdot Continuance_t \cdot InterestDiscount_t$$

1. Continued

Pending claims
- Claims that have been reported but have not yet begun receiving payments.
- The calculation involves an additional factor, called the pending factor, reflecting the likelihood that the claim will eventually receive a payment.
- Claim reserve may be computed as
    - For pending claims that are still in the elimination period:
        - Product of the pending factor and the tabular claim reserve at the end of the elimination period. (Discounting for interest between the valuation date and the end of the elimination period might be conservatively ignored.)
    - For pending claims that have completed the elimination period:
        - Product of the pending factor and the sum of (a) the tabular reserve at the current claim duration, and (b) the accumulated value of past claim payments that have not yet been made since the claim is not yet approved.

IBNR claims
- These are claims for which the loss has already occurred (the person has become disabled or satisfied the LTC benefit requirements), but which have not yet been reported to the company.
- Method to use:
    - o Percentage of premium method
    - o Lag method
    - o Loss ratio method
    - o Combination methods

(b)   List the guidelines and standards of practice that apply to the calculation of LTD claim reserves.

Commentary on Question:
Most candidates were able to list a few items and received partial credit.

- Actuarial Standards of Practice (ASOPs) including:
    - ASOP No. 5, "Incurred Health and Disability Claims"
    - ASOP No. 18, "Long-Term Care Insurance,"
    - ASOP No. 42, "Determining Health and Disability Liabilities Other Than Liabilities for Incurred Claims."
    - ASOP No. 23, "Data Quality"
    - ASOP No. 41, "Actuarial Communications"

- Health practice notes issued by the American Academy of Actuaries.
- NAIC guidelines and model regulations relative to reserve standards and opinions.
- NAIC Accounting Practices and Procedures Manual.

1. Continued

- GAAP accounting standards, including SFAS 60 and ASC 712, and GASB 74 and GASB 75.
- Canadian Office of the Superintendent of Financial Insurance (OSFI) and the Canadian Institute of Actuaries publications and papers.
- Literature published in textbooks and by the actuarial profession.

(c) Calculate the incurred but not reported (IBNR) reserve as of 12/31/2016 using the following combination methods:

(i) Loss ratio method for October 2016 to December 2016 and Lag method for July 2016 to September 2016.

(ii) Lag method for October 2016 to December 2016 and Loss ratio method for July 2016 to September 2016.

Show your work.

Commentary on Question:
Majority of the candidates received full credit. Candidates who correctly calculated most steps to the question received partial credit.

Calculate the ultimate loss using the completion factor or loss ratio method for the corresponding month.

Completion Factor Method: [Reported Claims] / [Completion Factor]
Loss Ratio Method: [Monthly Premium]* Loss Ratio

Month	Monthly Premium	Reported claims as of 12/31/2015	Completion factors	Loss Ratio	Ultimate Losses	IBNR Reserve
12/2015	1,500,000	125,000	10.0%	80.0%	= 1,500,000 x 80% = 1,200,000	= 1,200,000-125,000 = 1,075,000
11/2015	1,500,000	250,000	20.0%	80.0%	= 1,500,000 x 80% = 1,200,000	= 1,200,000-250,000 = 950,000
10/2015	1,500,000	350,000	30.0%	80.0%	= 1,500,000 x 80% = 1,200,000	= 1,200,000-350,000 =850,000
9/2015	1,500,000	650,000	50.0%		= 650,000/0.50 = 1,300,000	= 1,300,000-650,000 = 650,000
8/2015	1,500,000	1,000,000	75.0%		= 1,000,000/0.75 = 1,333,333	= 1,333,333-1,000,000 = 333,333
7/2015	1,500,000	1,200,000	100.0%		= 1,200,000/1.0 = 1,200,000	= 1,200,000-1,200,000 = 0

1. **Continued**

Total IBNR Reserves = $3,853,333

Month	Monthly Premium	Reported claims as of 12/31/2014	Completion factors	Loss Ratio	Ultimate Losses	IBNR Reserve
12/2015	1,500,000	125,000	10.0%		= 125,000/0.10 = 1,250,000	= 1,250,000-125,000 = 1,125,000
11/2015	1,500,000	250,000	20.0%		= 250,000/0.20 = 1,250,000	= 1,250,000-250,000 = 1,000,000
10/2015	1,500,000	350,000	30.0%		= 350,000/0.30 = 1,166,667	= 1,166,677-350,000 = 816,667
9/2015	1,500,000	650,000	50.0%	80.0%	= 1,500,000 x 80% = 1,200,000	= 1,200,000-650,000 = 550,000
8/2015	1,500,000	1,000,000	75.0%	80.0%	= 1,500,000 x 80% = 1,200,000	= 1,200,000-1,000,000 = 200,000
7/2015	1,500,000	1,200,000	100.0%	80.0%	= 1,500,000 x 80% = 1,200,000	= 1,200,000-1,200,000 = 0

Total IBNR Reserves = $3,691,667

(d)   Recommend one of the two combination methods for evaluating IBNR claims on ABC's LTD block. Justify your answer.

Commentary on Question:
Majority of the candidates answered this part correctly and received full credit. Partial credit was rewarded for alternate recommendations with appropriate justification.

Method (i) is suggested for the following reason:
Since a high proportion of claims incurred in recent months are still in their elimination periods and the completion factors are low, the loss ratio method should be used for estimating IBNR for recent months and use the lag method for earlier periods.

2. **Learning Objectives:**
2. Evaluate and apply techniques for claim utilization management, care management, and population health management.

Learning Outcomes:
(2a) Describe, compare and evaluate care management and population health programs and interventions.

(2b) Estimate savings, utilization rate changes and return on investment as it applies to program evaluation.

(2c) Describe the considerations in the design, implementation and evaluation of a care management program.

(2d) Describe value chain analysis as it applies to the planning and management of disease management and other intervention analysis.

Sources:
Duncan, 6 pages 122- 125

Duncan, 9 pages 183 - 184

Duncan, 9.3 pages 184 - 185

Duncan figure 9.3 page 195

Commentary on Question:
Commentary listed underneath question component.

Solution:
(a) Describe the components of the Value Chain used to develop a care management program.

Commentary on Question:
Part A tested candidates' understanding of the different components of the value chain development in care management. Candidates did very well in this section and many candidates had very similar answers in how they described the components.

- Data provision and warehousing
  - Integrates membership, medical and drug info
  - Identifies conditions
  - Identifies care gaps

2. **Continued**

- Predictive modeling
  - Definition of risk
  - Accuracy of prediction in predicting likelihood of risk event
  - The model should stratify membership by risk
- Intervention Programs
  - Determine number of interventions
  - Need to determine how to engage members
  - What is the objective of each intervention program
- Outreach
  - Determine how members are identified for initial and subsequent outreaches
  - What is the expected contact rate
- Program Statistics
  - Program statistics include target rates, reach and unreachable rates, rates of termination, member assessment, frequency of re-stratification
- Member Coaching/Assessment
  - Maintain member enrollment, coach members, refer members.
- Outcomes and reporting
  - Includes Administrative reporting, clinical, lifestyle-related risk factors, targets for clinical improvement, and Financial reporting – ROI

(b) Describe Opportunity Analysis as it relates to developing a care management program.

Commentary on Question:
Part B tested candidates' understanding of how Opportunity Analysis relates to the care management model. Many candidates had very similar answers, which covered the top bullet point (i.e. data driven process that uses predictive model to identify opportunities; often a retrospective approach that is applied prospectively). However, not many candidates listed the components associated with opportunity analysis.

- Opportunity Analysis is a data driven analytical process that uses predictive modeling to match opportunities in client's population to care management programs
  - Opportunity analysis differentiates between high cost and high opportunity members
  - Opportunity analysis is retrospective (it looks at a population's history to identify pockets of opportunity), the results are applied prospectively.

2. Continued

- Requires the following components
  - Knowledge of member benefit design
  - Information on evidence-based care management programs
  - Eligibility and claims data for prior 2 to 3 years

(c) Critique models for member stratification used to create a care management program.

Commentary on Question:
Part C tested candidates' understanding of the various risk stratification models and the limitations that each of those models impose. Candidate performance was mixed on this portion of the question. Numerous candidates tried listing different predictive models that are currently in the market place such as the Wakely Model or Milliman model.

- Stratify members by predictive risk score –
  - Some members with high risk scores cannot be intervened
  - Predictive risk score ranking will result in a mix of different conditions, issues and needs. Operationally challenging to address this diverse group.
- Condition-specific model
  - This model address member heterogeneity that predictive risk score model doesn't provide
  - This model doesn't handle co-morbidities where there is potential for great opportunity
- Rules-based approach
  - This relies on clinicians to identify good candidates. This is not a very accurate approach
- Opportunity Analysis approach
  - Uses predictive modeling to identify best economic opportunities
  - It tries to target members with common risk profiles

(d) Calculate the percentage of the population that should be targeted to maximize the overall savings amount. Show your work.

Commentary on Question:
Part D was testing candidates' understanding in calculating the ROI and savings of care management programs. Many candidates performed well on this calculation and made the correct recommendation.

2. **Continued**

The percentage of the population that should be targeted should be 0.3% based on the following table.

Penetration Percentage	Cumulative Intervention Cost	Cumulative Savings	ROI
0.0% to 0.1%	$1,000,000	$7,000,000	7.0
0.1% to 0.2%	$2,000,000	$12,000,000	6.0
0.2% to 0.3%	$3,000,000	$15,000,000	5.0
0.3% to 0.4%	$4,000,000	$16,500,000	4.125

3. **Learning Objectives:**

1. The candidate will understand how to evaluate the effectiveness of traditional and leading edge provider reimbursement methods from both a cost and quality view point.

Learning Outcomes:

(1a) Calculate provider payments under standard and leading edge reimbursement methods.

(1b) Evaluate standard contracting methods from a cost-effective perspective.

Sources:

Provider Payment Arrangements, Provider Risk, and their relationship with cost of healthcare

Commentary on Question:

Commentary listed underneath question component.

Solution:

(a) List the market forces that drive providers toward payment reform.

Commentary on Question:

Candidates provided a variety of answers but many were not from the syllabus. Most candidates received at least partial credit on this section.

