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USAID ASSIST PROJECT
Applying Science to Strengthen and Improve Systems

Tips and Tools for Learning Improvement

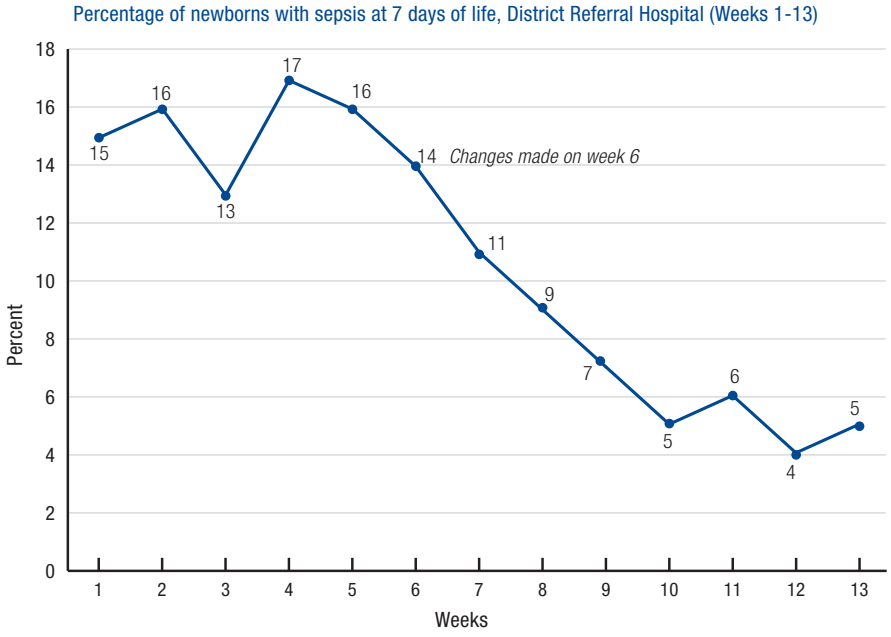
Answer Key | Measurement - Variation vs. Improvement

Exercise 1: Calculating a median

Data set	Line up the numbers in numerical order	Median
52, 41, 44, 60, 77, 41, 58	*41 41 44 52 58 60 77*	*52*
10, 6, 15, 20, 7, 3	*3 6 7 10 15 20*	*8.5*
4, 8, 0, 2, 4, 2, 6, 7	*0 2 2 4 4 6 7 8*	*4*
11, 82, 33, 59, 25, 71	*11 25 33 59 71 82*	*46*

Exercise 2: Determining variation or improvement

Example 1



What can you tell from this graph? Check the right answer.

- ✓ It shows improvement
- ☐ It does not show improvement
- ☐ I can't tell. I need to do more analysis

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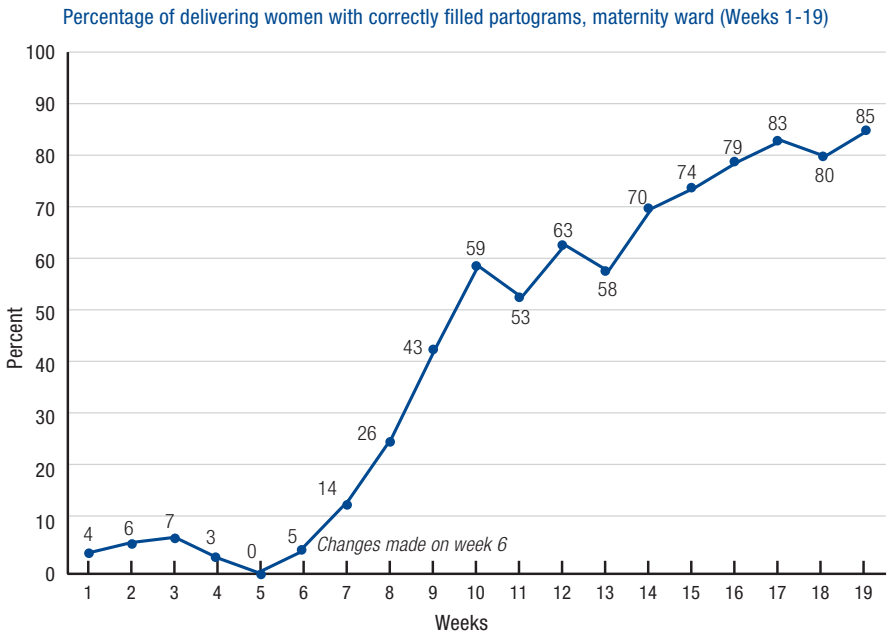
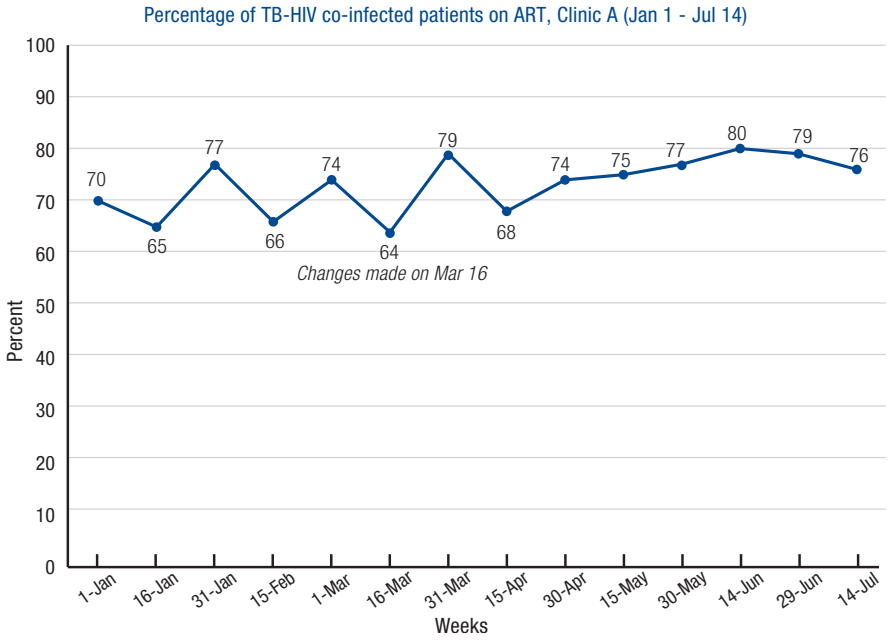
Example 2



