Analysis of ACN Group summary data
Prepared by Jeffrey S. Simonoff, Ph.D.
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Summary

Data from the ACN Group database are used to examine the general pattern of provider performance, as well as the individual performance of Dr. ___________. Attention is focused on three measures: the average dates of service (DOS) per patient, the proportion of patients with more than 20 visits, and the proportion of patients with exactly 1 visit. Examination of the provider DOS per patient means and standard deviations indicates increasing underdispersion relative to the natural zero-truncated Poisson process, which is consistent with outside truncation of values in the upper tail. This pattern appears to have accelerated in the first half of 2005. Dr. ______'s mean DOS per patient has been decreasing steadily since 2000, and is well within the ACN quality control limit of ± 1 standard deviation for the past year. Similarly, his proportion of patients with more than 20 visits has been declining steadily since 2000, and is well within the ACN quality control limit of ± 1 standard deviation for the past year. Both of these decreasing trends are highly statistically significant. Dr. ______'s proportion of patients with exactly 1 visit has stayed stable for the past five years, and each six-month proportion is well within the ACN quality control limit of ± 1 standard deviation.

Introduction

This report discusses the conclusions that can be drawn from the ACN Group summary data, both from the point of view of the general reimbursement process, and from the point of view of Dr.___________'s specific performance. It is important to note that it is not possible to make concrete inferential statements relative to the set of all providers using only the summary data; in order to truly understand the process, all of the raw data (that is, data at the level of the individual patient for each provider) is necessary. Still, it is possible to draw general conclusions based on the summary data that paint a broad picture of what appears to be occurring.

DOS per patient

The DOS per patient variable is a *count* variable; that is, it counts up the number of occurrences of an event during a particular time period. The standard statistical model for such data is the *Poisson* random variable (see Simonoff, 2003, chapters 3, 4, and 9, for extensive discussion of all of the statistical models discussed here). The Poisson random variable is defined as follows. Let X be the number of dates of service for a particular patient. The Poisson random variable states that the probability that the number of dates of service equals a particular number x satisfies

$$P(X = x) = \frac{e^{-\mu}\mu^x}{x!}, x = 0,1,...$$

The Poisson random variable has the property that the expected value μ equals the variance (the standard deviation squared); this is called the property of *equidispersion*. This property allows us to use summary data to assess whether the process controlling DOS per patient is consistent with a "natural" Poisson process, or is possibly being modified by outside effects. In this context, μ is the natural expected number of dates of service without any interference.

It is immediately apparent that the Poisson random variable is not an appropriate model for dates of service as is, since there cannot be zero dates of service for a patient (by becoming a patient a person is guaranteed to have at least one date of service). This is easily addressed by rescaling the distribution to account for the impossibility of zero dates of service. The resultant *zero-truncated Poisson* random variable has the probability function

$$P(X = x) = \frac{e^{-\mu}\mu^x}{x!(1-e^{-\mu})}, x = 1, 2, \ldots$$

This truncation changes the mean and variance of the random variable, as now the expected number of dates of service is

$$E(X) = \frac{\mu}{1-e^{-\mu}},$$

while the variance of the number of dates of service is

$$V(X) = \left(\frac{\mu}{1-e^{-\mu}}\right)\left(1-\frac{\mu e^{-\mu}}{1-e^{-\mu}}\right).$$

Note that the truncated Poisson distribution does not have the property of equidispersion, since the variance is slightly smaller than the mean. The ratio of variance to mean (the so-called *dispersion ratio*) for this random variable equals

$$\frac{V(X)}{E(X)} = 1 - \frac{\mu e^{-\mu}}{1-e^{-\mu}}.$$

For the values of μ that are relevant here (roughly 6.0-7.5 for dates of service over a six-month period) this ratio is roughly .99, so while the zero-truncated variable does not exhibit exact equidispersion, equidispersion holds almost exactly.

Consider the semiannual data available on the ACN website. The data start with the year 2000. The mean DOS values for the first three six-month periods are 7.4, 7.13, and 6.94, respectively, with standard deviations 2.67, 2.58, and 2.55, respectively (implying variances of 7.1, 6.7, and 6.5, respectively). The dispersion ratios are thus .96, .93, and .94, respectively. These are not too different from the value 1 that is (roughly) implied by the zero-truncated Poisson distribution, so this suggests that among the population of providers, the distribution of DOS can be reasonably represented as being zero-truncated Poisson, with a mean number of visits roughly 7 to 7.5 for the period. This can be viewed as the natural distribution of visits required, when there is little or no intervention.

It is not unusual for observed count data to not satisfy the equidispersion condition, even approximately. The most common violation of equidispersion by far is overdispersion, where the variance exceeds the mean; this typically occurs because of unmodeled heterogeneity in the population (that is, differences between members of the population that are not taken into account). Underdispersion, which is much more unusual, most often arises because of truncation of the Poisson, either from below (the zero-truncation process previously discussed) or from above (values in the upper tail above a certain cutoff cannot appear). The latter mechanism would certainly be consistent with a managed care philosophy of trying to limit the DOS; if the number is above the cutoff, reimbursement is not given. Note that the data for pre-mid 2001 suggests the possibility of mild truncation at a relatively high cutoff (since the observed dispersion ratios are a bit less than 1).