- Transformation of Medicare and Medicaid programs
- Trend towards physician employment
- Increased competition resulting from exchange plans
- Other market forces to reduce costs and maintain quality of care

(b) List the key players on the payment reform team and describe the role each plays in the payment reform process.

Commentary on Question:

Candidates that performed well on this part included descriptions of the roles in the process. Full credit was reliant on BOTH the list and the accompanying descriptions.

- **Actuary** – quantifies and financially models risks; calculates full amount of capital to set aside to adequately cover unexpected risks; sets budget with CFO
- **Chief Financial Officer (CFO)** – together with actuary, sets budget to maintain return on investment of the payment reform model; allocates resources to keep the health system within the predefined budget of the payment model

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3. **Continued**

- **Clinician / provider** – provides high-quality care to the patient to achieve customer satisfaction and good outcomes while staying within service and administrative budgets
- **Policymaker / Government Agencies** – addresses systemic issues such as shortage of primary care entrants into the workforce or the adequacy of care to the most vulnerable and remote populations

(c) Describe the following types of risk considered in evaluating payment models:

   (i) Utilization risk

   (ii) Technical risk

   (iii) Insurance risk

   (iv) Performance risk

Commentary on Question:
Most candidates performed very well on this part.

- Utilization risk – the risk related to changes in utilization resulting from the payment model and the impact to profitability
- Technical risk – the risk of appropriately structuring technical elements of a contract to match population and circumstances
- Insurance risk – the risk related to normal variation in demand for medical services over time and differences in utilization within segments of insured populations
- Performance risk – the risk of causing inefficiency, suboptimal quality, and high cost of care. Highly dependent on how the contract is written.

(d) Describe:

   (i) Bundled payment models

   (ii) Reference pricing models

Commentary on Question:
Overall, candidates understood the basics of each of these payment models. The candidates receiving the highest scores included thorough descriptions of each model.

3. **Continued**

        (i)   **Bundled payment models**
- Provide payment for an episode of care with the goal of delivering higher quality, more coordination, and lower cost of care
- Usually start with DRG(s) or a surgery and extends to include a specific time frame after inpatient discharge (typically 30, 60, or 90 days)
- Can be used for outpatient episodes of care
- Incentivize provider to manage the entire episode of care

        (ii)   **Reference pricing models**
- Stipulate a benefit limit (i.e., reference price) for a specific surgery, medical procedure or service, or medical device
- Patient must pay the difference between the allowed charge and reference price set by the health plan
- Items subject to reference pricing are not usually counted toward the out-of-pocket maximum
- Shifts some financial risk to the patient

(e)   Compare and contrast the following to the current payment model using the four types of risk identified in part (c).

        (i)   Bundled payment models

        (ii)   Reference pricing models

Commentary on Question:
It was important for candidates to compare both Bundled and Reference pricing models to the current payment model (DRGs) – this is what separated a low score from a higher score in most cases.

        (i)   **Bundled payment models**

        Utilization risk
- In the DRG/case rate model, provider profits increase as utilization, measured in inpatient admits, increases. Similarly, in the bundled payment model, provider profits increase as utilization, measured in number of episodes, increase, assuming episodes are priced appropriately.
- For utilization measured in length of stay, the DRG/case rate model incentivizes providers to reduce length of inpatient stay and replace it with another admission. The quality measures in the bundled payment model incentivize providers to decrease medically unnecessary or preventable services (e.g., readmissions) during an episode in order to profit.

3. **Continued**

Technical risk
- Low to medium risk for DRG/case rates because DRGs have been in existence for some time, and there are two established DRG groupers, but high for bundled payments due to complexity
- High risk for the bundled payment model due to selection and analysis of conditions, standardizing treatment, coordinating care, partnering with post-acute care, and gain-sharing between physicians and hospitals

Insurance risk
- Generally low risk for DRG/case rates, because in the absence of outlier per diem, provider is at risk for members who have higher-than-average inpatient lengths of stay
- Medium risk for bundled payments because provider is at risk for members who have higher allowed costs than average, have complicated cases, or are at risk for readmissions. However, providers may limit their risk exposure by only choosing to limit bundled payments to a few specific conditions.

Performance risk
- In DRG/case rate, hospital has to be cautious of discharging patients too early, as the risk of readmissions may increase.
- In bundled payments, burden of inefficiency is shifted to providers or patients, limiting payer exposure.
- If gain-sharing in bundled payments is based on quality outcomes, this includes performance risk as well.

(ii) **Reference pricing models**

Utilization risk
- Unlike the DRG/case rate model, where provider profits increase as utilization (measured in inpatient admits) increases, in the reference pricing model, members will be less likely to use provider services as their out of pocket share increases.

Technical risk
- Low to medium for DRG/case rates because DRGs have been in existence for some time, and there are two established DRG groupers, but high for reference pricing.
- For reference pricing, largest technical risk is policyholder education. Communication of the complexities of reference pricing may be difficult.

3. **Continued**

Insurance risk
- Generally low risk for DRG/case rates, because in the absence of outlier per diem, provider is at risk for members who have higher-than-average inpatient lengths of stay
- Medium risk for reference pricing, where insurance risk exists for patients with more complex needs or higher costs than average, but the risk is shifted away from the insurer and provider to the patient.

Performance risk
- In DRG/case rate, hospital has to be cautious of discharging patients too early, as the risk of readmissions may increase, while in reference pricing, burden of inefficiency is shifted to providers or patients, limiting payer exposure.
- In reference pricing, patient education is key, as they may be unhappy with their providers and insurers if they do not fully understand reference pricing and/or are charged high amounts.

4. **Learning Objectives:**
4. The candidate will understand how to apply principles of pricing, risk assessment and funding to an underwriting situation.

Learning Outcomes:
(4a) Understand the risks and opportunities associated with a given coverage, eligibility requirement or funding mechanism.

(4b) Understand, evaluate and apply various risk adjustment mechanisms.

Sources:
Group Insurance, B, 7th Edition, 2016 Ch. 31

Commentary on Question:
This question was designed to test the understanding of the risks, opportunities and management of selection in a multiple-choice environment. Candidates were asked to describe ways to manage selection and its financial impact. Most candidates were able to list and describe steps to develop monthly premiums offered in a multiple choice environment and got the calculations in part C correct but struggled in part D even though the calculations were similar to part C. Candidates also struggled to list ways to manage selection.

Solution:
(a) Describe situations where insurers and employers take advantage of a multiple choice environment.

Commentary on Question:
Successful candidates were able to list and describe at least 4 situations where insurers and employers can take advantage of a multiple choice environment. Some candidates misunderstood the question and listed different selection options like employer vs exchange coverage or Medicaid vs Medicare etc.

A.) *Introducing a new option.* Insurers and employers are often reluctant to totally replace a proven incumbent plan with an untested new product. Offering a new product as an option to the incumbent plan allows time for testing and transitioning to a new product.

B.)*Taking advantage of favorable selection*. Some insurers create plan features and pricing to attract low-cost risks. For example, healthy employees without strong ties to particular providers may be willing to choose a lower cost plan with a limited provider network. Active and fit employees may be drawn to plans that include wellness benefits. This may be particularly effective for one insurer offering a health plan option alongside other insurers' options.

4. Continued

C.) *Encouraging consumerism.* Offering a variety of health plan options is a natural extension of consumerism. Americans expect choice in other products they purchase, so why not in health care? Many insurers believe they can provide information and distinguishing plan features that can entice employees to choose their option, even at a higher price.

D.) *Implementing a defined contribution concept.* Some employers want to switch from providing a defined medical plan benefit to providing a defined monthly contribution toward the premium. Under the defined contribution concept, the employer lets each employee choose from a variety of health plan options. The employer's contribution to any plan's premium is a fixed dollar amount, regardless of the option the employee chooses. The employee must pay the difference between their option's total premium and the employer's fixed contribution. The defined contribution strategy allows employers to avoid having to decide between increasing monthly employee contributions or increasing employee cost sharing (deductibles and copays) each year. The employer can let each employee decide by offering a generous plan (with higher employee contributions) alongside a lower cost plan (with higher employee cost sharing).

E.)*Choice for the sake of choice.* Choice itself has intrinsic value. Offering choice distinguishes an insurer or employer as flexible, leading-edge, and sensitive to the needs of employees.

(b)   Describe the steps to develop monthly premiums for group medical products offered in a multiple choice environment.

Commentary on Question:
Most candidates were able to describe the steps to develop monthly premiums offered in a multiple choice environment. However, some candidates weren't able to actually calculate the premiums in part C even though they got part B correct. Full credit was given for describing all steps and points were deducted for partial answers

Step 1. *Determine the actuarial value[1] of each benefit option*, taking into consideration:
(a) the expected cost of the benefits,
(b) provider reimbursement arrangements,
(c) medical management differences, and
(d) administrative expense and margin requirements.
The actuarial value of each benefit option should be determined prior to considering any impact on the aggregate claims due to selection. These values reflect the required premium rates assuming every employee in the group participated in the option.

4. **Continued**

Step 2. *Estimate the enrollment mix by plan option.*
Employee contribution rates can serve as a basis for estimating the enrollment mix.
Increasing contribution rates for specific options will tempt employees to choose other lower cost plan options. Each employee will decide if the option differences (benefits, network, managed care restrictions, and so forth) offset the employee contribution differences.

Step 3. *Estimate the relative health status factor for each option based on the expected enrollment mix from Step 2.*
The relative health status factor estimates the average expected costs for employees in each plan option relative to the overall cost of the group (100% is the overall health status/cost for the employer group) based on their age/gender and other health status or morbidity differences.
The relative health status factor can be estimated based on the expected enrollment mix between the two plan options

Step 4. *Calculate the preliminary selection-adjusted rates for each option.*
The selection adjusted rates equal the Step 1 actuarial rates multiplied by the Step 3 relative health status factor for each option. The resulting selection-adjusted rates would be self-sustaining for each option if the expected mix of employees by option is exactly correct and does not change. However, static participation is unlikely if the employer uses the defined contribution model for setting employee contributions (described earlier in this chapter). The difference in employee contributions between Plans X and Y is likely to expand significantly using the Step 4 rates. This would cause further employee selection and an antiselection spiral, as illustrated earlier.