What can you tell from this graph? Check the right answer.

- [x] It shows improvement
- [ ] It does not show improvement
- [ ] I can't tell. I need to do more analysis

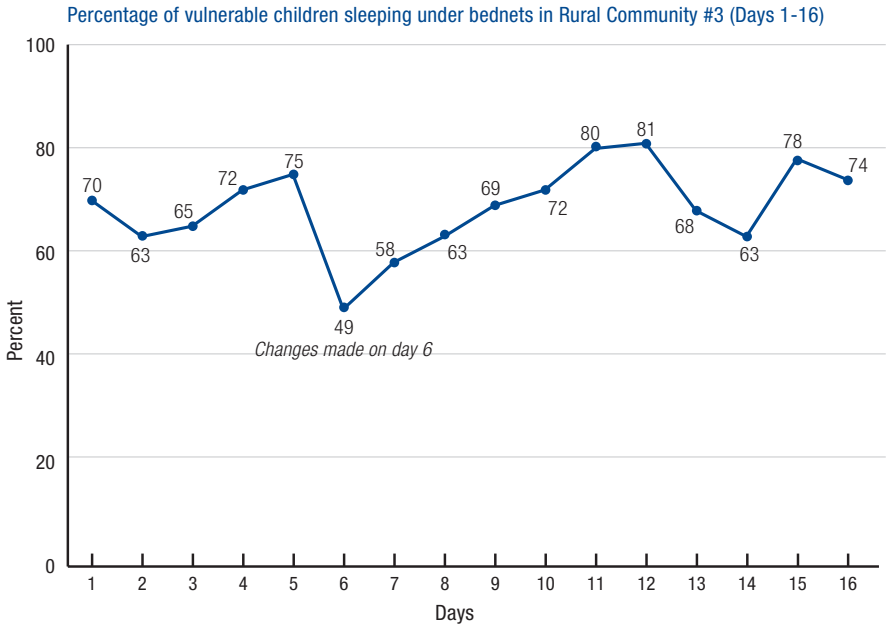
Example 3



What can you tell from this graph? Check the right answer.

- [ ] It shows improvement
- [ ] It does not show improvement
- [x] I can't tell. I need to do more analysis