In order to model this situation statistically, the Poisson random variable needs to be generalized to also allow for truncation at some cutoff K. This truncated Poisson random variable is thus based on the mechanism that the number of visits is inherently Poisson with mean μ, but is truncated both from below (not allowing the possibility of zero dates of service) and above (not allowing the possibility of more than K dates of service). This random variable is consistent with the probability function

$$P(X = x) = \frac{\mu^x / x!}{\sum_{k=1}^{K} \mu^k / k!}, x = 1, 2, \ldots, K$$

For this model, the variance can be considerably smaller than the mean, so it can be a reasonable representation for these data, which are underdispersed relative to the Poisson distribution.

Consider again the mean DOS and its standard deviation, but now for each half-year since 2000:

Time	*Mean*	*Standard deviation*	*Dispersion ratio*
2000 (1st half)	7.40	2.67	.96
2000 (2nd half)	7.13	2.58	.93
2001 (1st half)	6.94	2.55	.94
2001 (2nd half)	6.72	2.26	.76
2002 (1st half)	6.75	2.19	.71
2002 (2nd half)	6.57	2.15	.70
2003 (1st half)	6.62	2.27	.78
2003 (2nd half)	6.47	2.20	.75
2004 (1st half)	6.80	2.48	.90
2004 (2nd half)	6.35	2.22	.78
2005 (1st half)	5.29	1.77	.59

Starting in the second half of 2001, there has been marked underdispersion in the data. This underdispersion was reasonably stable from mid 2001 through the end of 2004, but there has been a notable drop again in the first half of 2005 (the first half of 2004 is a bit of an aberration). Note that the mean DOS drifted slowly down for the first three years, while the standard deviation stayed the same, but in 2005 both dropped dramatically. The 2005 data only covers a bit more than four months, so it could be expected that the average DOS per patient could be a little lower than for the six month period, but this would not affect the dispersion ratio, so it is still clear that the underdispersion has increased markedly in 2005.

The goal is to formulate a statistical model that is consistent with these patterns. The following tables give the mean, standard deviation, and dispersion ratio for the truncated Poisson distribution for different values of the underlying ("natural," untruncated) mean μ and cutoff value K (these are calculated using the computer, since they are not available in closed form). These values can be used to find truncation scenarios that are consistent with the data, and thereby provide evidence supporting the possibility that the underlying DOS process is being modified by outside effects.

Here are the means, standard deviations, and dispersion ratio values:

Mean

		Cutoff					
	mu	6	7	8	9	10	11
[1,]	5.1	4.116883	4.485150	4.749811	4.923741	5.027519	5.083598
[2,]	5.2	4.155791	4.537077	4.814640	4.999888	5.112379	5.174337
[3,]	5.3	4.193557	4.587662	4.878104	5.074846	5.196365	5.264548
[4,]	5.4	4.230214	4.636923	4.940197	5.148584	5.279428	5.354178
[5,]	5.5	4.265791	4.684883	5.000921	5.221075	5.361520	5.443173
[6,]	5.6	4.300320	4.731565	5.060277	5.292298	5.442600	5.531484
[7,]	5.7	4.333833	4.776993	5.118273	5.362233	5.522628	5.619060
[8,]	5.8	4.366358	4.821193	5.174919	5.430866	5.601567	5.705854
[9,]	5.9	4.397928	4.864192	5.230224	5.498186	5.679385	5.791822
[10,]	6.0	4.428571	4.906017	5.284205	5.564186	5.756052	5.876921
[11,]	6.1	4.458318	4.946696	5.336877	5.628862	5.831543	5.961109
[12,]	6.2	4.487196	4.986257	5.388258	5.692212	5.905835	6.044349
[13,]	6.3	4.515234	5.024729	5.438369	5.754240	5.978910	6.126606
[14,]	6.4	4.542460	5.062141	5.487229	5.814948	6.050750	6.207845
[15,]	6.5	4.568899	5.098520	5.534861	5.874345	6.121343	6.288037
[16,]	6.6	4.594580	5.133895	5.581289	5.932439	6.190678	6.367155
[17,]	6.7	4.619526	5.168296	5.626537	5.989242	6.258749	6.445172
[18,]	6.8	4.643762	5.201748	5.670628	6.044768	6.325551	6.522066
[19,]	6.9	4.667312	5.234281	5.713590	6.099030	6.391083	6.597817
[20,]	7.0	4.690200	**5.265920**	**5.755446**	6.152046	**6.455344**	6.672409
[21,]	7.1	4.712448	5.296693	5.796222	6.203832	6.518337	6.745827
[22,]	7.2	4.734077	5.326627	5.835946	6.254408	6.580067	6.818058
[23,]	7.3	4.755109	5.355745	5.874642	6.303794	6.640541	6.889092
[24,]	7.4	4.775563	5.384074	5.912337	6.352010	6.699768	6.958922
[25,]	7.5	4.795460	5.411637	5.949056	6.399078	6.757757	**7.027543**
[26,]	7.6	4.814818	5.438459	5.984825	6.445019	6.814521	7.094952
[27,]	7.7	4.833655	5.464562	6.019669	6.489856	6.870072	7.161148
[28,]	7.8	4.851990	5.489970	6.053614	6.533611	6.924426	7.226130
[29,]	7.9	4.869838	5.514704	6.086683	6.576309	6.977597	7.289903
[30,]	8.0	4.887217	5.538784	6.118902	6.617971	7.029602	7.352471
[31,]	8.1	4.904141	5.562233	6.150294	6.658622	7.080458	7.413839
[32,]	8.2	4.920627	5.585070	6.180883	6.698285	7.130184	7.474015