Step 5. *Calculate the average selection load.*
Calculate the average selection load as the ratio of the average of the Step 4 selection adjusted rates and the average of Step 1 actuarial rates.

Step 6. *Calculate blended-selection adjusted rates.*
Calculate the blended selection-adjusted rates by multiplying the Step 1 actuarial rates by the average selection load from Step 5. This step assumes that a single insurer insures both plan options. These Step 6 blended rates are appropriate for a single insurer environment because they are self-sustaining for the entire group, and they do not create the potential for additional selection. In a multi-insurer environment, the Step 4 preliminary selection adjusted rates are more appropriate, because each option should be self-sustaining.

4.   Continued

(c)   Calculate the 2018 monthly premiums for the PPO and HDHP plans. Show your work.

Commentary on Question:
To get full credit, selection load had to be calculated to apply to the premiums before selection. Following steps in part B would have helped the candidates in answering this question. Some candidates either ignored the health status factors provided or used the wrong factors

PPO Premium = $600 PMPM
HDHP Premium = $600 PMPM * .8 = $480
Selection factor for PPO at 70% = 113%
PPO Premium = 600*1.13 = $678
Selection factor for HDHP with PPO @ 70% = 70%
HDHP Premium = 480*.70=$336.00
Preliminary selection-adjusted rate: 678*.7 + 336.00*.3 = 575.40
Actuarial rates before selection: 564
Overall selection factor = 575.40/564=1.020
Final rates: PPO = 600*1.020 = 612.13
                    HDHP = 480*1.020= 489.70

(d)   Calculate the aggregate premium surplus/deficiency based on actual enrollment. Show your work.

Commentary on Question:
Part D was an extension of Part C and had to recalculate premiums based on actual enrollment with corresponding health factors provided. Most candidates struggled with this question even though they got part C right

PPO Premium = $600 PMPM
HDHP Premium = $600 PMPM * .8 = $480
Selection factor for PPO at 90% = 105%
PPO Premium = 600*1.05 = $630
Selection factor for HDHP with PPO @ 90% = 55%
HDHP Premium = 480*.55=$264
Preliminary selection-adjusted rate: 630*.9 + 264*.1 = 593.40
Actuarial rates before selection: 588.00
Overall selection factor = 593.4/588.00=1.009
Final rates: PPO = 600*1.009= 605.51
                    HDHP=480*1.009=484.41

4. **Continued**

Priced for PPO members at $612.13 PMPM and HDHP members at $489.70 PMPM = 900*12*612.13 + 100*12*489.70 = 7,198,644

Actually enrolled 900 PPO members at $605.51 PMPM and 100 HDHP members at $484.41 PMPM = 900*12*605.51 + 100*12*484.41 = 7,120,800 ➔ $77,844 surplus

(e) Recommend two ways XYZ can manage selection and its financial impact. Justify your response.

Commentary on Question:
Most candidates were able to recommend at least 1 way to manage selection. To get full credit at least 2 of the following ways should have been described

A.) *Additional premium margin.* An insurer may also want to add an additional margin (1% to 3%) to the premium to account for the potential that the underwriting may not be able to perfectly predict the selection pattern and costs when determining prospective premium rates.

B.) *Employee Contribution or Plan Design Limits.* Reasonably limiting the cost and benefit differences between plans can help manage selection

C.) *Participation requirements: One insurer offering multiple choices.* A single insurer can offset the antiselection in one option with the favorable selection in another option in a multiple-choice environment.

D.) *Participation requirements: Multiple insurers, each offering one or more choices.* When an employer's risk pool is split between multiple insurers, one insurer may attract an unexpected, unfavorable risk mix and not be able to offset the losses from another option's favorable risk mix since the other option is insured by someone else. Additional participation rules may be imposed to mitigate the antiselection risk inherent in these situations.

5. **Learning Objectives:**
2. Evaluate and apply techniques for claim utilization management, care management, and population health management.

Learning Outcomes:
(2a) Describe, compare and evaluate care management and population health programs and interventions.

(2b) Estimate savings, utilization rate changes and return on investment as it applies to program evaluation.

(2c) Describe the considerations in the design, implementation and evaluation of a care management program.

Sources:
Duncan, Chapter 4, Section 3 (pages 84-96)

Duncan, Chapter 10, Section 4 (pages 199-206, 208-209)

Duncan, Chapter 8, Section 4 (pages 173-176)

Commentary on Question:
The question addressed candidates' understanding of common measurement issues in regards to disease management, study design methods, and strengths and weaknesses of each method. Candidates were required to evaluate the results against a benchmark, and finally to provide analysis and insights on program improvements.

Solution:
(a) List the common measurement issues in the development of a disease management (DM) program study design.

Commentary on Question:
Only 4 of the bullet points were required for full credit. Most candidates received partial credit, providing some bullet points but not enough unique points to earn full credit.

- Determining appropriate outcome measure
- Timing of exposure, i.e. determining starting points and end points
- Total medical costs vs disease specific medical costs
- Data issues including quality, reliability, sources, etc.
- Regression to the mean
- Identifying appropriate patient study groups
- Establishing a uniform risk measure for comparability, i.e. ensuring equivalence between populations

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5. Continued

- Patient selection bias (patient drop outs are a type of selection)
- Sample size issues, e.g. general or large vs specific or small populations

(b)

(i) Define each method.

(ii) Identify each method as a control group, non-control group, or statistical method.

(iii) Rank the study design methods from most appropriate to least appropriate for evaluating the outcomes of a DM program. Justify your rankings.

Commentary on Question:
The details for this question are given as part of Table 10.3 in the source material. Most candidates were able to describe and categorize the various techniques as required in parts (i) and (ii). Performance on part (iii) varied, as many candidates did not adequately justify the ranking they provided in response to the question.

Randomized control group methods
(i)
- randomized control group withheld from intervention
- metric in intervention group compared with same metric in control group, and difference is assigned to the effect of the intervention
- randomization must occur at population level if results are to be applied to population

(ii)
- Control group method

(iii)
- Most appropriate as the "Gold Standard" in the industry
- Difficult to implement and potentially unethical, but most ideal method to evaluate vendor's program if feasible

Pre-post cohort methods
(i)
- patients are identified pre-intervention and then followed post-intervention
- pre-intervention metric is compared with post-intervention metric
- differs from temporal method because same cohort is used for comparison in pre- and post-period

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5.   **Continued**

(ii)
- Control group method

(iii)
- widely used in the industry
- regression to the mean is common
- not as appropriate as a randomized control group method given the intervention group acts as its own control

Participant vs non-participant methods
(i)
- patients invited to participate in program and those who participate are subject to treatment while those who do not form the control group

(ii)
- Control group method

(iii)
- widely used in the industry
- subject to selection bias
- possible to correct for effect of selection bias, but not possible to measure member's "willingness to change"

Services avoided methods
(i)
- record intent of different patients, track for a period of time to determine actual outcomes, and assign a dollar value to avoided event
- adjust for alternative treatment, if needed

(ii)
- Non-control group method

(iii)
- familiarity of method in industry
- difficult to replicate
- frequently used for small, highly specialized programs such as case management
- participant bias common since participants who are more likely to change their minds about the service in question are more likely to seek information and support
- generally not recommended over control group methods if a control group is available

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5.   Continued

Regression discontinuity

(i)

- regression line is fitted to the relationship between Year 1 risk score and Year 2 PMPM costs in a population
- dummy variable is included to indicate membership in intervention group
- difference at the "cut-off point" between non-intervention and intervention population regression lines indicates intervention had an effect

(ii)

- Statistical method

(iii)

- low familiarity within the industry
- highly regarded as a theoretical method in literature but specific DM applications are unknown

(c)   Evaluate the outcome of the DM program using:

(i)   The required hurdle rate. Show your work.

(ii)   The Risk Management Economic Model.

Commentary on Question:
Almost all candidates evaluated the program using the required hurdle rate correctly in part (i). Very few candidates evaluated the DM program using The Risk Management Economic Model correctly in part (ii).

(i)   Reference trend = $2,400 / $2,500 = 0.96
Savings = ($3,000 x Reference Trend) - $2600 = $2880 - $2600 = $280
Gross Savings = (1,000 x $280) = $280,000
Program Costs = (1,000 x $200) = $200,000
ROI = Savings / Program Costs
ROI = $280,000 / $200,000 = 1.4
The vendor's program achieved an ROI of 1.4 below the required hurdle rate required of 1.65.

(ii)

- The risk management economic model examines the link between DM program risk, cost, and savings – the ROI does not meet the hurdle rate
- The program may be subject to "decreasing risk – increasing population penetration" trade-off

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5. Continued

- The program may be penetrating too large a percentage of the population, resulting in a lower population risk ranking across the cumulative total population.
- As the population penetration increases, a lower marginal savings per each additional member engaged leads to a declining ROI that doesn't meet the required hurdle rate.

(d) Recommend changes to improve the financial results of the DM program. Justify your response.

Commentary on Question:
Candidate performance on this question was varied. Candidates scored more points for offering multiple recommendations and fully justifying their responses compared to offering only one recommendation without justification.

The DM program produces savings but fell short of the hurdle rate.

I recommend stratifying members into different cost groups and targeting higher risk/cost members to improve the financial results of the DM program. I also recommend researching means to reduce the cost of administering the DM program to improve the return on investment.

Targeting higher risk/cost members and administrating the DM program more efficiently may enable the program to be more profitable and achieve the required hurdle rate.

6.

Learning Objectives:
1. The candidate will understand how to evaluate the effectiveness of traditional and leading edge provider reimbursement methods from both a cost and quality view point.

2. Evaluate and apply techniques for claim utilization management, care management, and population health management.

Learning Outcomes:
(1a) Calculate provider payments under standard and leading edge reimbursement methods.

(1b) Evaluate standard contracting methods from a cost-effective perspective.

(2b) Estimate savings, utilization rate changes and return on investment as it applies to program evaluation.

(2e) Apply the actuarially adjusted historical control methodology.

Sources:
Provider Payment Arrangements, Provider Risk, and their relationship with cost of healthcare (Milliman) Pg 7

Managing and Evaluating Healthcare Intervention Programs, Duncan, Second Edition, 2014, Ch. 12

Commentary on Question:
Commentary listed underneath question component.

