Gimme All Your Money!

Post-Audit Extrapolation Mitigation

CMS Pub. 100-08 Chapter 3 Section 10.1.2

- Statistical sampling is used to calculate and project (i.e., extrapolate) the amount of overpayment(s) made on claims. The Medicare Prescription Drug, Improvement, and Modernization Act of 2003 (MMA) mandates that before using extrapolation to determine overpayment amounts to be recovered by recoupment, offset or otherwise, there must be a determination of sustained or high level of payment error, or documentation that educational intervention has failed to correct the payment error.
- By law, the determination that a sustained or high level of payment error exists is not subject to administrative or judicial review.

The Post-Audit Review

"There are three things in the world that deserve no mercy; hypocrisy, fraud and tyranny." - *[Frederick William Robertson]*

From the Horse's Mouth

As an alternative to individualized claims adjudication, sampling has been used by government agencies as a means to determine overpayments in instances involving large numbers of beneficiaries and claims.[30] The Act provides requirements that Medicare contractors must follow when extrapolating overpayment amounts via sampling. The Act states that a Medicare contractor may not use extrapolation to determine overpayment amounts unless the Secretary determines that "…there is a sustained or high level of payment error; or documented educational intervention has failed to correct the payment error."[31] The ALJ may not review the Secretary's decision that there has been a sustained or high level of payment error.[32]

CMS Pub.100-08 Chapter 3 Section 10.1.3

- If a particular probability sample design is properly executed, i.e., defining the universe, the frame, the sampling units, using proper randomization, accurately measuring the variables of interest, and using the correct formulas for estimation, then assertions that the sample and its resulting estimates are "not statistically valid" cannot legitimately be made. In other words, a probability sample and its results are always "valid."

Defining the Universe

"It is a capital mistake to theorize before one has data. Insensibly one begins to twist facts to suit theories, instead of theories to suit facts." – *[Arthur Conan Doyle, Sherlock Holmes]*

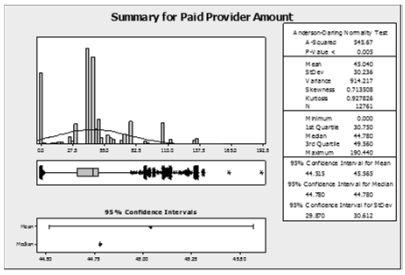
Defining the universe

- Collection, population, or set of entities, items, or quantities (grouped together on the basis of common or defining characteristics or features) from which a representative sample is drawn for comparison or measurement.
- Homogeneity
  - In statistics, homogeneity describes the properties of a dataset, or several datasets. They relate to the validity of the often convenient assumption that the statistical properties of any one part of an overall dataset are the same as any other part.

How do we see homogeneity?

- Universe with both E/M and non-E/M codes
  - Homogenous or heterogeneous?
- Universe for multi-specialty group with both primary and speciatlists
  - Homogenous or heterogeneous?
- It is critical to conduct tests of the universe as well as visiualize the data points to understand homoscedasticity (homogeneity of variances).

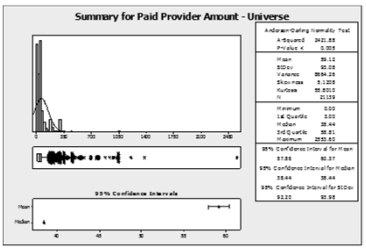
Understanding the visual universe



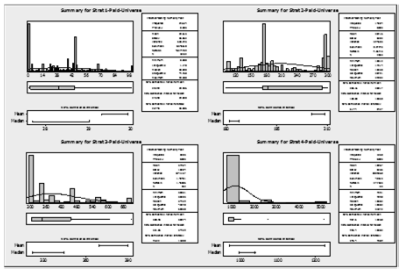
Stratification of the universe

- A technique used to analyze/divide a universe of data into homogeneous groups (strata) often data collected about a problem or event represents multiple sources that need to treated separately.
- A stratifying factor, also referred to as stratification or a stratifier, is a factor that can be used to separate data into subgroups. This is done to investigate whether that factor is a significant special cause factor

Example Heterogeneous Universe



Sample Stratified Universe



Sampling Frame

The Sampling Frame

- Sampling frame (synonyms: "sample frame", "survey frame") is the actual set of units from which a sample has been drawn: in the case of a simple random sample, all units from the sampling frame have an equal chance to be drawn and to occur in the sample. In the ideal case, the sampling frame should coincide with the population of interest.
- Is the sample frame the same as the universe?
  - No
- For example, in a stratified sample, the universe produces two sampling frames from which two separate samples will be drawn