[33,]	8.3	4.936689	5.607314	6.210691	6.736982	7.178799	7.533008
[34,]	8.4	4.952340	5.628984	6.239740	6.774738	7.226320	7.590829
[35,]	8.5	4.967595	5.650098	6.268054	6.811575	7.272770	7.647488
[36,]	8.6	4.982466	5.670674	6.295653	6.847516	7.318166	7.702998
[37,]	8.7	4.996967	5.690729	6.322558	6.882583	7.362531	7.757373
[38,]	8.8	5.011108	5.710280	6.348789	6.916800	7.405884	7.810626
[39,]	8.9	5.024903	5.729341	6.374367	6.950187	7.448247	7.862773
[40,]	9.0	5.038361	5.747929	6.399310	6.982767	7.489640	7.913830

Standard deviation

		Cutoff					
	mu	6	7	8	9	10	11
[1,]	5.1	1.419119	1.637925	1.827836	1.978192	2.085493	2.154118
[2,]	5.2	1.411829	1.632522	1.826376	1.982176	2.095338	2.169144
[3,]	5.3	1.404257	1.626571	1.824081	1.985120	2.104093	2.183176
[4,]	5.4	1.396437	1.620118	1.821001	1.987063	2.111773	2.196211
[5,]	5.5	1.388399	1.613206	1.817185	1.988044	2.118400	2.208249
[6,]	5.6	1.380174	1.605878	1.812680	1.988105	2.123996	2.219294
[7,]	5.7	1.371786	1.598174	1.807534	1.987287	2.128585	2.229350
[8,]	5.8	1.363260	1.590130	1.801791	1.985631	2.132194	2.238423
[9,]	5.9	1.354619	1.581781	1.795496	1.983180	2.134851	2.246524
[10,]	6.0	1.345883	1.573161	1.788689	1.979974	2.136586	2.253664
[11,]	6.1	1.337071	1.564300	1.781412	1.976056	2.137430	2.259856
[12,]	6.2	1.328201	1.555227	1.773703	1.971466	2.137415	2.265116
[13,]	6.3	1.319288	1.545970	1.765599	1.966243	2.136575	2.269461
[14,]	6.4	1.310347	1.536552	1.757135	1.960428	2.134941	2.272911
[15,]	6.5	1.301392	1.526999	1.748344	1.954059	2.132550	2.275487
[16,]	6.6	1.292434	1.517330	1.739259	1.947173	2.129434	2.277210
[17,]	6.7	1.283483	1.507566	1.729909	1.939807	2.125628	2.278104
[18,]	6.8	1.274551	1.497726	1.720322	1.931994	2.121167	2.278195
[19,]	6.9	1.265646	1.487827	1.710525	1.923770	2.116084	2.277508
[20,]	7.0	1.256777	**1.477885**	**1.700543**	1.915166	**2.110413**	2.276069
[21,]	7.1	1.247949	1.467913	1.690400	1.906214	2.104188	2.273905
[22,]	7.2	1.239171	1.457926	1.680117	1.896943	2.097442	2.271046
[23,]	7.3	1.230448	1.447936	1.669715	1.887382	2.090205	2.267518
[24,]	7.4	1.221784	1.437954	1.659214	1.877558	2.082511	2.263350
[25,]	7.5	1.213186	1.427989	1.648631	1.867497	2.074388	**2.258571**
[26,]	7.6	1.204656	1.418052	1.637982	1.857223	2.065867	2.253210
[27,]	7.7	1.196199	1.408151	1.627284	1.846760	2.056976	2.247295
[28,]	7.8	1.187817	1.398294	1.616550	1.836130	2.047742	2.240854
[29,]	7.9	1.179514	1.388487	1.605795	1.825352	2.038194	2.233916
[30,]	8.0	1.171292	1.378736	1.595030	1.814447	2.028356	2.226507
[31,]	8.1	1.163152	1.369048	1.584266	1.803434	2.018252	2.218656
[32,]	8.2	1.155097	1.359428	1.573514	1.792328	2.007907	2.210389
[33,]	8.3	1.147128	1.349879	1.562784	1.781147	1.997343	2.201732
[34,]	8.4	1.139246	1.340407	1.552084	1.769906	1.986582	2.192710
[35,]	8.5	1.131452	1.331013	1.541423	1.758618	1.975644	2.183348
[36,]	8.6	1.123747	1.321703	1.530807	1.747297	1.964548	2.173670
[37,]	8.7	1.116131	1.312478	1.520244	1.735955	1.953313	2.163700
[38,]	8.8	1.108605	1.303341	1.509740	1.724605	1.941958	2.153460
[39,]	8.9	1.101168	1.294294	1.499300	1.713255	1.930497	2.142970
[40,]	9.0	1.093822	1.285338	1.488928	1.701916	1.918947	2.132254