Solution:
(a) Create a chart showing the impact of DM Program 1 on provider profits for the various payment models.

Commentary on Question:
Part (a) tests the candidate's recall of several payment models, and their ability to determine the impact on provider profits of a particular disease management program. Candidates were generally able to recall most payment models, but many candidates struggled to identify the appropriate impact, especially with regards to more sophisticated payment models.

6. **Continued**

DM program 1 reduces costs by reducing inpatient admissions. The following table outlines the impact of reduced inpatient admissions on provider profits.

Payment Model	Utilized Items	Impact of Decreased Utilization
Fee For Service	All	Decreases profits
Global Capitation	All	Increases profits
Shared Savings	All	Depends on the structure of the program
DRG/Case Rates	Admissions	Decreases profits
Bundled Payments	Episodes based on admissions	Decreases profits
Reference Pricing	Selected episodes	Depends on the fee scale
Outliers and Reinsurance	High-cost episodes	Likely unaffected
Pay For Performance		Depends on the performance measure

(b) Calculate net claim savings using the Actuarially-Adjusted Historical Control Methodology for:

(i) DM Program 1

(ii) DM Program 2

Show your work.

Commentary on Question:
This question tests the candidate's ability to apply the Actuarially-Adjusted Historical Control Methodology (AAHCM) to two different disease management programs. Students generally understood the basic concept of the AAHCM, but struggled to interpret the question and appropriately apply the key formula. In order to receive full credit, the candidate needed to outline the formula used, perform calculations correctly, and arrive at the correct answer. Most candidates inappropriately applied trend in addition to the DM impact, earning partial but not full credit on this part.

The Actuarially-Adjusted Historical Control Methodology calculates disease management savings as

$$Savings = Costs\ without\ DM - Costs\ with\ DM$$

Net savings are calculated as the difference between savings and the program cost.

6. Continued

(i)   As described, DM Program 1 only impacts hip replacement admissions.

$$Costs\ without\ DM$$
$$= 50 * Util * (1 + Util\ Trend) * Cost$$
$$* (1 + Cost\ Trend)$$
$$= 50 * 5 * (1 + 0.04) * 25,000 * (1 + 0.02)$$
$$= \$6,630,000$$

$$Costs\ with\ DM$$
$$= 50 * Util * (1 - Util\ Reduction) * Cost$$
$$* (1 + Cost\ Trend)$$
$$= 50 * 5 * (1 - 0.2) * 25,000 * (1 + 0.02)$$
$$= \$5,100,000$$

$$Savings = \$6,630,000 - \$5,100,000 = \$1,530,000$$

$$Net\ Claims\ Savings = \$1,530,000 - \$1,000,000 = \$530,000$$

(ii)   As described, DM Program 2 only impacts cost of professional services.

$$Costs\ without\ DM$$
$$= 50 * Util * (1 + Util\ Trend) * Cost$$
$$* (1 + Cost\ Trend)$$
$$= 50 * 8 * (1 + 0.04) * 5,000 * (1 + 0.02)$$
$$= \$2,121,600$$

$$Costs\ with\ DM$$
$$= 50 * Util * (1 + Util\ Trend) * Cost$$
$$* (1 - Cost\ Reduction)$$
$$= 50 * 8 * (1 + 0.04) * 5,000 * (1 - 0.05)$$
$$= \$1,976,000$$

$$Savings = \$2,121,600 - \$1,976,000 = \$145,600$$

$$Net\ Claims\ Savings = \$145,600 - \$125,000 = \$20,600$$

(c)   Recommend which DM program(s), if any, ABC should implement. Justify your response.

6. Continued

ABC should implement both Disease Management Program 1 and Disease Management Program 2, since each program has positive net claims savings.

(d)   Calculate, ensuring GHI maintains the same total revenue as under the current payment arrangement:

(i) the minimum capitation rate GHI should accept.

(ii) the minimum bundled payment rate GHI should accept.

Show your work.

The question asks to maintain current revenue for GHI. Current revenue for hip replacement admissions is:

$$HRA\ Revenue = 50 * 5 * 25,000 = \$6,250,000$$

Current revenue for professional services is:

$$Prof\ Revenue = 50 * 8 * 5000 = \$2,000,000$$

Thus total current revenue is

$$\$6,250,000 + 2,000,000 = \$8,250,000$$

6. Continued

(i)   The capitation rate per member per month is equal to total current revenue divided by the total number of projected member months. We assume that membership will not change under the new contract.

$$Capitation\ Rate = \frac{\$8,250,000}{12*50,000} = \$13.75 \text{ PMPM}$$

(ii)   We assume the bundled payment rate is based on inpatient admissions. The bundled payment rate that preserves current revenue is the total revenue divided by the projected number of admissions after implementing both disease management programs.

The projected number of hip replacement admissions is

$$Admissions = 50 * 5 * (1 - 0.2) = 200$$

The bundled payment rate is thus

$$Bundled\ Payment\ Rate = \frac{\$8,250,000}{200} = \$41,250 \text{ per inpatient admission.}$$

7. **Learning Objectives:**
4. The candidate will understand how to apply principles of pricing, risk assessment and funding to an underwriting situation.

Learning Outcomes:
(4a) Understand the risks and opportunities associated with a given coverage, eligibility requirement or funding mechanism.

(4b) Understand, evaluate and apply various risk adjustment mechanisms.

(4c) Recommends strategies for minimizing or properly pricing for risks.

Sources:
GHA-104-15: Actuarial Aspects of Employer Stop Loss

Group Insurance, Skwire, 7th Edition, 2016 - Ch. 30 Group Insurance Underwriting

Commentary on Question:
Commentary listed underneath question component.

Solution:
(a) Describe the criteria used to screen, approve, and classify large group prospects.

   Commentary on Question:
   - *In order to get the maximum points allowed on this question, candidates must have listed the major items of the model solution along with an appropriate description.*
   - *Many candidates did well in that part of the question.*
   - *Candidates that did not score well in that question are those that did not list the items of the model solution.*

   - Age and gender
     o Age is a highly correlating factor with future mortality and morbidity.
     o Gender mix impacts both life and health claim costs, and composite age-gender factors are good predictors for several specific medical conditions such pregnancy and heart disease.
   - Location or area
     o There are significant regional and local differences in health care practices and prices.
   - Type of industry
     o Particularly important for disability insurance.
     o Some industries expose employees to health hazards or to high stress levels, while other industries have higher than expected costs because of benefit entitlement attitudes or close proximity and access to the health care system.

7. **Continued**

- Financial stability
  - o Financial strength and credit rating are important risk criteria.
  - o Business downturn often lead to reduction in staff and it can result in dramatic shifts in demographic factors.
  - o Anticipated layoffs may produce a spike in disability claims and in utilization of elective medical and dental procedures.

- Ease of administration
  - o Large groups have economies of scale, but offset that with added complexity.
- Participation level
  - o Higher participation leads to lower antiselection.
  - o Insurers usually require that the employer pay a minimum portion (such as 50%) of the premium to keep the cost attractive for healthier employees.
- Carrier persistency
  - o Installation and setup of a very large group account can be extremely expensive, and competitive pricing pressures do not allow room to recoup these costs in the first or second contract year.
  - o Should carefully review a prospective client's track record of persistency with their prior carriers.
- Plan design
  - o Must assess the relative value and effectiveness of all available plan designs, utilization controls and health care delivery systems in order to anticipate the impact of employee choice.
- Other considerations
  - o ASO
  - o HIPAA
  - o ACA

(b)   Describe the rating considerations related to Specific Stop Loss.

Commentary on Question:
- *In order to get the maximum points allowed on this question, candidates must have listed the major items of the model solution.*
- *Few candidates did well in that part of the question.*
- *Candidates that did not score well in that question are those that did not list the items of the model solution.*

7. **Continued**

- Trend leveraging
    - If losses increase at a rate of 10% per year, excess losses increase at a greater rate to the fixed excess deductible.
    - The effect of leveraging tends to increase as the deductible increases.
- Area leveraging
    - If the cost of claims in a high cost area were a constant 10% higher than average claims costs, then the effect of area leveraging would be analogous to the effect of trend leveraging at a 10% base trend.
    - More expensive procedures (transplants, for example) tend to be performed in regional tertiary hospitals, teaching hospitals, and/or Centers of Excellence.

- Network leveraging
    - It is unlikely that hospitals would discount their charges at the same rate as non-hospital providers of medical care would discount theirs.
        - Negotiated hospital fees are often subject to ''outlier'' provisions.
        - The form of the network contract (e.g. DRG, per diem or discounted billed charges) may also influence the way in which discounts leverage.
    - At extremely high deductibles, the leveraged discount begins to bend back toward the first dollar discounts.
        - Leveraging is influenced by many factors, and their effect on losses between $100,00 and $500,000 may be different than their effect on losses excess of $500,000
- Variation by age and sex
    - Total medical costs vary by age and sex have been long understood.
        - In short, young males are less expensive than young females and older males are more expensive than older females.
    - However, excess medical costs by age and sex exhibit considerably different patterns than total medical costs by age and sex.
        - At most age bands, male claims costs are greater than female claims costs at the same age.
        - The % difference between male and female claims costs varies significantly by age.
            - Among the reasons for this different pattern is the prevalence of accidents among young males.

7.   **Continued**

- Other specific SL rating considerations
  - Underlying plan design
    - Per person out-of-pocket maximum expenses
    - Lifetime maximum benefit
    - Managed care features
  - Industry
    - Many stop loss insurers adjust rates up or down based on the industry.
  - Contract type
    - A 12/12 contract is less costly than a 12/15.
    - Anti-selection by contract type often occurs and should be reflected in the rate structure.

