

Days of Therapy and Beyond!

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Disclosures

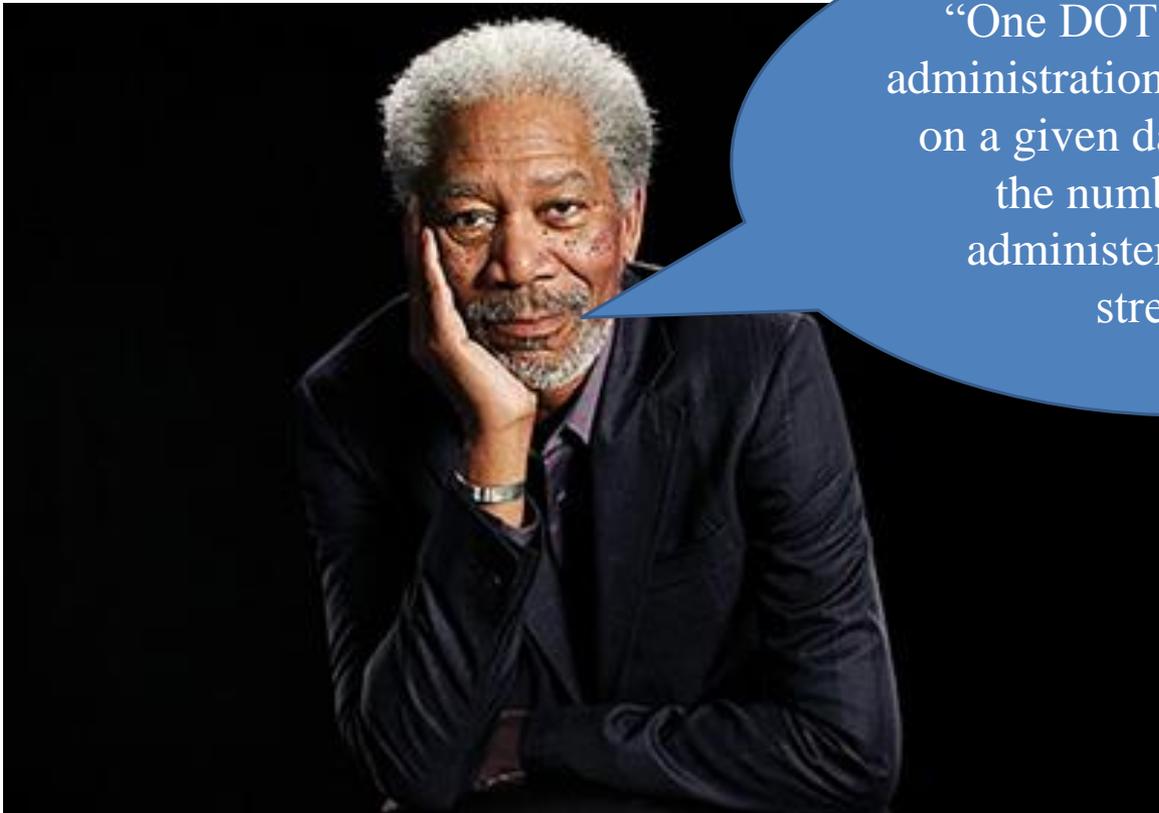
I have no conflicts of interest to disclose.

Why Should We Spend Resources Collecting DOT?

- ❑ Most validated and useful metric regarding antibiotic utilization.
- ❑ Meets mandate criteria for:
 - ❑ Monitoring antibiotic use within your facility.
 - ❑ Can help you decide actionable items as it relates to opportunities for your antibiotic stewardship program.
- ❑ Can be a significant source of ongoing education to providers, nursing, pharmacy, and administration.

How Do You
Get Started??

Day(s) of Therapy (DOT)



“One DOT represents the administration of a single agent on a given day regardless of the number of doses administered or dosage strength.”

Data!!!