Dispersion ratio

		Cutoff					
	mu	6	7	8	9	10	11
[1,]	5.1	0.4891808	0.5981509	0.7033933	0.7947706	0.8650945	0.9127839
[2,]	5.2	0.4796344	0.5874109	0.6928139	0.7858219	0.8587867	0.9093312
[3,]	5.3	0.4702300	0.5767064	0.6820830	0.7765164	0.8519814	0.9053493
[4,]	5.4	0.4609779	0.5660611	0.6712372	0.7668940	0.8447102	0.9008555
[5,]	5.5	0.4518864	0.5554962	0.6603105	0.7569935	0.8370049	0.8958679
[6,]	5.6	0.4429622	0.5450302	0.6493339	0.7468519	0.8288975	0.8904059
[7,]	5.7	0.4342105	0.5346793	0.6383362	0.7365048	0.8204197	0.8844896
[8,]	5.8	0.4256356	0.5244577	0.6273436	0.7259859	0.8116033	0.8781400
[9,]	5.9	0.4172401	0.5143775	0.6163798	0.7153274	0.8024792	0.8713788
[10,]	6.0	0.4090259	0.5044489	0.6054664	0.7045593	0.7930783	0.8642282
[11,]	6.1	0.4009941	0.4946805	0.5946227	0.6937100	0.7834303	0.8567111
[12,]	6.2	0.3931448	0.4850797	0.5838662	0.6828060	0.7735645	0.8488506
[13,]	6.3	0.3854775	0.4756520	0.5732122	0.6718721	0.7635090	0.8406700
[14,]	6.4	0.3779913	0.4664022	0.5626744	0.6609310	0.7532909	0.8321929
[15,]	6.5	0.3706846	0.4573336	0.5522647	0.6500040	0.7429363	0.8234428
[16,]	6.6	0.3635555	0.4484489	0.5419935	0.6391104	0.7324703	0.8144430
[17,]	6.7	0.3566015	0.4397496	0.5318699	0.6282680	0.7219164	0.8052166
[18,]	6.8	0.3498201	0.4312366	0.5219013	0.6174929	0.7112973	0.7957866
[19,]	6.9	0.3432085	0.4229100	0.5120944	0.6067997	0.7006341	0.7861752
[20,]	7.0	0.3367634	**0.4147695**	**0.5024542**	0.5962017	**0.6899469**	0.7764044
[21,]	7.1	0.3304817	0.4068141	0.4929853	0.5857106	0.6792544	0.7664954
[22,]	7.2	0.3243600	0.3990423	0.4836909	0.5753369	0.6685741	0.7564688
[23,]	7.3	0.3183948	0.3914524	0.4745735	0.5650899	0.6579221	0.7463446
[24,]	7.4	0.3125825	0.3840421	0.4656349	0.5549778	0.6473136	0.7361418
[25,]	7.5	0.3069195	0.3768091	0.4568763	0.5450075	0.6367623	**0.7258787**
[26,]	7.6	0.3014022	0.3697505	0.4482980	0.5351853	0.6262810	0.7155729
[27,]	7.7	0.2960269	0.3628635	0.4399001	0.5255161	0.6158812	0.7052409
[28,]	7.8	0.2907900	0.3561450	0.4316818	0.5160044	0.6055735	0.6948985
[29,]	7.9	0.2856879	0.3495918	0.4236424	0.5066536	0.5953675	0.6845604
[30,]	8.0	0.2807170	0.3432005	0.4157804	0.4974666	0.5852716	0.6742407
[31,]	8.1	0.2758736	0.3369677	0.4080940	0.4884453	0.5752935	0.6639524
[32,]	8.2	0.2711544	0.3308900	0.4005814	0.4795915	0.5654400	0.6537075
[33,]	8.3	0.2665558	0.3249637	0.3932403	0.4709060	0.5557169	0.6435176
[34,]	8.4	0.2620744	0.3191854	0.3860682	0.4623893	0.5461296	0.6333929
[35,]	8.5	0.2577070	0.3135515	0.3790626	0.4540414	0.5366825	0.6233432
[36,]	8.6	0.2534503	0.3080585	0.3722205	0.4458620	0.5273792	0.6133772
[37,]	8.7	0.2493010	0.3027027	0.3655392	0.4378503	0.5182231	0.6035031
[38,]	8.8	0.2452561	0.2974807	0.3590156	0.4300053	0.5092166	0.5937281
[39,]	8.9	0.2413125	0.2923891	0.3526466	0.4223256	0.5003618	0.5840589
[40,]	9.0	0.2374673	0.2874243	0.3464291	0.4148097	0.4916603	0.5745013