(c)   Compare and contrast the product variations of:

(i)   Specific Stop Loss contracts

(ii)   Aggregate Stop Loss contracts

Commentary on Question:
- *In order to get the maximum points allowed on this question, candidates must have listed the major items of the model solution.*
- *Few candidates did well in that part of the question.*
- *Candidates that did not score well in that question are those that did not list the items of the model solution.*

(i) SSL product variations:
- Aggregating specific stop loss (ASSL)
  - This variation is useful in several situations
    - It enables the stop loss insurer to avoid nuisance claims that is otherwise reimbursable claims that are close to the specific stop loss deductible.
    - Some self-funded plan sponsors prefer not to change their SSL deductible with inflation.
    - It saves the plan sponsor the cost of administrative loads and commissions relating to the aggregating specific deductible.
    - Aggregating specific is sometimes used in lieu of lasering
  - ASSL increases the specific deductible.
    - The amount of the increase depends upon the pattern of losses exceeding the specific deductible.
    - The results of ASSL are subject to greater volatility than traditional SSL.

7. Continued

(ii) ASL product variations:
- Monthly accommodation
  - ASL ordinarily provides for a settlement of losses at the end of the policy period.
    - Smaller policyholders often prefer to have a monthly settlement based upon losses paid to date compared to a pro rata attachment point.
  - Monthly accommodation simply means that the ASL insurer advances a portion of the annual settlement.
    - The SL insurer will incur processing and opportunity costs associated with advancing interim benefits.
    - Credit risk may arise if the plan cancels the stop loss policy prior to the end of the policy period.

- Aggregate only
  - ASL is rarely offered and when it is offered, the ASL only policy ordinarily includes a ''ghost deductible'', which has the same effect as a SSL deductible.
    - It limits the stop loss insurer's exposure to large losses per covered life under the ASL.
    - In effect, the plan truly self-insures excess losses per covered life.
  - There are fixed costs related to issuing and administering such policies.

- Terminal liability
  - Terminal liability is an option that some insurers allow policyholders to elect at issue of a 12/12 policy.
    - It provides coverage for run-out liability when the policy terminates.
  - It converts a 12/12 policy into a 12/15 policy, but only in the year that the policyholder terminates coverage.
  - It is particularly useful to policyholders that wish to convert their employee benefit plan's financing from self-funding to conventional funding.

(d)   Calculate the losses reimbursed under this stop loss contract. Show your work.

7. Continued

Commentary on Question:
- *In order to get the maximum points allowed in this question, the candidates must have got the correct calculations.*
- *Most candidates did score very well in that part of the question.*
- *Candidates that did not score well in that question are those that did not calculate correctly the Total Reimbursement Losses.*

Answer to the question:

Losses exceeding SSL deductible:	= Max (0; 300,000-250,000) + Max (0; 375,000-250,000) + Max (0; 425,000-300,000) = 350,000
Remaining Losses:	= 1,600,000 - 350,000 = 1,250,000
Minimum Aggregate Attachment Point:	=120% x 90% x 240 x 12 x 400 = 1,244,160
Aggregate Attachment Point:	= Max (120% x 400 x 3,000; 1,244,160) = 1,440,000
ASL Reimbursement:	= Max (0; 1,250,000-1,440,000) = 0
Total Reimbursed Losses:	= 350,000 + 0 = 350,000

(e)   Describe other types of special funding arrangements.

Commentary on Question:
- In order to get the maximum points allowed on this question, candidates must have listed the funding arrangements and briefly describe each of them.
- Most candidates did well in that part of the question.
- Candidates that did not score well in that question are those that did not list the funding arrangements with a brief description.

Answer to the question:
- Reserveless plan
    - Insurer foregoes premium payments in return for a contractual promise by the policyholder that they will pay reserves needed when contract terminates (called ''terminal'' premium).
    - The premium savings is a one-time reduction, future premiums will be higher than those of the first year.
- Fully-insured plan
    - Insurer bears immediate risk of adverse experience, as well as the profit in case of favorable experience.
    - Insureds have the security of the insurer being claim guarantor.
    - Premium tax will be payable, thus increasing the cost of providing benefits.

7.   Continued

- Self-insured plan
  - The employer is the primary risk-taker.
  - Most self-insured plans will contract with an insurance company or independent administrator to administer the plan.
- Minimum premium contract
  - The expected claims portion of the premium goes to a fund that is used thereafter by the insurer to pay claims.
  - Insurer is liable for excess amounts.
  - Avoids premium tax in many jurisdictions (Except California).
- Retrospective premium arrangement
  - Policyholder takes over some or all of the aggregate claim risk in exchange for reduced risk charges and lower up-front premiums.
  - If experience is worse than anticipated, there would be an additional premium due up to an agreed-upon limiting amount.
  - If experience is better than anticipated, there might be a refund payable to the policyholder or its RSF, or the policyholder might just keep the initial reduction.

8. **Learning Objectives:**
2. Evaluate and apply techniques for claim utilization management, care management, and population health management.

Learning Outcomes:
(2a) Describe, compare and evaluate care management and population health programs and interventions.

Sources:
Program Measurement and Evaluation Guide for EHM p. 15

Program Measurement and Evaluation Guide for EHM pp.20-21

Commentary on Question:
Candidates did well on parts a and b but struggled on part c.

Solution:
(a) Calculate the reduction in the number of admissions necessary to achieve the stated ROI. Show your work.

Commentary on Question:
The question did not state Gross or Net ROI so candidates could earn full marks for either solution. Overall, candidates did very well on this part of the question.

Desired Gross ROI = Needed Savings/Program Costs

Annual Program Costs = EHM Fees per member per month x # members x 12 months
Annual Program Costs = $0.75 x 1,000 x 12 = $9,000

Desired Gross ROI = 2

Needed Savings = 2 x $9,000 = $18,000

Hospitalization Cost per admission= Hospitalization Costs/Hospital Admissions = $1,000,000/43 = $23,256

Reduction in hospitalizations Needed = Needed Savings/Hospitalization Cost per admission = $18,000/$23,256 = 0.77

So essentially, a reduction of 1 hospital admission is needed to achieve the desired Gross ROI.

8. **Continued**

(b)   Describe the inadequacies of using the reduction in the number of admissions to calculate ROIs.

Commentary on Question:
Many candidates pointed out that average length of stay was the more important metric but few candidates pointed out the impact on other healthcare costs. Some candidates focused on issues with ROI in general, but the question was asking for issues specific to hospital admissions

By instituting the EHM program, there may be a reduction in other services, such as ER visits, outpatient procedures, etc., that would result in further savings. This would mean that fewer hospital admission reductions would be needed to achieve the desired ROI. Additionally, hospital admissions vary greatly in terms of length of stay. Reducing the average length of hospital stay would more directly translate to plan savings.

(c)   Calculate the total annual savings provided by this program by comparing the adjusted-expected whole-population cost trend to actual cost trend. Show your work.

Commentary on Question:
Many candidates used either all prospective trends or all retrospective trends. Candidates were given credit for identifying that not all trend components are impacted by the EHM program. Additionally the trend factors are multiplicative rather than additive.

Expected trend for performance year is set in advance of the study year. Upon completion of the study year, the expected trend is adjusted for factors that were not considered impacted by the EHM.

Trend Components	Prospective Expected	Retrospective Actual	Impacts EHM?	Actuarially Adjusted Expected
Demographic Changes	1.0%	**0.5%**	No	0.5%
Risk Factors	**1.0%**	0.0%	Yes	1.0%
Unit Prices	3.5%	**3.0%**	No	3.0%
Utilization	**1.5%**	1.0%	Yes	1.5%
Plan Design	-1.0%	**1.0%**	No	1.0%
Total	6.09%	5.60%		7.18%

Expected PMPM = Baseline PMPM x (1 + Actuarially Adjusted Expected Trend)
Expected PMPM = $250.00 x 1.0718 = $267.95

8. **Continued**

EHM PMPM Savings = ($ spend expected) – ($ spend actual)
EMH PMPM Savings = $267.95 - $265.00 = $2.95

Total Savings = $2.95 x 15,000 x 12 = $531,000

9. **Learning Objectives:**
2.   Evaluate and apply techniques for claim utilization management, care management, and population health management.

Learning Outcomes:
(2b)   Estimate savings, utilization rate changes and return on investment as it applies to program evaluation.

(2c)   Describe the considerations in the design, implementation and evaluation of a care management program.

Sources:
Duncan Chapter 13 and the Case Study

Commentary on Question:
Commentary listed underneath question component.

Solution:
(a)   Explain the importance of adjusting for patient risk to properly assess the effectiveness of a disease management (DM) program.

   Commentary on Question:
   A well prepared candidate would have identified the most important item to adjust for risk is that the baseline and intervention populations are considered equivalent. A majority of candidates were able to identify that adjustments are necessary since changes in risk can impact claims costs.

   - A key characteristic of evaluating a disease management program is that it is a population based technique comparing the chronic disease population before and after an intervention.
   - This leads to an often-implicit assumption that the baseline and intervention populations are equivalent
   - Adjusting for patient risk is important to ensure this equivalence since
     o Average cost of different subgroups can vary significantly from the overall average and
     o Changes in mix of subgroups within overall population can affect overall average cost PMPM and therefore trend

(b)   Calculate the total dollar claims savings for this DM program for the following scenarios:

   (i)   Not normalized for risk.

   (ii)   Normalized for risk.

   Show your work.

9. Continued

Commentary on Question:
A majority of candidates incorrectly calculated a non-risk adjusted trend of 8%. The important methodology change for normalizing and not normalizing for risk is to reweight your baseline PMPM cost based on the different intervention populations. Both calculations use the risk adjusted baseline trend on the baseline PMPM cost. Partial credit was received for calculating the other steps correctly (for example the not normalized baseline PMPM of $764.33), but not using the appropriate trend.

- Not Normalized For Risk
    - First calculate a risk adjusted baseline trend :
        - ($810/1.02)/(750/1.01) - 1 = 6.94%
    - Not Normalized For Risk
        - Calculate Baseline PMPM Cost
            - ($875*45/225)+(765*120/225)+(680*60/225) = 764.33
        - Calculate Intervention Year PMPM Cost
            - (680*63/234)+(675*117/234)+(596*54/234) = $658.12
        - Savings = 764.33 * 1.0694 – 658.12 = $159.25 PMPM
            - 159.25 * 234,000 = $37,264,500
    - Normalized For Risk
        - Calculate Baseline PMPM Cost based on Intervention Year Risk Spread
            - (875*63/234)+(765*117/234)+(680*54/234) = $775
        - Savings = 775 * 1.0694 – 658.12 = 170.67
            - 170.67 * 234,000 = $39,936,780

(c) Recommend whether or not you should continue using this DM program. Justify your response.