Example 4

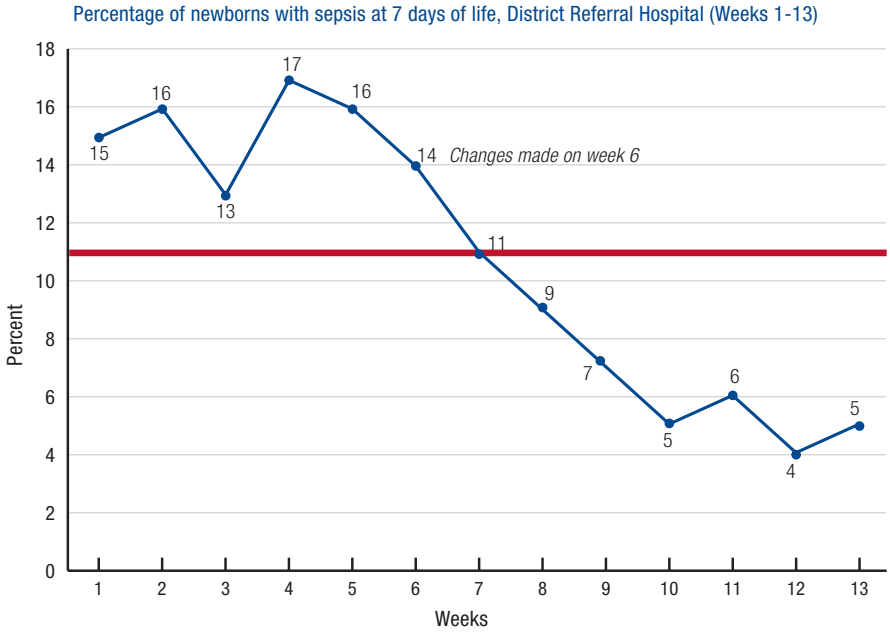


What can you tell from this graph? Check the right answer.

- ☐ It shows improvement
- ☐ It does not show improvement
- ✓ I can't tell. I need to do more analysis

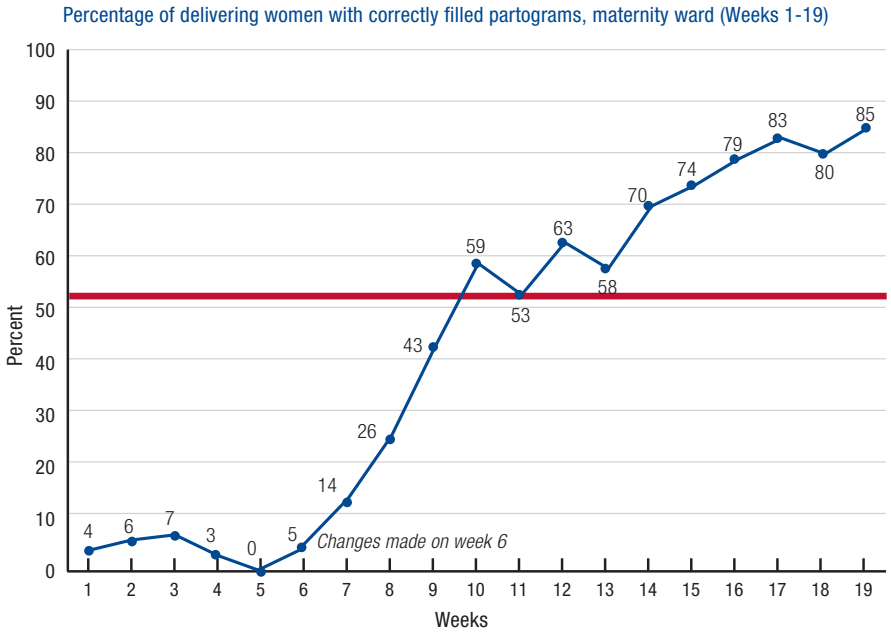
Exercise 3: Practicing run chart rules

Example 1



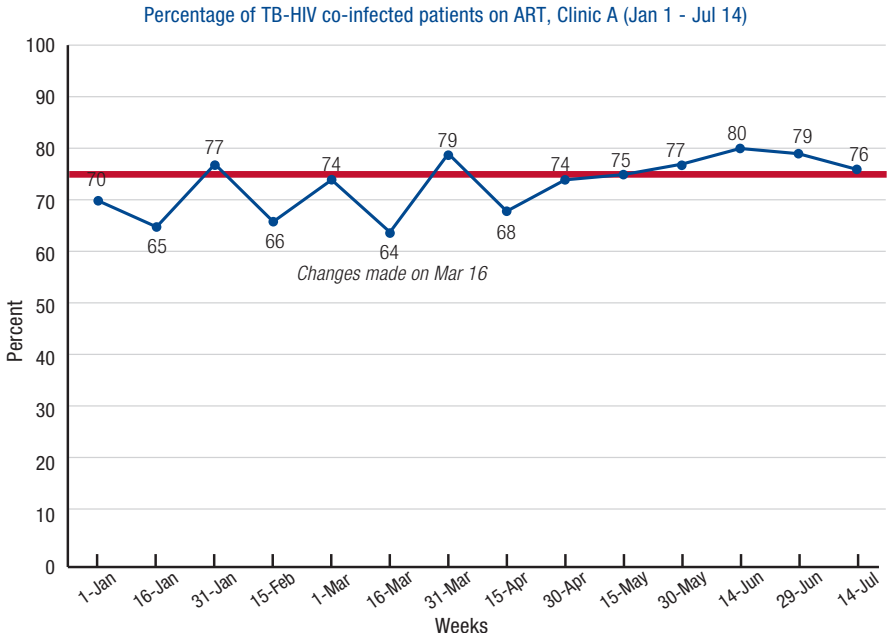
Analysis question	Circle or write in the answer
At least 10 data points?	(Yes) No
Do at least 5 points continue up or down in the same direction?	(Yes) No
Is there a trend?	(Yes) No
What is the median? (write in and draw on graph)	*11*
Are there 6 or more points above or below the median?	(Yes) No
Is there a shift?	(Yes) No
Does this graph show improvement?	(Yes) No

