Visual Data Displays Project

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Visual Data Displays Project

Article: Effect of bar-code-assisted medication administration on medication administration errors and accuracy in multiple patient care areas for the Visual Data Display Project. Team C chose the article on the Effect of bar-code-assisted medication administration on medication administration errors and accuracy in multiple patient care areas by Helmons, Wargel, and Daniels (2009), for the purpose of learning about visual data displays and uses in decision making. This presentation will reveal: how measures of central tendency and variation were used, the comparison of the measurements with standard normal distribution, and if Team C agrees with the conclusions of the study.

What are measures of central tendency for the Visual Data Display Project?

- Mean
- Median
- Mode

In order to understand how measures of central tendency are used in this study, one must first comprehend what measures of central tendency are. A measure of central tendency is the measure of a location of the middle or center of a distribution. Commonly used measures of central tendency are the mode, median, and mean. The mean is an average, or sum of all numbers divided by the amount of numbers available. The median is the middle of a distribution; it means that half of the numbers are above the median, and half are below the median number. Last, but not least is the mode. This is the number that appears most frequently in a set of numbers (Bennett, Briggs, & Triola, 2009). The median was the measure of central tendency utilized in Table 2, on page 1206 (Helmons, Wargel, & Daniels, 2009).

How were measures of central tendency used in the study for the Visual Data Display Project?
Types of medication administration errors via route:

- Oral
- Subcutaneous
- IV minibag
- IV bolus dose
- IV large-volume parenteral
- Intramuscular
- Topical
- Miscellaneous

One main focus area in the use of measures of central tendency evolved in this study: the types of medication administration errors in distinct patient care areas. The data collected was collected one month prior to implementing the bar-code assisted medication administration (BCMA), and then three months after implementation. Table 2 is the primary area of concentration for the median number for opportunities for errors is clearly defined, as well as for the median duration of medication administration in minutes (Helmons et al., 2009). Bennett, Briggs, and Triola (2009), define the median number as the “middle value” (p. 149).

The median number of opportunities for errors per patient was 5 before BCMA with a range of 1-14 on the Medical-Surgical Units, and a median number of 5 after BCMA with a range of 1-16. The median number of opportunities for errors per patient was 5 before BCMA with a range of 1-11 on the Intensive Care Units, and a median number of 4 after BCMA with a range of 1-14. Then, the median number of duration of medication administration in minutes per patient was 10 before BCMA with a range of 1-30 on the Medical-Surgical Units, and a median number of 10 after BCMA with a range of 1-50. The median number of duration of medication
administration in minutes per patient was 12 before BCMA with a range of 1- 58 on the Intensive Care Units, and a median number of 13.5 after BCMA with a range of 1-53 (Helmons et al., 2009).

Did the study use the most appropriate measure of central tendency for the given data for the Visual Data Display Project? Why or why not? No appropriate measure of central tendency

given appropriate measure: Mean

The study did not use the most appropriate measure of central tendency for the given data because the numbers would not be accurate by using the median. The mean should have been used for the data and presented as a pie chart to show the percentages of the errors. It would have been better to be able to see the differences in the medication errors depending on the departments that were affected. All of the percentages are based on staff and the occupancy of the patients. Typically the median is used if the data are skewed. If the data is highly skewed, the mean will be pulled in the direction of the skew. For example, if the data are skewed to the right, then the mean will be higher. If the data is skewed to the left, then the mean will be lower. The good thing about the median is that it is not affected by outliers like this (Helmans et al., 2009).

How were measures of variation used in the study for the Visual Data Display Project? What conclusions can you draw based on the variation?

- Measures of variation
- Median Range
- Different administration routes

The term “measures of variation” refers to a method of finding how widely spread out a set of data is, such as percentiles, quartiles, range, and standard deviation (Bennett et al., 2009).

In table 2 of the study, measures of variation are used to show the median range of opportunities
for error (OE) among different nursing units. The study also used measures of variation to show the changes in range of numbers of OE after the introduction of the BCMA. Some administration routes showed an increase in OE, while others showed a decrease. Among medical surgical units, the range increased slightly after the introduction of BCMA, as did the range in the ICU units. The total amount of OEs on the Medical-Surgical units was decreased after the implementation of the BCMA, while in the ICU units, the numbers were slightly increased. At the same time, the range of duration of medication administration stayed the same for Medical-Surgical Units and increased for ICU units (Helmons et al., 2009). These results suggest that Medical-Surgical units would benefit more from the implementation of BCMA than ICU units would.