Numerator

- ❑ Antimicrobial Days or Days of Therapy
 - ❑ Monthly reports of antibiotics **administered in the inpatient setting (either by eMAR or BCMA)**
 - ❑ Electronic reports created as part of the eMAR are ideal, especially if linked to barcode scanning
 - ❑ You want the most accurate record of antibiotics ordered and administered

- ❑ Prospective collection of data as antibiotics are administered
 - ❑ Must be organized and stay on top of data collection prospectively

- ❑ Clinical decision support software (ie. Senti 7, Theradoc, etc.)

- ❑ **Billing data or pharmacy orders are not acceptable sources for this information**

Data!!!

- Census data organized by location
 - All inpatient locations
 - Organize data collection by location (ICU, Surg, Medical, etc.)
 - The census you are looking for is “patient days” (not the same things as “days present”)
 - Folks knowledgeable with “admissions” data should be able to help with this information

AMS Pseudocode	Clinical Translation
<p>5. Define Denominator</p> <p>Count total facility “Patient Days” :</p> <p>Number of patients who were present for any portion of each day of a calendar month at a facility-wide, acute inpatient location</p> <p>Include: observation and rehab patients</p> <p>Exclude: all “Well” Newborn locations</p>	<p>Compile Denominator:</p> <p>Total number of facility-wide acute inpatient days per month</p>

How To Organize The Data?

However it works to track and organize the data!!!

- Excel spreadsheet
 - Antimicrobials by agent
 - Antibacterials
 - Antifungals
 - Antivirals
 - Location (across the top)
 - Can break the data down by floor to analyze use by service
 - 12 tabs (one for each month of the year)

- To get DOT/1000 patient days add up the usage by agent, then divide by patient days and multiply by 1000
 - In Excel...
 - = (cell number of antibiotic days/census)*1000
 - After you do this to one cell, highlight that cell and drag down! This tells Excel to use the same formula on the remaining data without you having to input the equation in over and over.
 - Once you have all your normalized days of therapy, Excel can add it up for you into one number for the month (Formulas tab → Autosum → Sum)

	A	B	C	D	E	F	G	H	I	J
1	Agent	DrugClass	Route	ProviderName	Location	PointofCare	AgentDays	PatientDays	DOTper1000PD	Month
2	Cefazolin	Cephalosporin	IV	Snow, Jon	INPATIENT	3EAST	3	2237	=(G2/H2)*1000	10/1/2017

Excel DOT Example

- Using our example patient DT for prospective data collection

	A	B	C	D	E	F	G	H	I	J
1	Agent	DrugClass	Route	ProviderName	Location	PointofCare	AgentDays	PatientDays	DOTper1000PD	Month
2	Cefazolin	Cephalosporin	IV	Snow, Jon	INPATIENT	3EAST	3	2237	1.341081806	10/1/2017
3	Vancomycin	Glycopeptides	IV	Snow, Jon	INPATIENT	3EAST	3	2237	1.341081806	10/1/2017
4	Amoxicillin	Penicillin	Oral	Snow, Jon	INPATIENT	3EAST	1	2237	0.447027269	10/1/2017

- If running reports and collecting retrospectively

	A	B	C	D	E	F	G	H	I	M	N
1	Antibiotic	2 East	2 South	3 East	3 South	4 East	4 South	BVH	ICU	DOT (raw)	DOT/1000 patient days
2	Amoxicillin	0	4	0	0	0	14	0	0	18	6.955177743
3	Amoxicillin/Clavulanate	5	6	14	19	0	3	18	2	67	25.88871716
4	Ampicillin	0	5	0	3	7	6	0	1	25	9.659969088
5	Ampicillin/Sulbactam	2	2	5	8	0	7	0	0	24	9.273570325
6	Azithromycin	4	0	36	32	1	23	11	13	120	46.36785162
7	Cefazolin	5	111	6	16	5	24	0	20	187	72.25656878
8	Cefdinir	4	0	0	15	0	0	2	2	23	8.887171561
9	Cefepime	50	3	16	19	0	0	0	13	101	39.02627512
10	Cefotaxime	0	0	1	0	0	0	0	0	1	0.386398764
11	Cefoxitin	0	22	0	0	9	29	0	1	61	23.57032457

