

Math Strand 5: Data and Probability

CLE: 5.1 Formulate questions that can be addressed with data and collect, organize and display relevant data to answer them

Health Profession: Physical Therapist

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References:

- Burns, N., Grove, S. (2007). Understanding nursing research: building an evidence-based practice (4th ed.) St. Louis, MO: Saunders Elsevier.**
- Hinman, R., Heywood, S., Day, A. (2007). Aquatic physical therapy for hip and knee osteoarthritis: results of a single-blind randomized controlled trial. *Physical Therapy*, 87, 1, 32-43.**
- Larson, R., Boswell, L., Kanold, T., Stiff, L. (2007). *Algebra 2*. Evanston, Illinois: McDougal Littell.**
- U.S. Department of Labor, Bureau of Labor Statistics, Physical Therapist. Retrieved February 25, 2008, from <http://www.bls.gov>.**

Objectives:

At the completion of this presentation the high school student will be able to:

- 1. State the research question and the desired outcome.**
- 2. Demonstrate a bar graph of improvement of pain levels and functional ability of the aquatic therapy participants and the control group participants.**
- 3. Identify the importance of evidence based practice and research to a physical therapist and the patient.**

Background Summary of Information as Related to Physical Therapist and CLE:

A Physical Therapist (PT) can provide services such as improving strength, range of motion, pain reduction, improving mobility and overall function. Physical therapists work with patients with many different problems ranging from a sports related injury, motor vehicle accidents, arthritis, head injuries and many disease processes. After receiving a doctor's order, the PT evaluates the patient testing and measuring strength, range of motion, muscle performance, balance and coordination of that patient. They then create a treatment plan specifically for that patient along with expected measurable outcomes in a specified amount of time. Medicare and other insurance companies pay for physical therapy services if it can be justified that the patient required skilled services. In other words, a PT must justify that the patient required and demonstrated improvement due to their service in order to get paid for that service.

With Medicare and other insurance companies becoming more stringent with payment for physical therapy services it has become extremely important for physical therapist to provide evidence-based practice. Burns & Grove (2007) defines evidence-based practice as "the conscientious integration of best research evidence

with clinical expertise and patient values and needs in the delivery of high-quality, cost-effective health care” (p. 4).

A PT requires a master’s or a doctoral degree from an accredited university along with a state license. The license is obtained by passing a national and state exam. The average median salary for a physical therapist is approximately \$66,000, with an approximate range of \$46,000 to \$99,000.

Aquatic therapy is physical therapy performed in the water. It is very beneficial if the water is warm for relaxation of the muscles. Water also reduces the amount of stress on weight bearing joints due to the buoyancy. The water can also act as resistance for strength training of muscles. The hydrostatic pressure also reduces joint and tissue swelling.

Scenario:

A hospital administration is holding their yearly financial review meeting and has determined that to meet budget that one of the two physical therapy’s aquatic therapy classes must be cancelled. It has been determined that the physical therapists from the Rehabilitation Department will assist in this decision by presenting to the board the outcomes that the patient’s have achieved from both programs. The decision will be made to cancel the program with the least favorable outcomes.

The Physical therapists have divided up into 2 groups that will represent each of the aquatic therapy classes. One class consists of 36 patients with hip or knee arthritis pain and the other class has 35 patients with shoulder arthritis pain. Each class will be compared to a control group of patients. Each control group completed a home exercise program established by a physical therapist for their arthritis pain.

Activity:

Have students divide up into three separate groups:

- 1) Hospital administration
- 2) Physical therapists (PT) representing aquatic therapy for hip and knee arthritis
- 3) Physical therapists representing aquatic therapy for shoulder arthritis.

Have group 2 create a bar graph to demonstrate pain levels of the hip/knee pain participants of aquatic therapy vs. a control group with a home exercise program. Have group 3 create a bar graph of pain level results from shoulder participants of aquatic therapy vs. a control group that completed a home exercise program. When bar graphs are completed, groups 2 and 3 must present their research question along with the bar graph containing the outcome results. Group 1 must decide between the two programs, which aquatic therapy program had the best outcomes and from this determine which program will be allowed to continue based on the research results. Discuss results of both programs.