Sampling

- Random sample
  - Every sample has an equal chance of being selected
    - Selecting claims to study payer behavior
- Stratified sample
  - Can still be random, however, distribution of sample is based on distribution of the population
    - Breaking the sample up based on paid amounts
    - Selecting E/M charts for audit based on distribution of codes
- Cluster Sample
  - Where a cluster of data points are chosen at random (i.e., beneficiaries)
  - Clusters can occur in multiple stages (i.e., sample of claims for a beneficiary)

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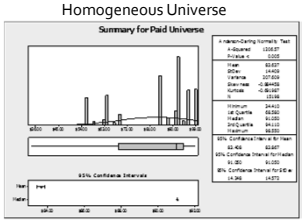
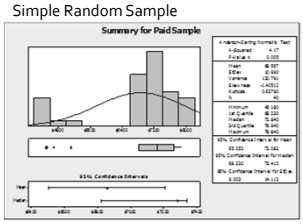
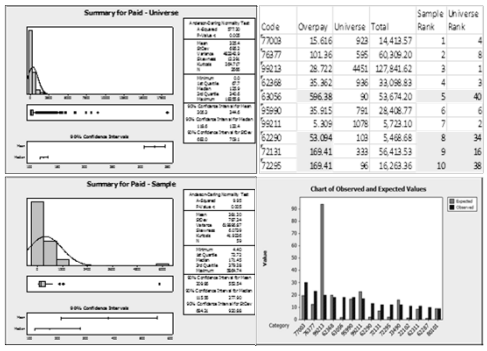
Simple random sample

Homogeneous Universe

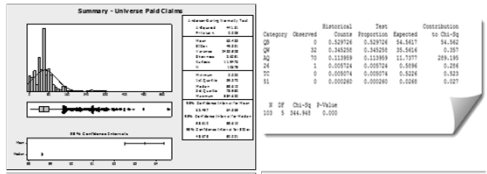


Simple Random Sample



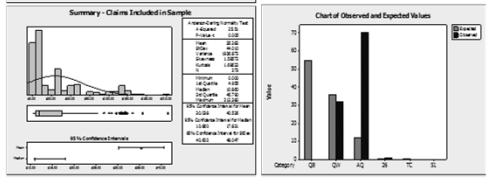


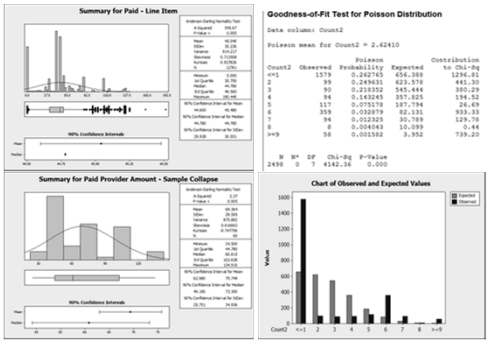
Code	Overpay	Universe	Total	Sample Rank	Universe Rank
77008	15.616	923	14,413.57	1	4
76877	101.36	595	60,309.20	2	8
99213	28.722	4451	127,841.62	3	1
62368	35.362	936	33,098.83	4	3
63056	596.38	90	53,674.20	5	40
95890	35.915	791	28,408.77	6	6
99211	5.309	1078	5,723.10	7	2
62290	53.084	103	5,468.68	8	34
72131	169.41	339	56,413.53	9	16
72195	169.41	96	16,263.36	10	38



Category	Observed	Historical Count	Test Proportion	Expected	Contribution to Chi-Sq
Q8	0	0.529726	0.529726	54.5417	54.542
Q4	32	0.345255	0.345255	35.5614	0.357
AQ	70	0.113959	0.113959	11.7377	259.195
26	1	0.009724	0.009724	0.8896	0.256
TC	0	0.000974	0.000974	0.0226	0.023
51	0	0.000260	0.000260	0.0268	0.027

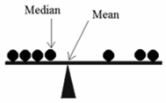
N	DF	Chi-Sq	P-Value
103	5	344.903	0.000





Measures of Central Tendency

- In the study of statistics there are three types of averages, called the mean, median, and mode.
- As a group, these averages are called measures of central tendency
- These metrics are used to identify the approximate location of the center of the data



Arithmetic Mean (average)

- Create a metric for each code using the same method
  - i.e., divide the charge by the RVU
- Add each of the results together to get a grand total
- Divide the grand total by the number of samples
- Pros:
  - Easy to calculate
  - Eliminates frequency bias
- Cons:
  - Does not take into account the frequency of occurrence
  - Not accurate if data is not normally distributed

$$\bar{x}_w = \frac{\sum_{i=1}^{n} x_i w_i}{\sum_{i=1}^{n} w_i}$$

Code	CF
99201	80.83
99202	81.61
99203	81.67
99204	106.79
99205	78.81
99211	86.96
99212	87.78
99213	68.43
99214	70.59
99215	75.73
Total	819.20
Count	10.00
Average	81.92