Compare the measurements in the study with the standard normal distribution, what does this tell you about the data?

Standard Normal Distribution use of Patient Specific Medication Record (MAR) Versus BCMA:

According to Bennett, Briggs and Triola (2009), “the normal distribution is a symmetric, bell shaped distribution with a single peak. Its peak corresponds to the mean, median, and mode of the distribution. Its variation can be characterized by the standard deviation of the distribution” (p. 198). What makes a distribution normal? “It must have values clustered near the mean so that it is single peaked, or unimodal. The values must be spread evenly around the mean so that it is symmetric. Large deviations from the mean must be increasingly rare so that it has the characteristic bell shape” (Bennett et al., 2009). The standard normal administration of medications has been the MAR which is a paper record used to administer patient medication. The focus using the MAR is the responsibility of the nurse to correctly verify the medication being given to the correct patient at the correct time and the correct dose. There have been a few
studies as to the effects of medication error showing that “less than 2% of medication errors are intercepted at the patient bedside” (Helmans et al., 2009), this has prompted the use of the BCMA which is a bar code assisted medication administration in hopes of decreasing the amount of medication errors reaching the patient.

This study shows the difference on medication errors before and after the implementation of the BCMA. Looking at the tables 1 and 2 there was an improvement to medical surgical units but not the ICU units. Table 1 shows that the length of stays after BCMA was longer at 5.8 to 4.6 before BCMA, as well as decrease in discharges versus before BCMA from 86 to 82. Table 2 shows before BCMA medication errors were high at 88 on medical surgical units and 374 on ICU units (Helmans et al., 2009). After the implementation of BCMA errors decreased on the medical surgical units from 888 to 697 where ICU units increased from 374 to 394. The research showed most of the medication errors occurred early in the morning, and after BCMA was initiated the errors decreased on the medical surgical unit, but on the ICU units the errors did not change or were increased. The study also showed after the BCMA was implemented, accuracy was higher on medical surgical unit and charting and labeling had improved on the ICU units. The research shows BCMA not as effective on all units but overall is more effective then the standard norm of the MAR, preventing more errors before reaching the patient bedside (Helmans et al., 2009). When considering this information in regards to standard normal distribution, the central tendency of the data is the median value of 5 from a range of 1-14 showing the distribution to be slightly skewed to the right, and being a normal distribution must be bell shaped and only one peak this data appears to have an almost normal distribution with a slight right skew.
Based on your review of the statistics in the study, do you agree with the study’s conclusions?

Why or why not?

- Table 1—there wasn’t much difference
- Table 2—medication errors decreased, but not in the ICU’s, the time it took for giving the medications increased
- Table 3—are things that every nurse should be doing with or without the scanning

In Table 2, (page 1206), the article states the ICU’s had the most medication errors after the implementation of BCMA and the medical-surgical units had decreased their medication errors. If nurses are scanning their patients at bedside before giving the medication, then there should have been no medication errors. Medication errors decreased due to the new system. Team C agrees with Table 2 since everything is being scanned and the medications match the patients orders in that system. What Team C does agree with is, if the orders were put into the system correctly. If not the nurse is pulling out what the pharmacy believes to be correct, the correct medication, dosage, and time. If the orders were updated, how quickly is the system updated? This could prove this study incorrect. Also in Table 2 (pg 1206), an “increase in time errors after BCMA was implemented”. (Helmons, pg 1206, 2009). However, “there were fewer omitted medications” (Helmons, pg 1206, 2009).

Table 3, (page 1207), demonstrates nurses should identify every patient with 2 identifiers at the bedside, charting of medications on the medication record, and explaining the medication to the patient. These things will increase because of scanning, the machine charted the medication and time the medication given.

Conclusion
This study showed that the implementation of BCMA technology actually decreased medication errors in the medical-surgical units, but it did not have any different effect in the intensive care units. This study helped our team have a better understanding of how measures of central tendency, measures of variation, and standard normal distribution measurements affect visual data displays utilizing different variables. The team agreed with the study’s findings about the implementation of BCMA technology, and how it can be one cost-effective intervention for medication errors along with continuous staff development and education in the realm of medication errors.