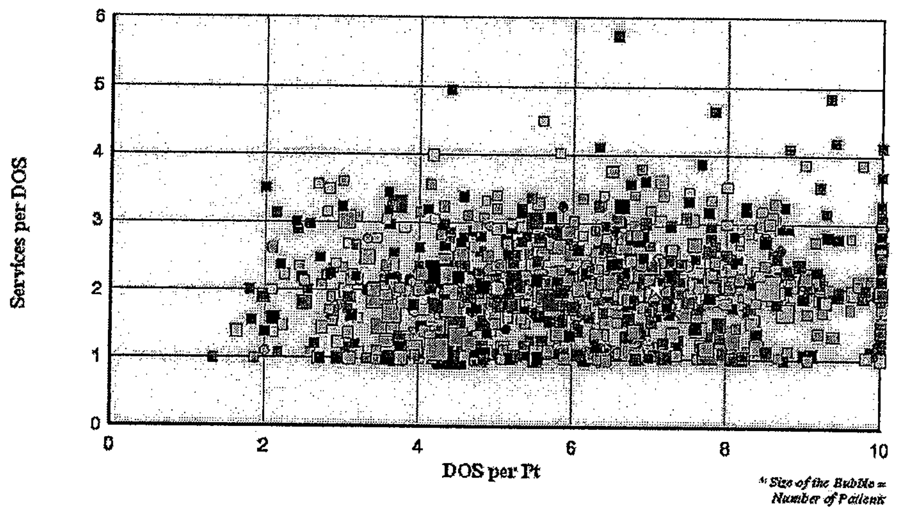
It is natural to start off with an underlying μ equal to roughly 7.5 (since, according to the data, that is apparently what it was before mid 2001). The observed mean and standard deviation of DOS per patient are then consistent with a truncation cutoff of 11; that is, visits were not reimbursed after 11 dates. This is not precisely true, but it provides a structure for the kind of cost control mechanism going on. By mid 2002 the observed values are consistent with an underlying mean (μ) equal to 7 and truncation at 10. For the next two years there is only a slow decrease in observed mean; by the end of 2004 the underlying mean (μ) appears to be roughly 6.8, still with a truncation at 10. This could be consistent with a generally slowly decreasing underlying average "natural" trend, consistent with providers being more sensitive to controlling costs, but also facing an outside truncating process. (These mean, standard deviation, and dispersion ratio values are marked above in bold face).

The plot on the next page gives the distribution of average number of services per DOS versus average DOS per patient for all providers in the second half of 2004, as taken from the ACN website. Note that while at this point most providers have mean DOS per patient values smaller than 8, there are still an appreciable number with mean values larger than that, and, in fact, larger than 10 (it is impossible to know how much larger than 10, since the horizontal scale only ranges from 0 to 10). Note also that Dr.______'s mean DOS per patient value (represented by the white star in the figure) is well within the norm for the population.

ACN group.

Provider Perfomance Profile
Health Plan: *UHC Empire Plan*

DOS per Pt and Services per DOS



Each bubble on this chart represents an individual health care provider with at least 5 patients during the timeframe specified above. The individual Health Care Provider is identified by the white star on the chart.

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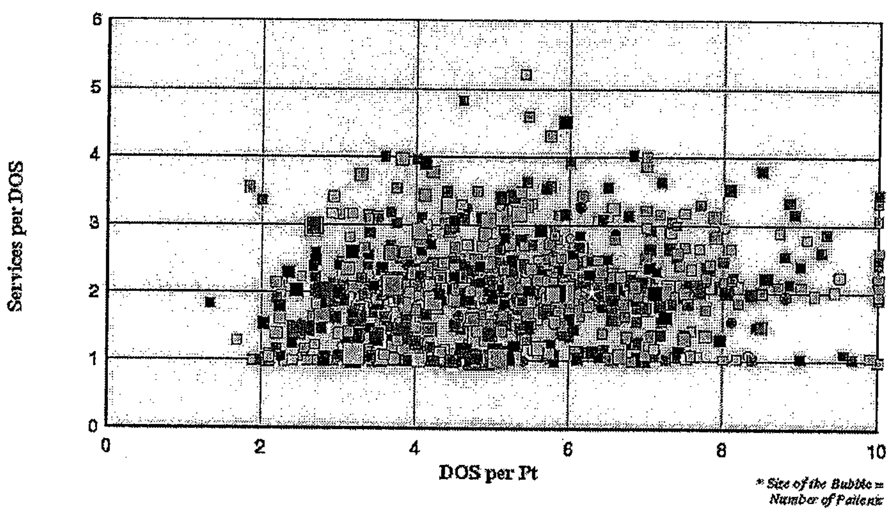
The 2005 provider values drop considerably, however. It is difficult to know exactly what these numbers mean, since they are based on a roughly 30% shorter time period, but they can be understood informally, at least. It seems unlikely that the underlying process would change very much from one six month period to the next, but the truncation mechanism can, of course, change quickly. The observed data are consistent with that, as now the observed mean, standard deviation, and dispersion ratio are consistent with a truncation at around 7 or 8 visits. In fact, there are still some values as high as 10 visits (see the figure below), but it seems obvious from the plot that there are very few providers with more than 8 DOS per patient. Note also that even with this pronounced loss of providers at the upper end, Dr. ______'s mean DOS per patient is still well within the population of providers.

ACN group.

Provider Performance Profile
Health Plan: *UHC Empire Plan*

DOS per Pt and Services per DOS



Each bubble on this chart represents an individual health care provider with at least 5 patients during the timeframe specified above. The individual Health Care Provider is identified by the white star on the chart.