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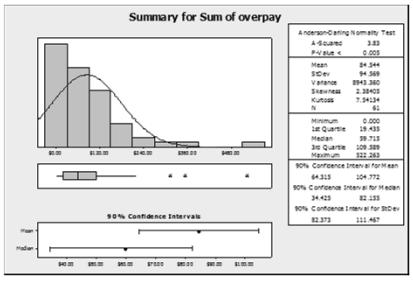
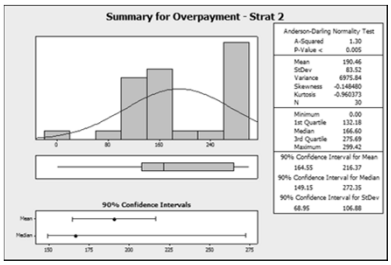
Median

- The median is the middle number in a set of data that is arranged in either ascending or descending order.
- One-half of the numbers will be on either side of the median.
- The median is good for use with non-normally distributed data as it is far less affected by outliers
- Order the data in ascending order
- Count the number of records and divide by two
- Pick the middle number
- If an even number of records, get the average of the middle two

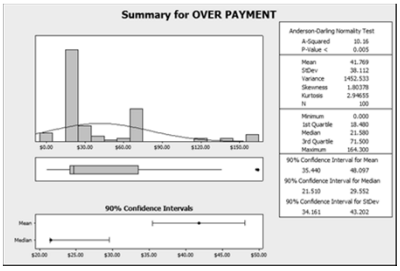
Example of Mean v. Median



Example of Mean v. Median



Example of Mean v. Median



Extrapolation

Science fiction is, after all, the art of extrapolation - *[Michael Dirda]*

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Rules of engagement

- Section 1842(a)(2)(6) of the Social Security Act requires the government to review, identify and/or deny inappropriate, medically unnecessary, excessive or routine services. Extrapolation techniques are used when the size of the universe of claims prohibits a complete review of every claim. In this case, a statistically valid random sample is drawn from that universe of claims in order to estimate potential payment error. In their "Standard of Work", CMS states that extrapolation may be used when there has been a determination that, within the universe of claims, there is a "sustained or high level of payment error" and again, this determination should be based upon a statistically valid random sample drawn from that universe.

Extrapolation

- Extrapolations are normally conducted in one of two ways:
  - Proportion of overpaid claims, or
  - Point estimate of overpaid amount per claim
- A proportion estimate is normally only appropriate when the individual ratios are close to each other
- In most audits, per claim estimates and error ratios are based on the lower bound of a one-sided 90% confidence interval

Example of a proportion finding

Template for overpayment estimate

Fill in the values for the shaded boxes

average ($\bar{X}$)	0.5805	Z	1.645	(value for 90% confidence interval)	
std dev (s)	0.4711	n	76	(sample size)	
		N	3489	(population size)	

$$\bar{X} - Z * \left(s/\sqrt{n}\right) * \left(\sqrt{\frac{N-n}{N-1}}\right) = 0.5805 - 0.0879$$

$$= 0.4926$$

Total paid to provider
$1,160,412.85

Estimate of overpayment
$1,160,412.85 * 0.4925670 = $571,581.02 Total due

Applying Proportions Generally

Note that the proportion (or percentage) reported in the Aberrancy Rate column is the same for every code.

This is problematic when the individual ratios are not closely associated

Claim ID	DOS	Paid Date	CPT	Amount Paid	Aberrancy Rate
300769576301	10/24/2011	11/1/2011	99214	$ 46.20	52%
300769576401	10/24/2011	11/1/2011	99214	$ 46.20	52%
300769576501	10/24/2011	11/1/2011	99214	$ 46.20	52%
300769576801	10/31/2011	11/1/2011	99215	$ 71.85	52%
300769576201	10/27/2011	11/2/2011	99214	$ 36.20	52%
300769576901	10/21/2011	11/2/2011	99214	$ 36.20	52%
300769576701	10/24/2011	11/2/2011	99214	$ 41.20	52%
300769576601	10/25/2011	11/2/2011	99214	$ 51.20	52%
300769576101	10/28/2011	11/2/2011	99215	$ 59.81	52%
354164579101	11/4/2011	11/5/2011	99214	$ 41.20	52%
354164579301	11/3/2011	11/5/2011	99215	$ 59.81	52%
354181276701	6/16/2011	11/7/2011	99214	$ 41.20	52%
354810022401	11/14/2011	11/17/2011	99214	$ 36.20	52%