DOT Calculation Examples

DOT Example

□ Patient DT, a 68 yo F, is admitted to the medical floor for cellulitis and empirically started on vancomycin 2gm IV Q12H and cefazolin (Ancef) 2gm IV Q8H. Both antibiotics were first administered at 1000. After 3 days skin culture comes back and show DT is growing a sensitive strep and is de-escalated to oral amoxicillin, receives 1 oral dose, and is then discharged at 1500. How many days of therapy did this patient receive during their stay?

Day	Abx Administrations	Abx Doses	DOT Total
1	Cefazolin (1000, 1800) Vancomycin (1000, 2200)	Cefazolin (2) Vancomycin (2)	2
2	Cefazolin (0200, 1000, 1800) Vancomycin (1000, 2200)	Cefazolin (3) Vancomycin (2)	2
3	Cefazolin (0200, 1000) Vancomycin (1000) Amoxicillin (1400)	Cefazolin (2) Vancomycin (1) Amoxicillin (1)	3

2+2+3= Total 7 DOT!

DOT in Action

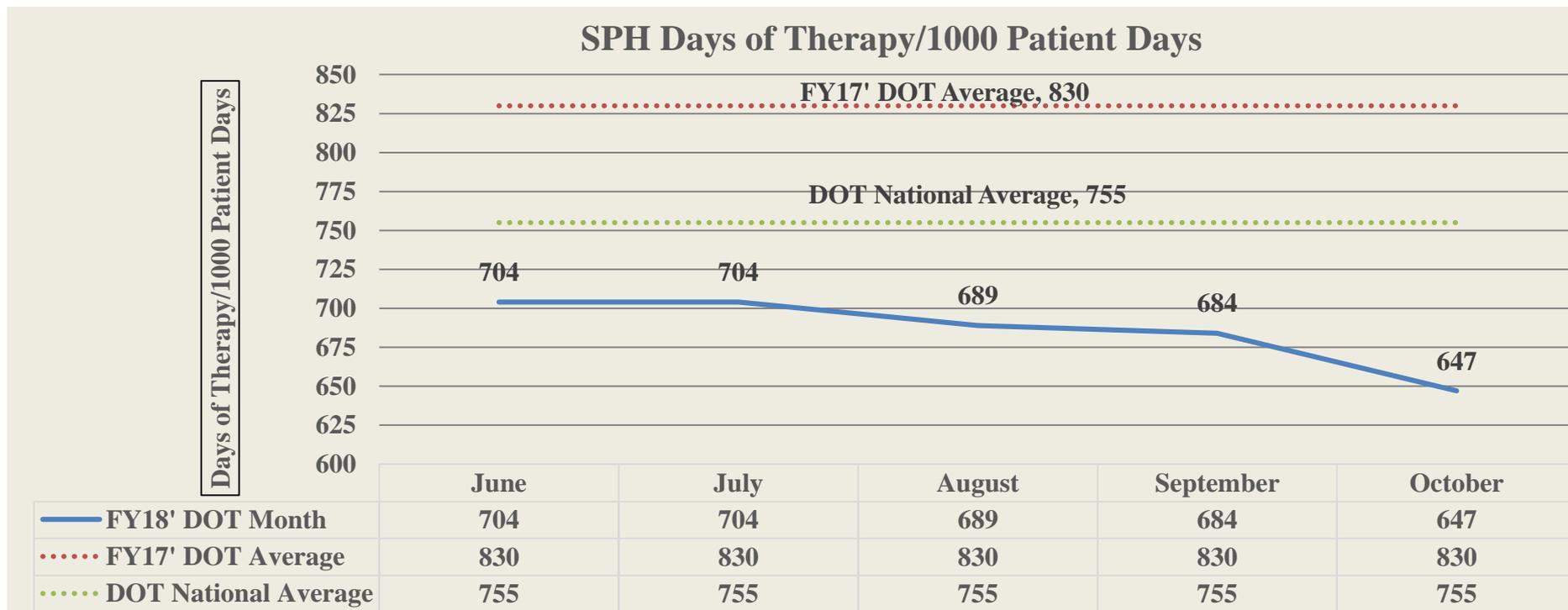
DOT in Action

- ❑ Use DOT to help identify areas of opportunity with antibiotic utilization and education
 - ❑ Use your facility's total DOT monthly average as ongoing program metric reporting
 - ❑ Compare to published national averages (DOT 755/month)
 - ❑ Try to get at least a couple of months historical DOT data for comparison
