



Activity 2B: General Transformation Support Information

TEKS

6th-8th

- (2) Scientific investigation and reasoning. The student uses scientific inquiry methods during laboratory and field investigations. The student is expected to:
 - (D) construct tables and graphs, using repeated trials and means, to organize data and identify patterns; and
 - (E) analyze data to formulate reasonable explanations, communicate valid conclusions supported by the data, and predict trends.
- (3) Scientific investigation and reasoning. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions and knows the contributions of relevant scientists. The student is expected to:
 - (A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student;
 - (D) relate the impact of research on scientific thought and society, including the history of science and contributions of scientists as related to the content.

UNDERSTANDING ABSOLUTE RISK

Scientists often calculate the absolute risk to determine a person's risk of obtaining a disease, outcome, or condition. Knowing this information can help individuals make educated choices and decisions. For example, if a group of 100 people are non-smokers and 1 person gets lung cancer, then the risk of getting lung cancer is 1 in 100 for individuals who have never smoked. This is a low absolute risk of obtaining lung cancer. Knowing this information, would you choose to smoke?

Absolute risk is the chance of developing a disease or some occurrence during a time span. To calculate the absolute risk, take the number of deaths and divide it by person months.

$$\frac{\text{Overdose Deaths}}{\text{Person Months}} = \text{absolute risk}$$

If an absolute risk is 2 out of 1000 deaths, this means that 2 people out of 1000 will die because of that risk. To better understand absolute risk, consider the following table:

Table 1: Patients With Chronic Non-Cancer Pain Diagnoses

Maximum prescribed daily opioid dose	Overdose deaths	100,000 Person-Months
0	243	27.3
1 to <20 mg	44	4.0
20 to < 50 mg	108	4.6
50 to <100	86	1.3
≥100	125	1.0





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In Table 1, the absolute risk of a person dying at the maximum daily dose of 0 mg/d, milligrams/dose, is

$$\frac{243}{27.3} = 9$$

This means out of 100,000 people, 9 who are taking 0 mg/d will end up dying of an opioid overdose. The same formula can be used to find the absolute risk for Table 2, found in the 2B student activity..

In this activity, students will use data from the peer-reviewed article to calculate the absolute risk of patients overdosing for each maximum prescribed daily dose.

ACTIVITY SUGGESTIONS:

- Introduce person-months by explaining it is the amount of exposure time to the drug. See person-months activity for more information.
- Students can use a calculator for the calculations.
- Students can work on both tables 1 & 2 individually or you can pair the students, having each and have each student work on a different table and collaborate.

EXTENSIONS:

- The peer-reviewed article has two additional tables (acute pain and substance use disorder). Students can calculate these tables to solve for the absolute risk. Before they solve for the absolute risk they will need to convert person months to 100,000 by dividing the person-months by 100,000.
- Have the students graph the difference between the non-cancer and cancer absolute risks.

RESOURCES:

Bohnert, A. S., Valenstein, M., Bair, M. J., Ganoczy, D., McCarthy, J. F., Ilegen, M. A., Blow, F. C. (2011). Association between opioid prescribing patterns and opioid overdose-related deaths. *Journal of the American Medical Association*, 305(13), 1315-1321. doi: 1315-1321. doi:10.1001/jama.2011.370.

(George Mason University)

<http://stats.org>

(patient.co.uk)

<http://www.patient.co.uk/health/Risks-of-Disease-Absolute-and-Relative.htm>