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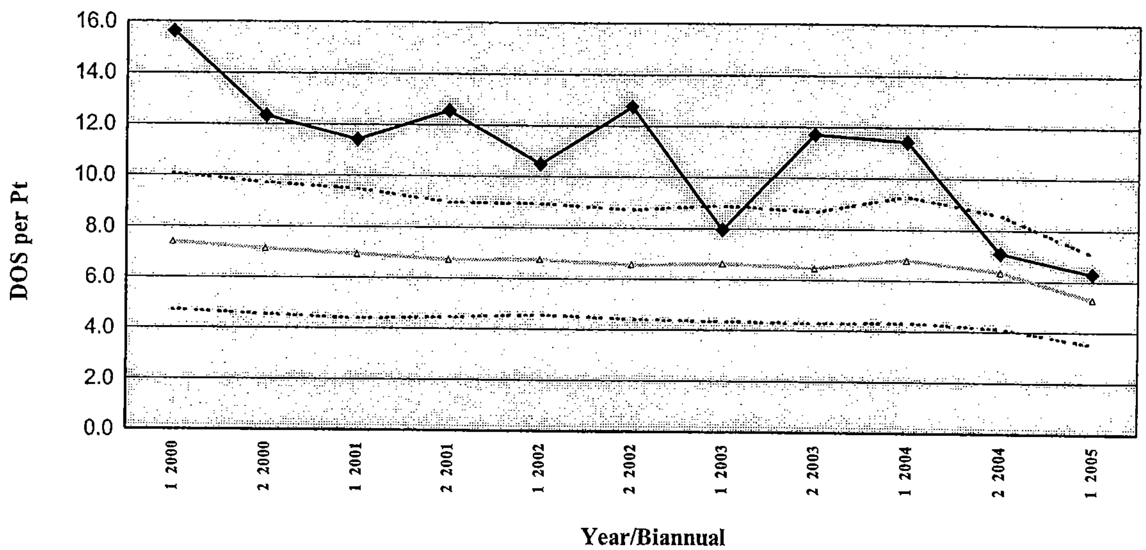
Other than noting where Dr._______'s mean DOS per patient values fall relative to the distribution of mean values for other providers, this analysis has focused on a general model for how the process is being managed. A second point is whether Dr. _______'s performance is problematic. The web site gives the following graph for his half-year DOS values, along with the overall means and standard deviations for each half-year period:

Number of Billed Dates of Service (DOS) Per Patient

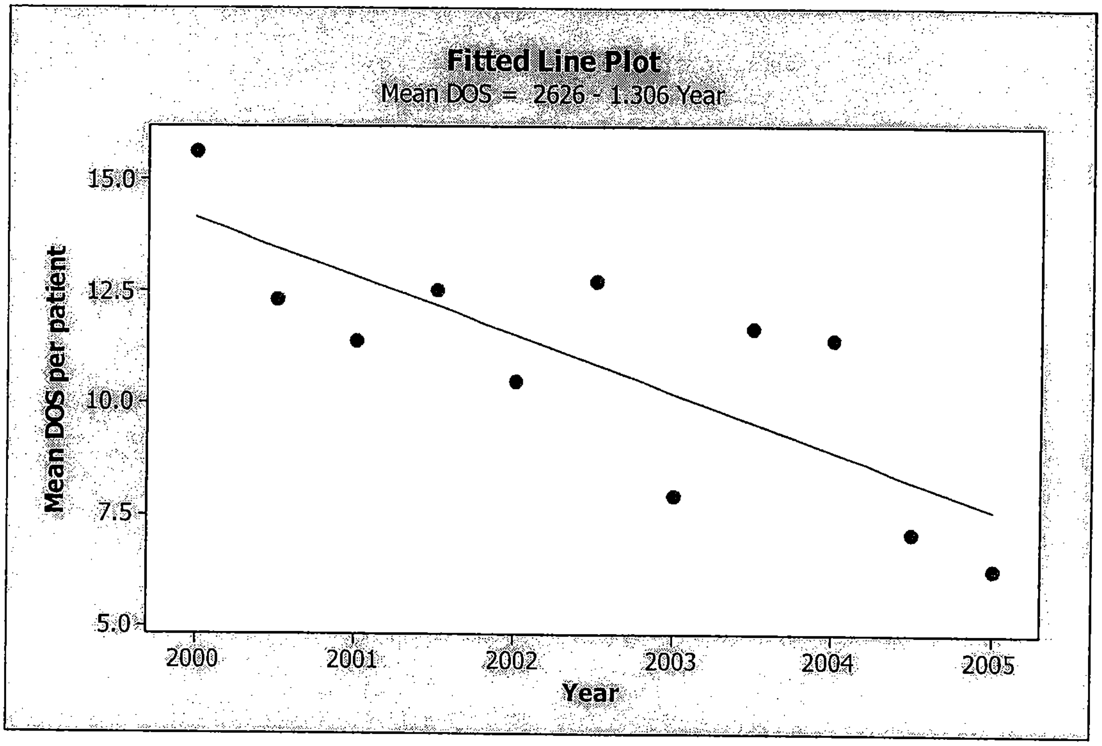


Note that in the last year Dr._______'s mean DOS is within one standard deviation of the overall mean (in fact, much closer than that), putting him well within the quality limits apparently favored by ACN.