 - ❑ Pick a specific agent or class of agents and perform a pre/post intervention analysis using DOT data
 - ❑ **Example 1:** If using meropenem somewhat routinely, define criteria for use or restrict this antibiotic using guidance that is evidence based. Use DOT data to track and trend your intervention's impact pre/post intervention.
 - ❑ **Example 2:** Pick a disease state that is problematic and develop clinical decision support algorithms (or pathways) that help guide evidence based antibiotic prescribing.
 - ❑ UTI's are often an area of opportunity of which you can help guide empiric antibiotic selection and durations of therapy. Both can be measured using trends with DOT.

Agent Class	Antibiotics
Penicillins	Piperacillin/Tazobactam (Zosyn) Ticarcillin/Clavulanate (Timentin) Ampicillin/Sulbactam (Unasyn) Amoxicillin/Clavulanate (Augmentin)
Cephalosporins	Ceftriaxone (Rocephin) Cefotaxime (Claforan) Ceftazidime (Fortaz) Cefepime (Maxipime) Ceftaroline (Teflaro)
Carbapenems	Meropenem (Merrem) Imipenem/cilistatin (Primaxin) Doripenem (Doribax) Ertapenem (Invanz)
Fluoroquinolones	Ciprofloxacin (Cipro) Levofloxacin (Levaquin) Moxifloxacin (Avelox)