Commentary on Question:
A majority of candidates were able to correctly calculate the savings (ROI was also accepted) for the program. An important distinguishing characteristic was that you need to use the normalized risk calculation from b to calculate the savings. Partial credit was awarded for not identifying which savings calculation was being used for the comparison.

- Using the normalized for risk savings calculations
    - $170.67 - $160.00 * 234,000 = $2,496,780
    - This is greater than zero so recommend to keep on using the program

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10. **Learning Objectives:**
1. The candidate will understand how to evaluate the effectiveness of traditional and leading edge provider reimbursement methods from both a cost and quality view point.

Learning Outcomes:
(1a) Calculate provider payments under standard and leading edge reimbursement methods.

(1b) Evaluate standard contracting methods from a cost-effective perspective.

Sources:
Essentials of Managed Health Care, Kongstvedt, 6th Edition, 2013, Ch. 9

GHA-102-13: Evaluating Bundled Payment Contracting

Provider Payment Arrangements, Provider Risk, and their relationship with cost of healthcare

Commentary on Question:
Most candidates did well on Part (a) (i), but did not provide the desired level of detail for part (a)(ii). Some candidates did not differentiate between risks applicable to an IPA vs. an insurer. Some candidates did not include physician payments in the bundled payment.

Solution:
(a)

     (i)   Describe six risks to the IPA of adopting a bundled payment contract with Quantum.

     (ii)   Describe the ways the IPA can mitigate risks involved with adopting a bundled payment contract.

     Commentary on Question:
     Many candidates addressed the risks from the perspective of the insurer, such as risk of overutilization to get a larger share in the bundled payment. In order to receive full credit, candidates needed to describe the risks from the perspective of the IPA.

     1) Risk of severity of C-Section in the cases higher than the severity built into the bundled rates.
        a. Mitigation: Propose the bundled rates vary by case severity.
     2) Risk of not distributing payments within the bundle properly.
        a. Mitigation: Ensure the bundled payment agreement has specified what the IPA will be paid and the rate is fair to the IPA.
     3) Risk of having catastrophic claims.
        a. Mitigation: Purchase stop loss insurance to mitigate the risk.

10. Continued

    4) Risk of financial stability of low case load.
       a. Mitigation: Ensure the insurer can direct enough members to minimize the random fluctuation of severity/complexity associated with a low number of C-Sections.
    5) Risk of providing services that are not paid by the bundle rate.
       a. Mitigation: clearly define the episode of care paid by the bundle rate.
    6) Risk of administration complexity to delay the share of bundle payment to IPA.
       a. Mitigation: Ensure the party receiving and allocating the bundled payment has the ability to administer and distribute the payments. Use contract terms to protect against delayed payments.

(b) Recommend whether or not the IPA should accept this bundled payment rate. Justify your response.

Commentary on Question:
A number of candidates did not answer 10 (b) and 10 (c). Common issues were: (1) Some candidates did not include the physician costs in the bundled payment. (2) Some candidates did not use the 2017 facility cost with blending the costs for hospital A, B and C. (3) Some candidate did not make correct comparisons (e.g. comparing facility cost to the bundle rate). (4) Some candidates did not make a recommendation.

Some candidates did not back out the 2018 physician costs, rather they trended the physician costs from 2016 to 2018 and calculated the expected bundled rate. This is not the ideal approach but we gave full credit if the calculation was correct.

The bundled payment will cover facility, professional, and supplies charges. Necessary steps to evaluate this:
* Calculate expected average facility charge
* Determine current professional and supplies charges
* Determine total average case rate and compare to proposal

10. Continued

Using Email #2 of the case study (Exhibit 6A), the 2017 average hospital cost per admit is calculated as:

Average per admit = ALOS x allowed per day; average across hospitals

$[50*3.2*2400 + 35*3.1*2500 + 40*3.4*2000] / [50 + 35 + 40] = 7418$

	A	B	C	2017 Average Cost
Admission	50	35	40	
ALOS	3.2	3.1	3.4	
Avg Billed per day	$4,800	$3,000	$4,000	
Avg Allowed per day	$2,400	$2,500	$2,000	
Per Admit	$7,680	$7,750	$6,800	**$7,418**

Using Email #1 (Exhibit 6) and the trends above:

	2016	2017	2018 (Ex 6B)
Facility	$7,400	$7,418	$7,418*1.05 = $7,789
Supplies	$2,200	$2,200*1.05 = $2,310	$2,310*1.02 = $2,356
Professional	$3,150		

Using 2017 costs, the IPA would receive $13,000 – $7,418 – $2,310 = $3,272
Using 2018 costs, the IPA would receive $13,000 – $7,789 – $2,356 = $2,855

The expected payment to the IPA in 2018 is $2,855 per C-section. This is less than the 2016 charges of $3,150.

Unless the IPA's costs are lower or the IPA believes it can negotiate a more favorable allocation of the bundled payment, the IPA should NOT accept this bundled payment arrangement.

(c) Recommend whether or not Hospital A should accept this bundled payment rate. Justify your response.

Commentary on Question:
Most of the candidates who answered 10 (b) did well on 10 (c). However, the majority of candidates did not include direct numerical support on this part.

The expected cost for Hospital A in 2018 is $7,680 * 1.05 = $8,064.

The expected cost for professional services in 2018 is $3,150*1.02*1.02=$3,227
The expected cost for supplies in 2018 is $2,356 (from part b above)
The bundled payment for Hospital A is $13,000-$3,227-$2,356=$7,417
This payment is less than the expected cost of $8,064. Therefore, the Hospital A should NOT accept the bundled payment.

11. **Learning Objectives:**
3.   The candidate will understand and apply valuation principles for insurance
       contracts.

Learning Outcomes:
(3c)   Calculate appropriate claim reserves given data.

(3g)   Apply applicable standards of practice related to reserving.

Sources:
GHA-103-16: Health Reserves (Lloyd)

ASOP #5: Incurred Health and Disability Claims

Commentary on Question:
*General comments have been given for each section. In general, candidates performed
well on this question, understanding what would affect an IBNR calculation/results,
where IBNR affects financial statements and how to compute an IBNR*

Solution:
(a)   Describe the considerations for estimating and analyzing incurred claims
       according to actuarial standards of practice.

       Commentary on Question:
       *Candidates performed well when describing how to estimate incurred claims and
       what might affect the IBNR per ASOP #5. However, most candidates did not
       describe considerations when analyzing, or computing the IBNR*

       Per ASOP #5, considerations that should be given when estimating incurred
       claims include:
       • Health Benefit Plan Provisions and Business Practices
       • Economic Influences – examples include economy downturns and interest
         rates which might affect the pattern of services sought out
       • Organizational Claims Administration – changes such as a change in the TPA
         or platform
       • Risk Characteristics and Organizational Practices by Block of Business –
         changes might include differences in demographics (e.g. ACA enactment or
         baby boomers aging into MA products) or recent changes to underwriting
         practices for group products
       • Legislative Requirements – examples might include new benefits being added
         as a requirement (e.g. essential health benefits, Mental Health)
       • Carve-Outs
       • Special Considerations for Long-Term Products

11. Continued

Per ASOP #5, considerations that should be given when analyzing, or computing the IBNR, include:
- Unpaid Claims Liability – examples might be changes in inventory that may or may not be influenced by administration practices
- Categories of Incurred Claims – examples might include things like whether claim lags are inclusive or exclusive of pharmacy
- Reinsurance Arrangements – similar to carve-outs, reinsurance contracts and provisions would affect the amount paid by the health plan and subsequently the claim lags
- Large Claim Patterns – as an example, larger claims maybe occur with regularity and as such could be reserved for as a separate line item
- Coordination of Benefits (COB) or Subrogation – similar to reinsurance or carve-outs, COB would affect the liability of the plan
- Provider Contractual Arrangements – reimbursement changes to providers would affect future lags or recent payments
- Consistency of Basis – examples would include the methodology being applied or the accounting method (e.g. GAAP vs STAT)

(b) Explain the interplay of the income statement and balance sheet with regards to claim reserving.

Commentary on Question:
Candidates typically at a basic level, understood how the IBNR would sit on the balance sheet as a liability and how changes to the IBNR would affect the income statement. However, most candidates did not describe other key interactions between the two nor the importance of adequate claim reserving

A sufficient answer describing the balance sheet, income statement, the interplay between the two and important concepts of how IBNR affects each include:
- Paid transactions are typically reflected by their entry in the General Ledger accounts of the company. Preparation of an Income Statement for a given period (such as month, quarter, or year) starts with cash transactions for the period in question, which would include paid claims, regardless of incurred date
- Balance Sheet entries include assets and liabilities as of points in time representing the beginning and ending dates for the Income Statement period
- The Balance Sheet also includes actuarial reserve entries for values not known as of the end-date, but which can be estimated using models, contingencies, or actuarial principles. As a practical reality, actuarial reserves usually represent the largest estimated values on the books of most health insurers

11. Continued

- The basic goal of reserving is to help achieve a matching of revenue to expense – and thereby more accurately reflect actual experience under insurance contracts. Cash collections and payments are rarely timed entirely consistently with the accounting period for which the carrier was at risk for the contract. Accounting conventions have developed to create interplay between the Income Statement and the Balance Sheet to better accomplish the desired matching of revenue to expense
- Changes in Balance Sheet entries between the beginning and end points are used to adjust paid transactions and achieve the desired matching. Income for a given period is thereby determined by the combination of the cash entries and the change in these Balance Sheet entries

(c) Describe types of statements of actuarial opinion regarding health insurance liabilities and assets.

