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Data, Decisions, Directions:
Creating in new breakpoint in the treatment of Diabetes Mellitus
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Garbage in – Garbage out! This is an old axiom which recognizes that if your decisions are made on the basis of faulty data, it will lead you in the wrong direction. Another of my favorite axioms which may be original is "Fact to Fiction to Fantasy." This axiom indicates that it is possible to start with valid information or accurate facts, but through misinterpretation of that information, often based on prejudice or presuppositions, to end up with a conclusion which is no closer to reality than a fantasy. In human relations, this is a very common scenario. Propaganda occurs when a fiction or a fantasy is knowing used to manipulate others.

As we plan for 2009, SETMA has the same goal which we have had since 1995, which is excellence. However, without definition and details the pursuit of excellence can be an idea without substance. As a result, our future pursuit of excellence is founded on the analysis of data and our performance from the past and the lessons which can be learned from them, i.e., we use data to make decisions and to set the course and direction for the future.

SETMA's major goal for 2009 is an improvement in our care of patients with diabetes. This includes many elements of treatment such as;

1. Blood pressure control
2. Cholesterol and triglyceride control
3. Immunizations
4. Routine Screening for eye disease, dental disease, kidney disease and nerve damage in feet and extremities
5. Preventive health such as treatment with aspirin

Each of these will be audited on a daily basis and the result reported to all of SETMA's providers in order to challenge everyone to the same standard of excellence. Universally, however, the first standard of excellence in the treatment of diabetes is the hemoglobin A1C value (Hgb A1C). The Hgb A1C indicates the average blood glucose (sugar) for the past three months and the value is not dependent upon the patient being in a fasting state when the test is done. The Hgb A1 C is a percentage designation of non-enzymatic glycosalation of the red blood cell surface with glucose. The key here is non-enzymatic, which is abnormal due to high blood glucose (sugar) levels, as opposed to the normal and imperative enzymatic glycosalation of proteins in the body.

Normal Hgb A1C values are below 5.0% in the person without diabetes. The ideal treatment of diabetes would result in a Hgb A1C below 6%. Until recently, the American Diabetes Association had a standard of 7.0%, but that has been changed to 6.5% recently.

The major limitation in getting the Hgb A1C to "target" is to do so without resulting in dangerous episodes of low blood sugary (hypoglycemia).

As SETMA has analyzed our treatment of patients with diabetes, we have generated the following data from our electronic medical record. This data represents treatment of diabetes over a period of eight years and shows a consistent improvement in the treatment of diabetes.

Year	Average HgbA1C (%)	Change (%)	No. Tests Done
2000	7.778		555
2001	7.4789	-0.299	1193
2002	7.4549	-0.024	3036
2003	7.2671	-0.188	4971
2004	7.2102	-0.057	7080
2005	6.9847	-0.226	7521
2006	6.8763	-0.108	8610
2007	6.6265	-0.250	9117
2008	6.5378	-0.089	6275
Total Decline (2000 to 2008)		-1.240	

From 2000 to 2008 our average Hgb AIC values have dropped from 7.778% to 6.5378% which is a collective drop of 1.240%. As you look at this data, it becomes clear that:

- Between 2000 and 2001, there was a significant improvement in the Hgb A1Cs.
- Another improvement is seen between 2004 and 2005.
- And, another improvement is seen between 2006 and 2007.

If we are going to learn from the past, we need to know if something intentional happened which would account for this improvement in Hgb A1C and which would account for that improvement being consistently sustained, as there has been an uninterrupted improvement in our diabetes care over the past 8 years. To discover what could have caused this improvement in diabetes care requires a review of SETMA's history.

SETMA's History – Dr. Wilson

SETMA was conceived in excellence. Dr. Mark Wilson enunciated SETMA's goal in 1995 which was "to lead healthcare in Southeast Texas through the pursuit of excellence." He has always been fond of saying, "Excellence is not a stop sign at which you arrive but a direction in which you are going." Each of the "pieces" which have been added to SETMA since that time have augmented and sustained that consistent and relentless pursuit of excellence. Nevertheless, sustaining excellence over a long time

requires renewing a vision with new energy and with new vitality. It was a logical extension of SEMTA's original goal to develop a Diabetes Center of Excellence. Here are the steps which resulted in the center and which produced the data above.

1. SETMA is founded with a goal of excellence (1995)
2. The adoption of NextGen's electronic medical record in 1999 made disease-management excellence possible (1999)
3. Diabetes Disease Management tool was developed in the EMR.
4. Diabetes education, at a time when others thought it was too expensive, added to that vision. Michelle Satchfield, registered nutritionist, joined SETMA and organized an ADA-approved diabetes-education program and Kathryn Smith, diabetes educator, joined her. (2004)
5. Providers -- AND particularly our nursing staff support of that vision -- embraced that vision and expanded it. (1995)
6. The concept of a diabetes center of excellence was conceived. (2002)
7. Dr. Murphy with his interest in metabolic illness joined SETMA and helped develop a Lipid clinic.(2003)
8. Dr. Ahmed, endocrinologist, came abroad and gave credibility and guidance to all of the above.(2006)
9. Dr. Luviano added his commitment to preservation of vision in diabetes patients (2007)
10. The diabetes center of excellence became a reality. (2007)

The breakpoints of 2000 and 2001, 2004 and 2005, and 2006 and 2007 are associated with:

- The design and implementation of a EMR-based diabetes-disease management program in 2000
- The organization of a diabetes education program in 2004
- The joining of SETMA by an endocrinologist in 2006.