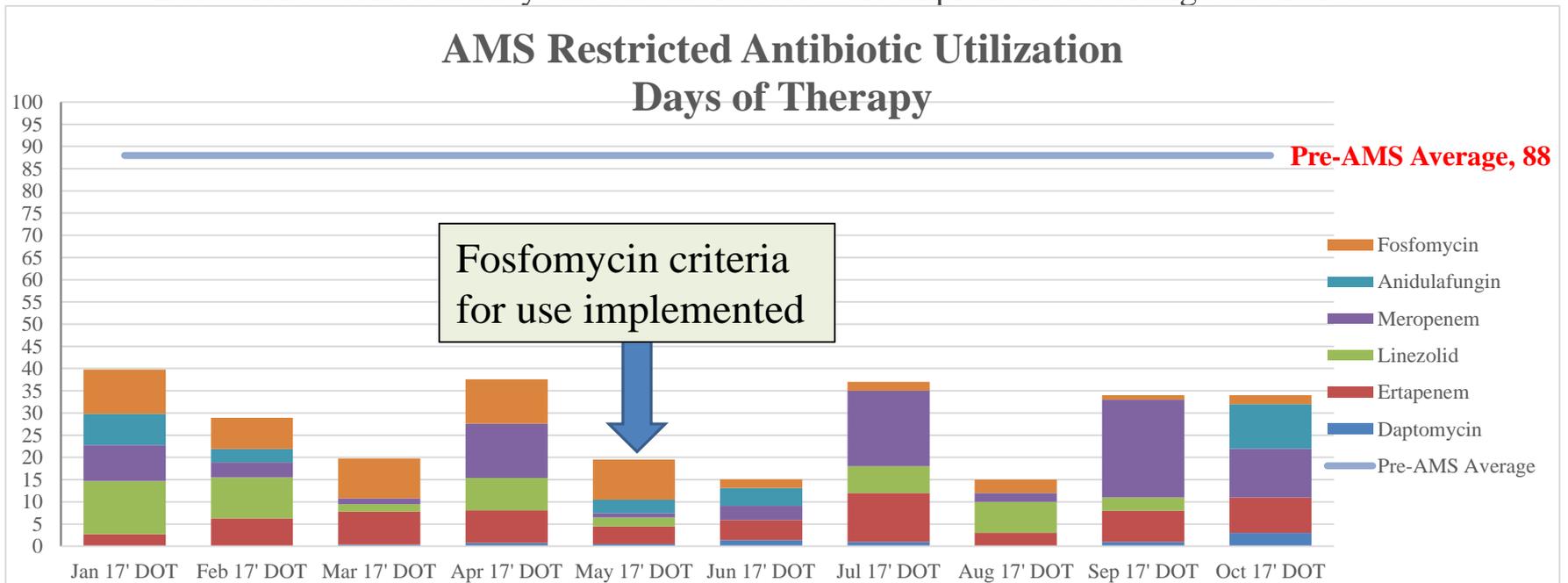
DOT in Action

□ **Example 1:** Evaluating global days of therapy use historically and compared to published national averages. Can be used to educate hospital staff and administration in addition to targeting action items.



DOT Data in Action

- ❑ **Example 2:** Collecting DOT for restricted or targeted antibiotics and developing an intervention.
 - ❑ Based on DOT data, the SPH AMS team targeted fosfomycin for a medication utilization review. This review showed this broad spectrum antibiotic was being prescribed when alternatives existed. Criteria for use before order approval were developed and pharmacy/providers were educated. Education occurred in May and criteria for use were implemented starting June 2017.



And Finally....

DOT Resources

Medici AU

- A validated 3rd party software that helps provide direction and analysis for antibiotic days of therapy.
 - Excel template provided for data collection
 - Data analysis provided in excel pivot tables
 - Cost: \$50/month (1-49 beds), \$100 (50-99 beds)
- May be a good option to help guide this data collection

Tips and Tricks

- ❑ Be prepared with the best antibiotic administration data and tools for summarizing data before starting any calculations.
 - ❑ This includes the correct list of antibiotics, the correct defined locations, the best antibiotic administration report you have that is the least prone to error, and a working knowledge of your chosen spreadsheet. Doing this by hand and then messing it up and doing it over is not fun.
- ❑ If calculating antimicrobial days by hand based off of larger reports for the month, develop a system to help quickly extract data.
 - ❑ Focus on one location at a time using a list of antibiotics to make quick tick marks to stay organized, then transfer to the spreadsheet.
- ❑ Understand that doing this by hand is prone to error and be able to accept a small amount of error while undertaking this endeavor.

DOT FAQ's

❑ How do you count drugs that are dosed greater than every 24 hours?

- ❑ If you encounter a medication that is dosed outside of a 24 hour interval (ie. Levofloxacin Q48hrs) count only the administrations as part of DOT. For example, a patient is on Levofloxacin Q48hrs x 6 days, this would result in 3 drug administrations and thus 3 DOT.

❑ Should I be collecting DOT for ALL anti-infectives or just certain targeted agents?

- ❑ The NHSN manual for AU guides which anti-infectives are part of the submission data elements.
- ❑ As we work collaboratively from the state level, having both total DOT and individual agents broken out will help us better understand each institutions utilization and how we can help with recommendations and targeted interventions.