Note also that Dr._______'s mean DOS per patient has been steadily dropping since 2000. The following plot summarizes that performance using a *least squares linear regression model*. Let y_i be Dr. _______'s mean DOS per patient during the i^{th} time period. The regression model states that y_i satisfies

$$y_i = \beta_0 + \beta_1 \times Year_i + \varepsilon_i,$$

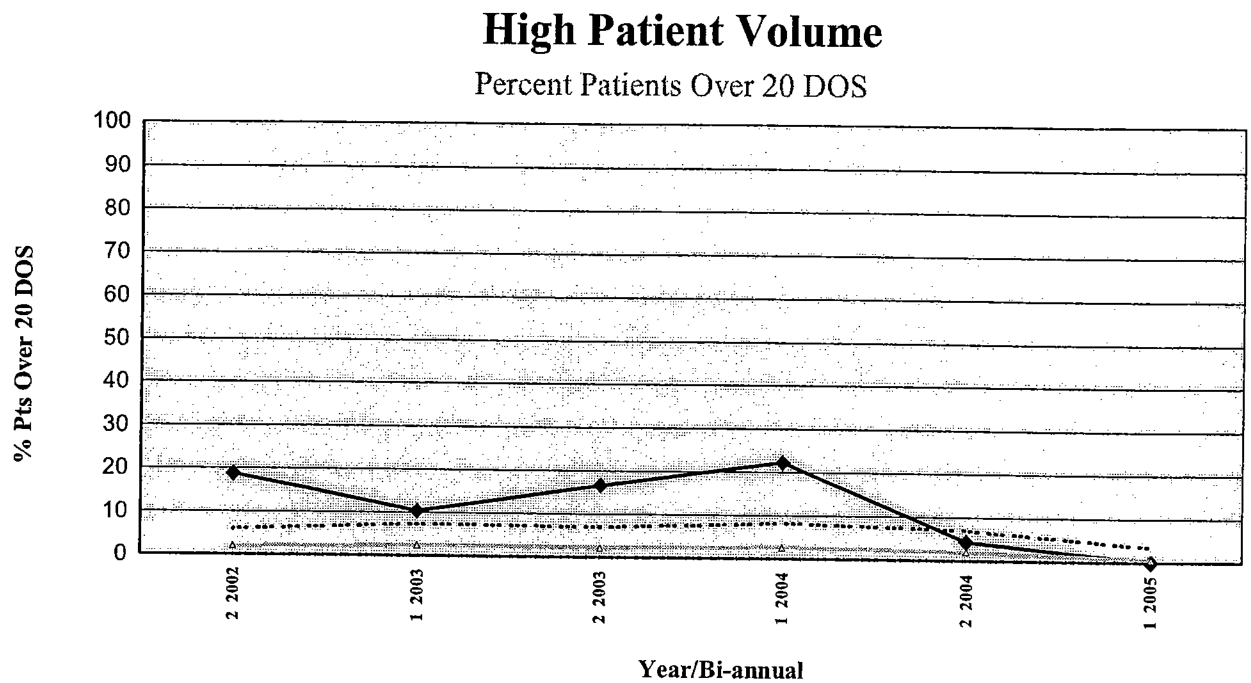
where ε_i is roughly normally distributed, and fits the line (by estimating the β coefficients) given in blue in the following plot.



Dr. ______'s mean DOS per patient has been decreasing at the rate of roughly 1.3 DOS per patient per year. This trend is highly statistically significant (with a tail probability of .004).

Patients with more than 20 visits or exactly 1 visit

Two other measures available from the ACN database are the proportion of patients with more than 20 visits, and the proportion of patients with exactly 1 visit. The following plot summarizes Dr. ______'s values for the first measure, along with overall provider values, for the past 2 ½ years:



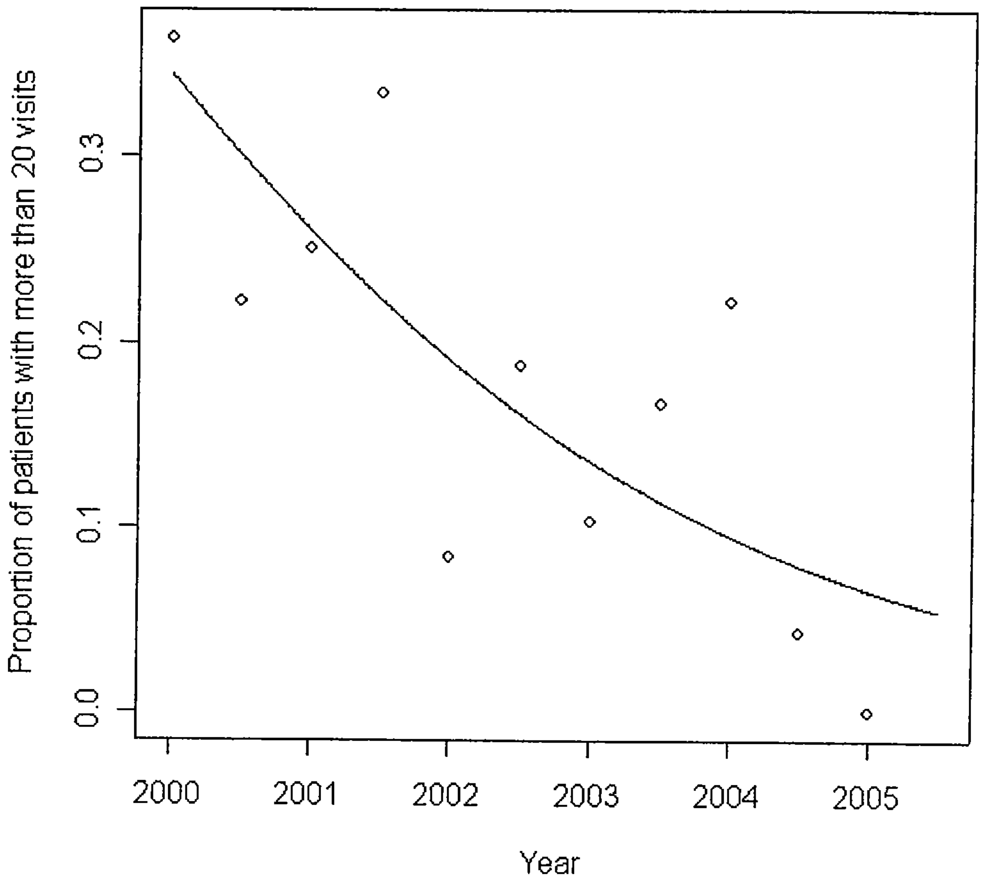
Dr. ______'s performance is well within the control limits over the past year. There is also a trend downwards for this measure. The appropriate regression modeling technique for data of this type is the *logistic regression* model. Here the response variable is the ratio of patients who had more than 20 visits, which is modeled using a *binomial* distribution. Let Z be the number of patients with more than 20 visits during some time period. The binomial random variable states that the probability that there will be exactly z such patients, out of a total of n patients during that time period, satisfies