With this information, SETMA can make decisions about how to improve care in the future.

Mean, Standard Deviation, Median, Mode

As we looked at the data and tried to draw conclusions about it, we realized that we needed more statistical analysis than just the average (the mean). We need to know the median, the mode and the standard deviation and we needed to know them by provider.

- For a data set, such as the HgbA1C values, the mean (average) is the sum of the observations divided by the number of observations. The mean is often quoted along with the standard deviation. In that case, the mean describes the central location of the data (often called the average) and the standard deviation describes the spread. The mean may be 6.5% in the case of Hgb A1C which is excellent,

but if the standard deviation is 1.6, the range would be from 4.0 to 8.1. The 8.1% is not good.

- A median is described as the number separating the higher half of a sample from the lower half. At most half the population has values less than the median and at most half have values greater than the median.
- The mode is the value that occurs the most frequently in a data set.

The analysis by provider in SETMA's treatment of diabetes showed the following. (The provider names have been removed.) As is often the case the worst numbers were found in the case of the best physicians because they see the sickest patients. As you analyze data, you begin to be able to devise a plan for future efforts at improvement of care.

Provider	Instances	Average	Std Dev	Median	Mode
	2666	7.361	1.926	6.8	6.0
	2143	6.875	1.492	6.5	6.2
	3574	7.288	1.812	6.8	6.2
	2110	7.356	1.729	6.9	6.9
	20	6.785	2.003	6.0	5.6
	54	6.915	2.197	6.1	6.0
	2319	7.021	1.585	6.6	6.6
	1281	6.117	0.897	5.9	5.6
	3023	6.845	1.617	6.4	6.0
	1285	6.847	1.600	6.4	6.2
	2142	6.886	1.633	6.4	6.2
	620	6.326	1.247	6.0	5.7
	1387	6.364	1.027	6.1	5.7
	1633	6.597	1.559	6.1	5.8
	45	7.116	2.251	6.3	6.5
	70	6.837	2.030	6.2	5.5
	1568	6.764	1.410	6.5	6.2
	1497	6.786	1.698	6.4	6.2
	2760	6.906	1.432	6.6	6.1
	197	6.203	1.146	5.9	6.0

In addition to excellence of care, there are also many population factors, not under the provider's control, which affect the results of HgbA1Cs:

- The age of the patients – younger patients tend to have better control
- The activity of the patients – older patients tend to be more sedentary
- The nutrition of the patients – nursing home patients and elderly often are under-nourished and will thusly skew the HgbA1Cs downward.
- Socio-economic status – patients with lower incomes have more difficulty eating right.
- Educational status of patients – often people with higher education are more motivated and better able to understand the complexities of DSME.
- How long the patient has been a diabetic can influence the HgbA1C.

- How long the patient has been cared for by our clinic. It would appear – and we shall examine this – that the longer a patient sees us, the better their HgbA1Cs will be.
- There are other factors in the care of a patient with diabetes which have equal and possibly superior important to the HgbA1C, i.e, blood pressure, etc. We will be looking at those factors.

Analysis and the future – plans for a 2008 breakpoint

As you analyze the data above, remember that the higher the median (the higher the value which represents the midpoint of your data set, i.e., 50% of our values are above the median and 50% are below), the higher your mean (average) will be and in general the higher your standard deviation will be.

For analysis purposes remember that if your standard deviation is ZERO, the mean (average), the median and the mode will be the same. The problem with the mean (average) as a standard of excellence is that many patients will still be experiencing end-organ damage, even though your mean (average) may be below the ADA target of 7.0. The goal is to lower the standard deviation, the mode and the median which will be reflected in an improved mean (average). With the treatment of diabetes, as with any other biological-system-based data-set, it will be impossible to have a zero standard deviation but the result of improving the care for each individual will be the decreasing and improvement of your standard deviation.

In planning for the creation of a new breakpoint in 2009, we believe that our improvement in the care of diabetes will come as:

- Our nurses initiate the utilization of the Diabetes Disease Management Tool – remember the first break point in the improvement of diabetes care in SETMA was the development and use of the disease management tool in NextGen. Our next breakpoint will be a combination of things including the revitalization of our use of the disease management tool for diabetes.
- Our healthcare providers use the disease management tool and measure their performance with the Consortium for Physician Performance Improvement data set which is built into our diabetes disease management tool.
- Also, the first thing every provider should review for ANY patient with diabetes is the date and value of their last HgbA1C. That is easily done as both of these data points are displayed on the front page of the Diabetes Disease Management tool along with all other critical indicators for quality improvement in the care of diabetes.
- We continue auditing the above again and publishing that data to all providers so that everyone can compare their performance with their colleagues..
- We query our system and involved all patient not to goal in diabetes education (Diabetes Self Management Education) and in specialty care.

SETMA's goal for 2009 is going to be for all providers to improve their median HgbA1Cs by .30 at a minimum. This new breakpoint will result from the understanding that we have gained from our data analysis. The first three breakpoints happened almost by accident but they will each be a significant part of our next breakpoint.

Remember, the better your data, the better your planning can be and the better your results can be. In 2010, we will report how we did in 2009.