Commentary on Question:
Candidates typically performed well on this part of the question, adequately describing the 4 types of opinions. Some candidates listed the actual statements where opinions might be attached however the question was asking for descriptions of the opinions

The four types of actuarial opinions and their descriptions are as follows:
- Unqualified Opinion:
  - When complying with NAIC Health Annual Statement, an unqualified opinion represents that the reserve amount makes good and sufficient provision for the specified liabilities. In forming an opinion as to whether the actuarial items "make good and sufficient provision for all unpaid claims and other actuarial liabilities," the actuary should be satisfied that the actuarial judgments made give recognition to any relevant factors, including the time periods over which the liabilities will extend. The actuary is expressing an opinion on the reasonableness of the aggregate liabilities and assets. The actuary should be satisfied that the liabilities, assets, and related items opined on make reasonable provision to cover obligations under moderately adverse conditions.
  - In other circumstances, such as under a contractual agreement with a principal, the actuary may provide an unqualified opinion if the liability and asset amounts are reasonable for the intended purpose. In this situation, the actuary should be explicit in the opinion or the supporting actuarial memorandum as to whether a provision for adverse deviation has been included in the determination of the reasonableness of the liability or asset.

11. Continued

- Adverse Opinion: When complying with NAIC Health Annual Statement, the actuary should issue an adverse opinion when the aggregate amount established is not sufficient for the actuary to provide an unqualified opinion. In other circumstances, the actuary should provide an adverse opinion when the liabilities fall outside a reasonable range for the specified purpose.
- Qualified Opinion: The actuary should issue a qualified statement of actuarial opinion when, in the actuary's opinion, the liability or asset for certain items are in question because they cannot be reasonably estimated or when the actuary is unable to render an opinion on the liabilities or assets for those items. The actuary should determine whether the total amount makes a reasonable provision for the specified items other than the items to which the qualification relates. The actuary is not required to issue a qualified opinion if the actuary reasonably believes that the items in question are not likely to be material.
- Inconclusive Opinion: The actuary's ability to give an opinion is dependent upon data, analyses, assumptions, and related information that are sufficient to support a conclusion. If the actuary cannot reach a conclusion due to deficiencies or limitations in the data, analyses, assumptions, or related information, then the actuary should issue an inconclusive opinion. A statement of an inconclusive opinion should include a description of the reasons that cause the opinion to be inconclusive.

(d)   Calculate the incurred but not reported (IBNR) reserve for the incurral months October 2016 – December 2016 for the PPO - Small Group (ACA-Compliant) block of business as of 12/31/2016 using the Without High and Low Averaging technique. Show your work.

Commentary on Question:
Candidates typically performed extremely well on this section tying the concepts of the high & low averaging technique, calculating completion factors and the subsequent IBNR

Computing the High & Low Development Factor:
- Month 1 would be the average of the remaining 9 factors, once the high of 42.812 and low of 5.167 were removed, resulting in   13.073
- Month 2 would be the average of the remaining 9 factors, once the high of 2.985 and low of 1.516 were removed, resulting in 1.902
- Month 3 would be the average of the remaining 9 factors, once the high of 1.806 and low of 1.104 were removed, resulting in 1.197

11. Continued

To compute the month 1 IBNR:
- Development factor: 13.073
- Completion factor: 31.7%/13.073 = 2.4%
- Cumulative payments: $102k
- Ultimate payment: $102,000/2.4% = $4,202,248
- IBNR: $4,202,248 - $102,000 = $4,100,248

To compute the month 2 IBNR:
- Development factor: 1.902
- Completion factor: 60.3%/1.902 = 31.7%
- Cumulative payments: $1,340,000
- Ultimate payment: $1,340,000/31.7% = $4,223,010
- IBNR: $4,223,010 - $1,340,000 = $2,883,010

To compute the month 3 IBNR:
- Development factor: 1.197
- Completion factor: 72.2%/1.197 = 60.3%
- Cumulative payments: $1,528,000
- Ultimate payment: $1,528,000/60.3% = $2,532,100
- IBNR: $2,532,100 - $1,528,000 = $1,004,100

Total IBNR = $4,100,248 + $2,883,010 + $1,004,100 = $7,987,358

(e) Calculate the first lag month age-to-age factors for the Quantum Legacy III – Individual block of business for July 2015 through December 2015. Show your work.

Commentary on Question:
Candidates did fairly well on this section of the question by demonstrating the concept computing first lag month age to age factors

To compute the following 6 months of factors you would compute each of these items per the exhibit given:
- Month 1 = (725,000+31,000)/31,000 = 24.4
- Month 2 = (652,000+54,000)/54,000 = 13.1
- Month 3 = (763,000+56,000)/56,000 = 14.6
- Month 4 = (755,000+44,000)/44,000 = 18.2
- Month 5 = (844,000+43,000)/43,000 =20.6
- Month 6 = (685,000+44,000)/44,000 =16.6

11. Continued

(f)   Recommend whether or not paid claims from the PPO - Small Group (ACA Compliant) block of business should be combined with paid claims from the Quantum Legacy III - Individual block of business for the purpose of establishing IBNR estimates. Justify your response.

Commentary on Question:
Candidates performed well on this section of the question by making a recommendation that the lags not be combined. However, most candidates did not reference the work done in e & f to support their position.

I recommend that the lags not be combined. There is a significant difference in the month 1 development factor of 13.073 in (d) vs. the month 1 age-to-age factor of 24.4 in (e). Claim patterns / benefits / risk profiles are also very different between the two blocks of business

12. **Learning Objectives:**
2.   Evaluate and apply techniques for claim utilization management, care management, and population health management.

Learning Outcomes:
(2b)   Estimate savings, utilization rate changes and return on investment as it applies to program evaluation.

(2c)   Describe the considerations in the design, implementation and evaluation of a care management program.

(2e)   Apply the actuarially adjusted historical control methodology.

Sources:
Duncan Chapter 8, 10, 12

Case Study

Commentary on Question:
Commentary listed underneath question component.

Solution:
(a)   List the common exclusion criteria for measuring the outcomes of a disease management (DM) program.

Commentary on Question:
Most candidates performed well on this part of the question and received full points. Some candidates provided explanations for why certain exclusion criteria might be applied. Because the question asks the candidate to only list common exclusion criteria and not explain or justify the reasoning for these criteria, candidates who only listed common exclusion criteria received full points. However, no credit was withheld and no additional credit was given if candidates explained or justified the criteria they listed.

- Trauma and accident claims, e.g. fractures, dislocations, sprains, burns, etc.
- Behavioral and substance abuse claims
- Malignant neoplasms
- Maternity and childbirth claims
- Drug claims
- ESRD members
- Hospice members
- Members eligible for other programs

12. Continued

- Members with transplants
- Catastrophic claims and/or claimants above a given threshold
- Members without continuous coverage over the baseline and intervention periods
- Institutionalized members
- Members with HIV/AIDS

(b) Calculate the savings due to averted chronic admissions for Royale Health's DM program using the actuarially-adjusted historical control group methodology. Show your work.

Commentary on Question:
Some candidates performed well on this part of the question while other candidates struggled with some parts of the calculation. This part of the question mirrors the example provided on page 182 in chapter 8 of Duncan's 2ⁿᵈ edition Managing and Evaluating Healthcare text.

Many candidates excluded the cancer, transplants, and heart failure cohorts (or some combination of these) from the "All Chronic" cohort in their calculations. Full points were given for any of these scenarios so long as the calculations were correct. The calculations for the solution presented below reflect the savings for the "All Chronic" cohort without excluding any of the other cohorts.

	Baseline Admissions/1000 x Utilization Trend	$= \dfrac{14,000}{200,000 / 1,000} \times 1.05 =$	73.50
Minus:	$\dfrac{\text{Actual Admissions}}{1000}$	$= \dfrac{15,500}{225,000 / 1,000} =$	68.89
Equals:	$\dfrac{\text{Reduced Admissions}}{1000}$	$= 4.61 =$	4.61
Multiplied by:	$\dfrac{\text{Average Members in Intervention Period}}{1000}$	$= \dfrac{225,000 / 12}{1,000} =$	18.75
Equals:	Total Reduced Admissions	$= 86.46 =$	86.46
Multiplied by:	$\dfrac{\text{Trended Unit Cost}}{\text{Admissions}}$	$= \dfrac{\$330.00 * 225,000}{15,500} =$	$4,790.32
Equals:	Estimated Savings due to Averted Admissions	$= \$414,163.31$	$414,163.31

12. Continued

(c)

    (i)   Describe the issues with applying the actuarially-adjusted historical control group methodology to Royale Health's DM program for calculating savings.

    (ii)   Recommend solutions to mitigate the issues identified. Justify your response.

Commentary on Question:
This part of the question was testing the candidate's understanding of the limitations of the actuarially-adjusted historical control group methodology as described in Duncan's 2nd edition Managing and Evaluating Healthcare text.

For part (i), candidates, who demonstrated an understanding of the concepts of equivalent populations, regression to the mean, and risk adjustment, by describing the concepts rather than simply listing them, received full points.

For part (ii), many candidates were able to recommend solutions to mitigate the issues identified in part (i) and received partial or full points for their responses.

(i)

- The actuarially adjusted historical control group methodology implicitly assumes that regression to the mean is uniformly distributed in both the baseline and intervention periods
- There is an implicit assumption that the baseline and intervention populations are equivalent
- The member mix of the chronic population may differ in the baseline period compared to the intervention period, thereby influencing the cost per admission in both periods and resulting in non-equivalent populations in both periods

(ii)

- Adjust for patient risk to ensure equivalence among the baseline and intervention populations
- Conduct a randomized control group study

13. **Learning Objectives:**
1.   The candidate will understand how to evaluate the effectiveness of traditional and leading edge provider reimbursement methods from both a cost and quality view point.

Learning Outcomes:
(1f)   Describe quality measures and their impact on provider reimbursement.

Sources:
Essentials of Managed Health Care, Kongstvedt, 6 th Edition, 2013, Ch. 9, 12

Commentary on Question:
Commentary listed underneath question component.

Solution:
(a)   Describe the five steps of the Lean Six Sigma model for continuous quality improvement.

       Commentary on Question:
       Few students got credit for this section, and a few commented they did not recall this from the source material. Six Sigma was covered in the "Quality Management" section of Chapter 12 in Kongstevedt, on "Introduction to Managed Behavioral Health Care Organization." For full credit, students needed to describe all 5 steps, and the descriptions needed to reference variation.

- Define – identify scope of problem and estimated benefits of solution
- Measure – measure current variation of performance data
- Analyze – find potential sources of variation
- Improve – verify, control, and optimize sources of variation
- Control – establish system of controls to manage gains of solution

(b)   Describe the tools and programmatic approaches used to change physician behavior.