Example of Proportion Problems

Claim #	DOS	CPT Code Reviewed	CPT Code Paid Amt	Correct CPT Code	Correct CPT Code Amt	Amt Due	Ratio
302293695301	11/22/2011	99214	$ 46.20	99212	$ 27.42	$ 18.78	0.41
358098923901	12/19/2011	99214	$ 41.20			$ 41.20	1.00
358649497901	12/29/2011	99214	$ 52.96	99212	$ 27.42	$ 25.54	0.48
358649498201	12/29/2011	99214	$ 36.20	99212	$ 27.42	$ 8.78	0.24
359727913001	1/5/2012	99214	$ 46.20	99212	$ 27.42	$ 18.78	0.41
907368601701	12/1/2011	99205	$ 99.44	99212	$ 27.42	$ 72.02	0.72
360121778201	1/13/2012	99214	$ 51.20				-
366718502901	3/9/2012	99215	$ 69.81	99212	$ 27.42	$ 42.39	0.61
374221588301	5/25/2012	99214	$ 59.58	99212	$ 27.42	$ 32.16	0.54
378915206301	7/12/2012	99214	$ 41.20	99212	$ 27.42	$ 13.78	0.33
388429280001	10/8/2012	99214	$ 51.20			$ 52.96	1.03

- Note the significant variance in ratios between individual codes even when the starting codes are the same (or nearly the same).
- Note the last row (damage is more than the paid amount)

What is a Confidence Interval (CI)?

- The purpose of a confidence interval is to validate a point estimate; it tells us how far off our estimate is likely to be
- A confidence interval specifies a range of values within which the unknown population parameter may lie
  - Normal CI values are 90, 95%, 99% and 99.9%
- The width of the interval gives us some idea as to how uncertain we are about an estimate
  - A very wide interval may indicate that more data should be collected before anything very definite can be inferred from the data

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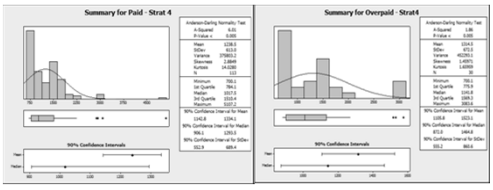
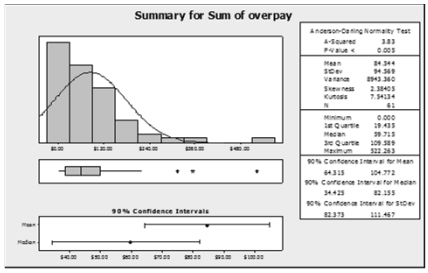
Extrapolation Case Study

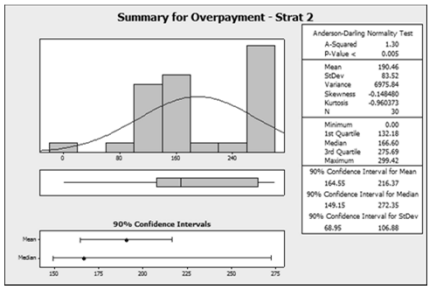


In this case, the average overpayment estimate per claim is higher than the average paid amount per claim.
This means that the practice would be required to pay back more than they were paid



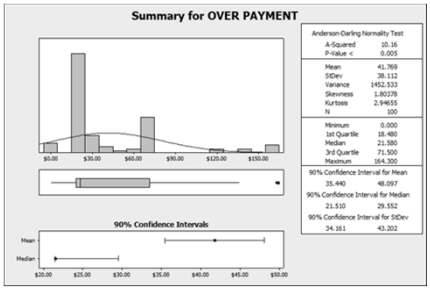
$64.315 x 12,011 = $772,487

$34.425 x 12,011 = $411,376



$164.55 x 4,293 = $706,413

$149.15 x 4,293 = $640,300



$35.44 x 10,256 = $363,473

$21.510 x 10,256 = $220,607

The Basics

- Universe should include EVERYTHING
- Sampling frame should be homogenous
- Stratification should follow some logical process
- Ensure that the correct variable of interest is used
- Test the sample for validity
- Determine metrics for point estimate and error based on distribution
- Make sure that the extrapolation calculation is correct
- Question everything!

For More Information

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- The Toolbox
- www.frankcohengroup.com
- Library>=Toolboxes
- Click on the link for the Post-Audit toolbox
- Password to unzip is 82498221