$$P(Z = z) = \binom{n}{z} p^z (1-p)^{n-z}, z = 0, \ldots, n,$$

where p is the probability that an individual patient has more than 20 visits. The logistic regression model hypothesizes that the probability that a patient during the i^{th} time period has more than 20 visits, p_i, satisfies

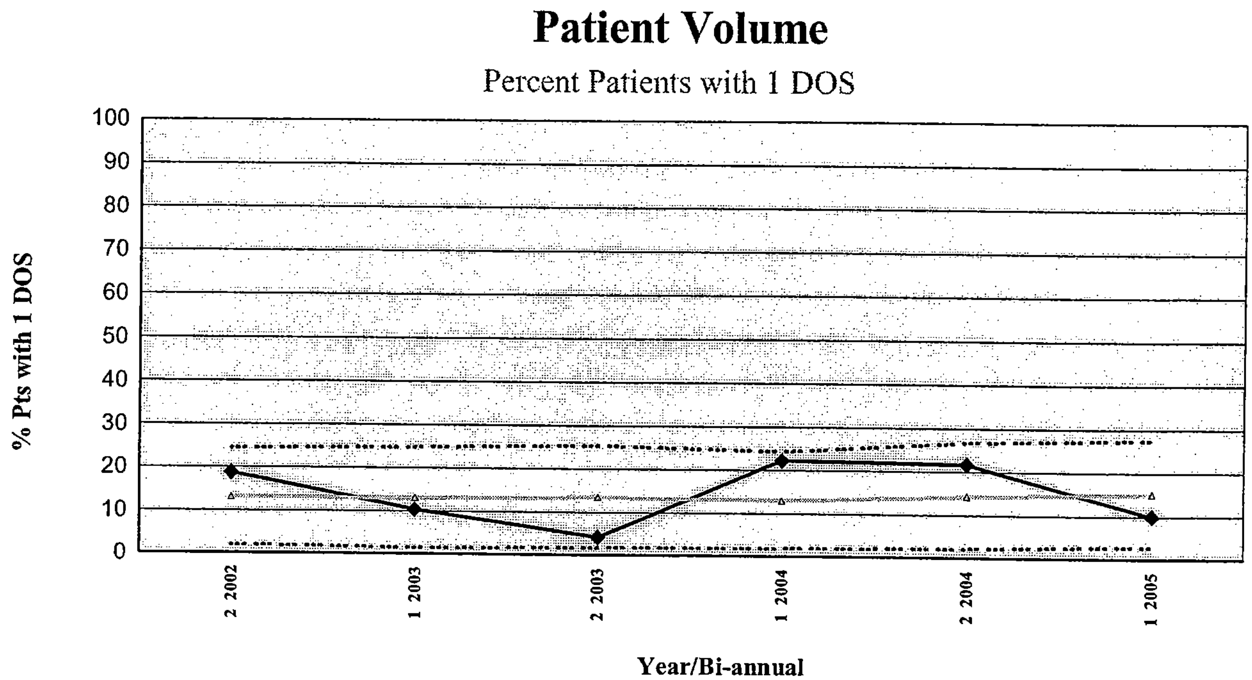
$$\log \frac{p_i}{1-p_i} = \beta_0 + \beta_1 \times Year_i.$$

The following plot summarizes the fitted model:



There is a strongly statistically significant (tail probability of .004) decline in the probability that a patient of Dr. _______'s has more than 20 visits, corresponding to an estimated 33% annual decrease in the odds that a patient will have more than 20 visits.

As the following plot shows, Dr. _______'s proportion of patients who have exactly 1 visit has stayed very stable, and well within the ACN control limits:



As would be expected, there is no statistical evidence to suggest any change in the proportion of Dr. _____ 's patients having exactly 1 visit over time, as it has varied randomly around an overall proportion of 13.1%.

Reference

Simonoff, J.S. (2003), *Analyzing Categorical Data*, Springer-Verlag, New York.