       Commentary on Question:
       Most students did well on this section. No credit was given for simply listing tools or approaches – to receive credit, students needed to provide descriptions that demonstrated an understanding of the tools or approaches, such as an indication of how effective the approach was, or considerations using the tools. Credit was given for valid answers not listed below. To receive full credit, the student needed to provide at least 6 valid descriptions in total between tools or approaches sections.

13. Continued

Tools
1. Communication
    Communication can take many forms, such as emails, social media, newsletters, etc. Demonstration of humility and empathy in communications can make the practitioner more likely to see the medical manager as an ally rather than an enemy.

2. Data
    The availability of data to change utilization patterns is fundamental to medical management. Data needs to be credible, accurate, and should be adjusted to take into account population differences where appropriate.

3. Mission Clarity
    Success in changing physician behavior is more likely if a critical mass of the physicians understand and embrace the goals of the organization. Efforts to communicate the mission and goals should go beyond just convincing leadership.

Programmatic approaches
1. Formal continuing medical education
    Clinical training events such as seminars and conferences, as well as distributing information for home-study. These have been shown to be relatively ineffective at changing behavior, but help disseminate clinical information.

2. Data and feedback
    To be effective, data should be provided to physicians in a timely manner (more often than once a year), and should be usable. Feedback linked to economic performance is more likely to produce substantial change.

3. Practice guidelines and clinical protocols
    Guidelines can be created based on evidence-based medicine, and are often related to the concept of "medical necessity." They are most effective at influencing physician behavior if the focus is on a small number of very specific guidelines.

4. Small group programs (or peer groups)
    This can be a highly effective approach. It is most effective if conducted by respected physicians or academics, without any conflict of interest.

5. Address non-compliance individually
    Discipline and sanctions should be a last resort, because of the potential of alienating other providers who work with the provider being sanctioned.

14.

Learning Objectives:

3.   The candidate will understand and apply valuation principles for insurance contracts.

Learning Outcomes:

(3c)   Calculate appropriate claim reserves given data.

(3g)   Apply applicable standards of practice related to reserving.

Sources:

AAA Premium Deficiency Reserves Discussion Reports pg 5-6, 16-17

ASOP 28

ASOP 42 page 9 section 2.9

Commentary on Question:

Question 14 tested the candidate's preparedness to determine Premium Deficiency Reserves on both a GAAP and Statutory Basis. The question writer provided sufficient information to determine deficiency reserves by two methods – Block by Block and Aggregate. Given the PDR, we expected the candidate to note Risk Based Capital issues, with acknowledgement of potential company and regulator action.

Solution:

(a)   Compare and contrast the purpose of premium deficiency reserves (PDR) under Statutory accounting and GAAP accounting.

Commentary on Question:

Most students understood the differences between GAAP and Statutory. Fewer students noted the similarities.

PDR equals the excess of future contracted benefits and associated expenses over future revenues and current contract reserves. [PDR = PVFC + PVFE less PVP, discounted with Interest.

GAAP PDR calculations are consistent with business assumptions, less conservative than Statutory;
GAAP PDR may result in DAC write down before establishing a reserve balance;

Statutory PDR calculations based on more conservative assumptions;
Statutory PDR focuses more on maintaining company solvency, ensuring the company can pay policy owner benefits.

14. Continued

(b)

    (i)   Create a chart of the PDR and the resulting net worth for each company at the beginning of the PDR determination period using:

- Block-by-block basis
- Aggregate basis

Show your work.

    (ii)   Calculate the projected net worth for each company at the end of the PDR determination period. Show your work.

    (iii)   Identify the applicable regulatory intervention level for each of A, B, and C. Justify your response.

Commentary on Question:
Most candidates answered b(i)and b(ii) correctly. We gave full credit if we found a complete chart, as listed below. Few candidates received full marks on b(ii) because of lack of "showing work".

B(iii) proved challenging for about 50% of students for these reasons:
1. *Failure to consider more than one perspective;*
2. *Failure to justify response;*

Solution:	Chart of Net Worth	A	B	C
ii)	Net worth Before PDR	5,000	5,000	5,000
i)	Block-by-block PDR	(1,000)	(1,000)	(2,500)
i)	Net worth after b-by-b PDR (BOY)	4,000	4,000	2,500
ii)	Projected Networth after B by B PDR (EOY)	4,000	6,000	6,500
i)	Aggregate-basis PDR	(1,000)	0	0
i)	Net worth after agg-PDR (BOY)	4,000	5,000	5,000
ii)	Projected Networth after Agg PDR (EOY)	4,000	6,000	6,500
ii)	Projected actual	4,000	6,000	6,500

14. Continued

Using the block-by-block basis for PDRs:	A	B	C
iii) Block-by-block PDR	(1,000)	(1,000)	(2,500)
iii) Net worth after b-by-b PDR	4,000	4,000	2,500
iii) **Intervention Level**	**Company**	**Company**	**Regulatory**

Using the aggregate basis for PDRs:	A	B	C
iii) Aggregate-basis PDR	(1,000)	0	0
iii) Net worth after agg-PDR	4,000	5,000	5,000
iii) **Intervention Level**	**Company**	**None**	**None**

Using the reasonable earnings projection:	A	B	C
iii) Projected actual	4,000	6,000	6,500
iii) **Intervention Level**	**Company**	**None**	**None**

Company A @ $4k Is at the company action level under either of the two possible PDR scenarios, and under a reasonable earnings projection.

Company B @ $4k Is at the company action level only under the Block by Block PDR scenario, with no action requirements in the other two scenarios.

Company C @ $4k Is at the Regulatory action level, only under the Block by Block scenario, with no action required under the other two scenarios.

Extra Point:
Specific to Company C, regardless of the lack of required action, the Company should pay attention to the SG business.

15. **Learning Objectives:**
4.	The candidate will understand how to apply principles of pricing, risk assessment and funding to an underwriting situation.

Learning Outcomes:
(4a)	Understand the risks and opportunities associated with a given coverage, eligibility requirement or funding mechanism.

(4b)	Understand, evaluate and apply various risk adjustment mechanisms.

Sources:
GHA-118-17: Issues to Consider in Self-Funding Long-Term Disability Insurance

Issues in applying credibility to group long term disability insurance , Milliman, pp 5-15

Group Health Chapter 38 pg 669-676

Commentary on Question:
This question was designed to ascertain the candidate's understanding of Long Term Disability issues, the 1987 CGDT and the 2012 GLTD, as well as the calculation of the credibility factors involved in a specific LTD block of business. This was a very good question at determining the depth of the knowledge of the candidates. Answers ranged from very superficial to a very thorough understanding of the material.

Solution:
(a)	List the challenges in applying credibility in LTD.

Commentary on Question:
*The question asked for a **list** of the challenges – unfortunately many candidates spent a lot of time describing these challenges and answered much more in depth than was required for this part of the question. Most candidates were able to list at least a few of the challenges. Only a small percentage of candidates identified a majority of the challenges.*

- Non-Independence of Claims
- Heterogeneous Claims
- Competitive Pricing Pressures
- Claim Duration
- Benefits from Other Sources
- Outlier Claims
- Regulatory Requirements
- Estimating Parameters

15. Continued

(b)   Calculate the credibility factor for the LTD block, according to limited fluctuation credibility theory. Show your work.

Commentary on Question:
Most candidates struggled with this question – only about a third of the candidates were able to successfully identify the required formulas for calculating the number of claims required for full credibility and the credibility factor. Many candidates chose an incorrect Z-score in the first calculation.

Number of claims required for full credibility:
$((1.96 / 0.05)^2) * (1 + (15,000/45,000)^2) = 1,707$

Credibility Factor:
$(1,278 / 1,707)^{(1/2)} = 87\%$

(c)   Calculate the credibility factor for the > 120 month duration, using the 1987 CGDT. Show your work.

Commentary on Question:
About half of the candidates were successful in identifying at least parts of the answer to this question, though less than a fifth were able to solve it to completion. Many candidates chose either an incorrect variance factor or Z-score in the first calculation.

Selected Variance Factor for duration > 120 months = 2.0

Number of terminations required for full credibility:
$2 * (1.44 / 0.05)^2 = 1,659$

Credibility Factor:
$(33 / 1,658)^{(1/2)} = 14\%$

(d)   Compare and contrast the 2012 Group Long-Term Disability Table (2012 GLTD) and the 1987 CGDT.

Commentary on Question:
This part of the question proved to be the most challenging. Most candidates struggled to come up with an answer that provided any depth to the comparison or contrasts between the 1987 CGDT and the 2012 GLTD.

15. Continued

- The statutory minimum reserve basis prior to Oct 2014, specifies the 1987 CGDT
- Companies are allowed to modify the claim termination rates contained in the table for the first two years of disability, "if the experience is credible."
- The 1987 CGDT is based on industry experience from the early 1980s and is fairly conservative resulting in higher-than-needed reserves for early claim durations.
- The 2012 GLTD is the required statutory minimum valuation basis for LTD claims incurred on or after Jan 1, 2017, but it may be used for claims incurred Oct 1, 2014 or later.
- Other differences between two tables:
  - 2012 based on much more recent experience and a much larger volume of experience
  - 2012 GLTD separates termination rates into death and recoveries – 1987 CGDT combined deaths and recoveries
  - 2012 GLTD claim termination rates vary by claim diagnosis, definition of disability, and indexed gross benefit amount
  - With 2012 GLTD, companies are required to modify the table for their own experience

(e)   Describe the types of follow-up studies for testing the adequacy of reserve methodologies and the accuracy of the resulting estimates.

Commentary on Question:
Most candidates identified the two types of studies found in the text. To receive full credit, candidates needed to provide some depth in their descriptions of the studies.

- Run-out Studies: Previous reserve balances are compared to subsequent payments and reserve balances, with appropriate adjustments for interest
- A/E Claim Termination Rate Studies
  - Compares actual claim terminations experienced by a company to expected claim terminations based on the table used in reserving.
  - A/E ratios of greater than 1 indicate more claims are terminating than assumed in reserve basis, meaning reserve basis is adequate.
  - duration
  - Special Considerations
    - Credibility
    - Types of terminations included
    - Exposure Characteristics
    - Voluntary Claim Settlements