Example 2



Analysis question	Circle or write in the answer
At least 10 data points?	(Yes) No
Do at least 5 points continue up or down in the same direction?	(Yes) No
Is there a trend?	(Yes) No
What is the median? (write in and draw on graph)	*53*
Are there 6 or more points above or below the median?	(Yes) No
Is there a shift?	(Yes) No
Does this graph show improvement?	(Yes) No

Example 3

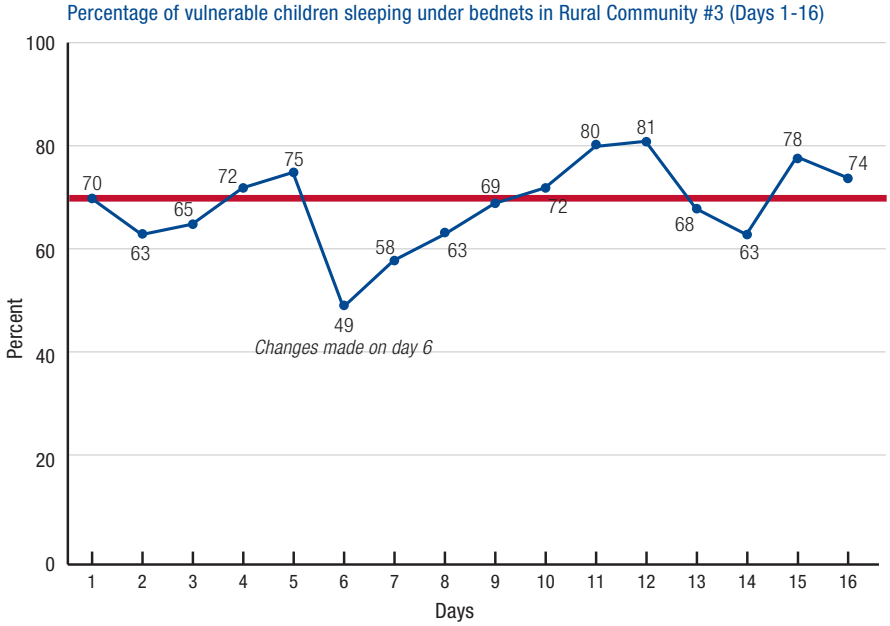


Analysis question	Circle or write in the answer
At least 10 data points?	(Yes) No
Do at least 5 points continue up or down in the same direction?	Yes (No)
Is there a trend?	Yes (No)
What is the median? (write in and draw on graph)	*74.5*
Are there 6 or more points above or below the median?	Yes (No)
Is there a shift?	Yes (No)
Does this graph show improvement?	Yes (No)

There is no trend here. You begin counting with the first data point going up, in this case Apr 30 (74). There are only 4 points.

The data show that there appears to be a change in the right direction towards improved performance. There are currently 5 points above the median. If the next point turns out to be above the median, then we would have a shift and could claim improvement in the process.

Example 4



Analysis question	Circle or write in the answer
At least 10 data points?	(Yes) No
Do at least 5 points continue up or down in the same direction?	(Yes) No
Is there a trend?	(Yes) No
What is the median? (write in and draw on graph)	*69.5*
Are there 6 or more points above or below the median?	Yes (No)
Is there a shift?	Yes (No)
Does this graph show improvement?	(Yes) No *between days 6 and 12*

It is not clear whether improvement will be sustained as the last few points on the graph are dropping. An improvement team would want to watch performance carefully and make note of anything that might be hindering performance.

There are options for more advanced analysis which are not covered here and not expected for the learner to know. For example, you can compare the median for the baseline period (days 1 – 6) with the median after the baseline (days 7 – 16). In this case, the baseline median is 67.5 and the median for the period after changes were made is 70.5 which shows improvement. We may be seeing a new variation pattern at the end of the graph. We would need more data points to understand exactly what is happening.