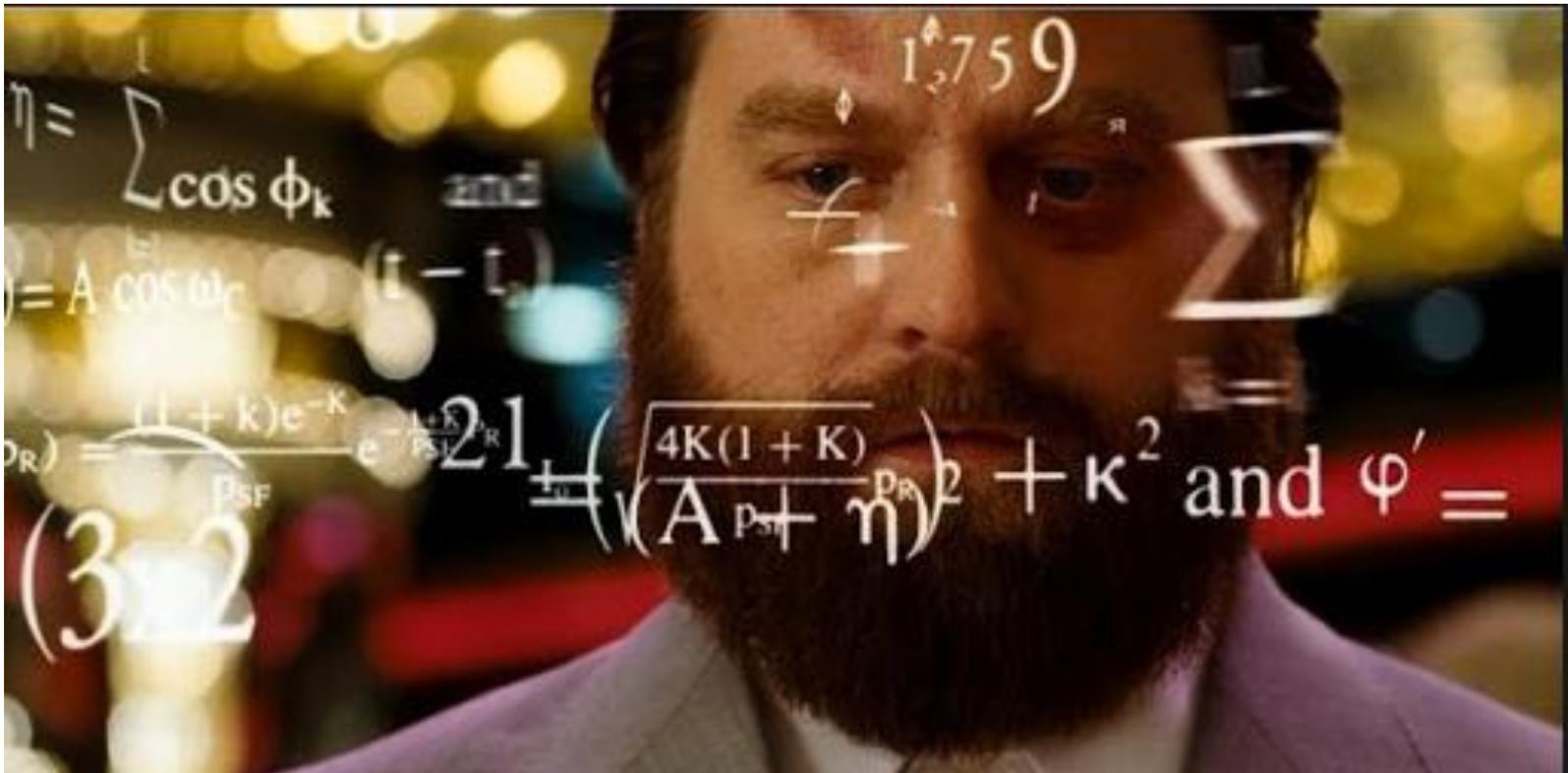
Questions?

Special thanks to:

Heidi Simons, PharmD, BCPS

Shea Fanning, PharmD

Calculating days of therapy be like.....



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References & Resources

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