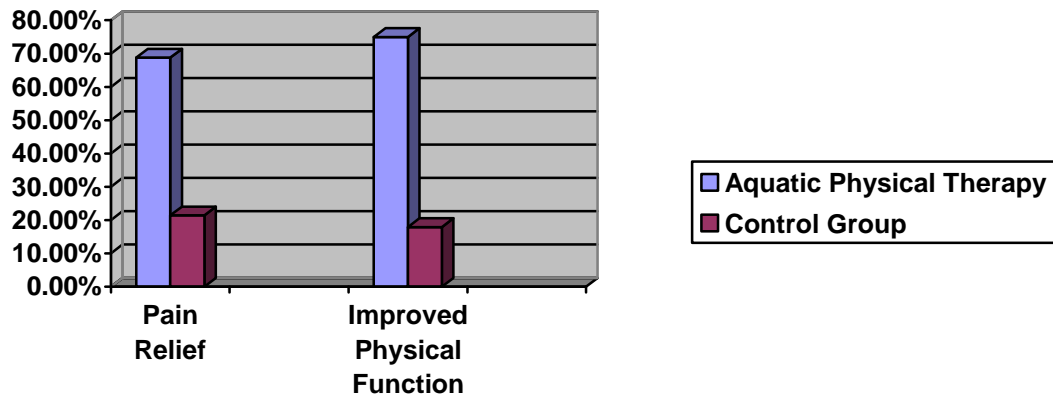
The following information will be given to group 2:

Hip/knee aquatic therapy group
32 participants completed a 6 week trial
22 of the participants reported a decrease in pain
24 of the participants had increased their physical function

Answer: $22/32=68.8\%$, $24/32=75\%$

Control group-home exercise program
28 participants completed a 6 week trial
6 of the participants reported a decrease in pain
5 of the participants increased their function
 $6/28=21.4\%$, $5/28=17.9\%$

Example Bar Graph for Participants with Hip/Knee Arthritis:



Information given to Group 3:

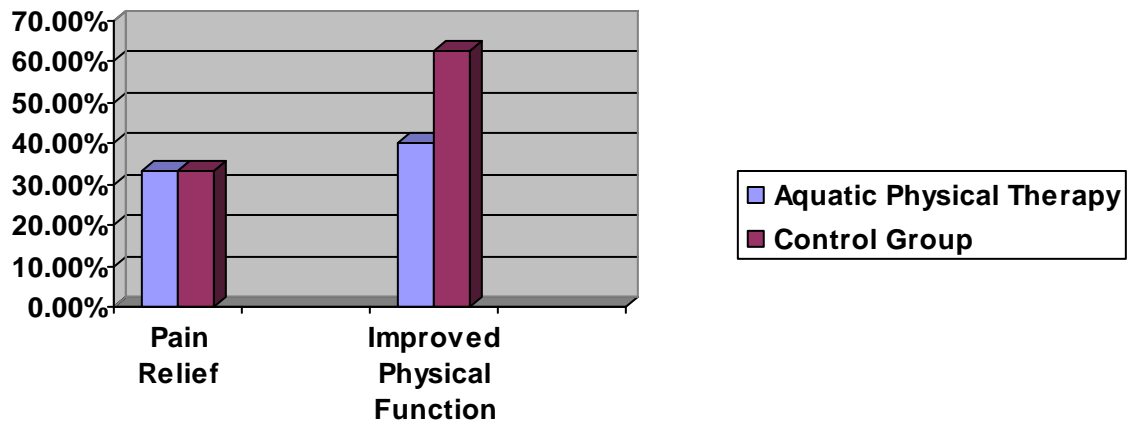
Shoulder aquatic therapy group
30 participants completed a 6 week trial
10 of the participants reported a decrease in pain

12 of the participants had increased physical function

Answer: $10/30=33.3\%$, $12/30=40\%$

Control group-home exercise program
24 participants completed a 6 week trial
8 of the participants reported a decrease in pain
15 of the participants had increased physical function
 $8/24=33.3\%$, $15/24=62.5\%$

Example Bar Graph for Participants with Shoulder Arthritis:



All students will be able to identify the research question: Which aquatic physical therapy program has the most pain reduction and increased physical function outcomes?

The students will be able to organize and display this information in a bar graph.

The students will be able to discuss the importance of collecting, organizing, and displaying relevant data to answer a formulated question.