Empower Through Connections

Empowerment is the development of confidence in one’s own abilities. Last year, we looked at empowerment through effective communication, leadership, motivation of others and proactive attitudes. This year we continue this series by discussing empowerment through connections with people, places and things. We’ll explore various incidents (scenarios) of improper infection prevention and safety that could occur in a dental facility. Then we’ll describe how empowerment through connections can help prevent such incidents and include a listing of related regulations and recommendations. The first five issues were titled “Connect with Policies and Training”, “Empower by Connecting with Places”, “Empower by Connecting with Compliance”, “Empower by Connecting with Products” and “Empower by Connecting with People”. The current issue is “Empower by Connecting with Research”.

Empower by Connecting with Research

The Scenario

The Incident
Dr. Duerre has been practicing for 35 years in the small Midwest town of Centerville. His wife (Paragem) of 40 years was the dental assistant and only employee, and she convinced Dr. D that they should retire soon and move to Florida. She thought that a 4th-year dental student may be interested in buying the practice, so she talked Dr. D into volunteering his office as a site for extramural training of dental students from the local dental school.

When the student (Monly) arrived, Paragem showed him around and went through the chairside, darkroom and infection prevention procedures they used. When Monly saw that all the hand instruments were cleaned and autoclaved between patients but that the handpieces were just wiped down with alcohol, he was quite alarmed. Paragem was surprised when Monly told her that the school flushed, cleaned, packaged and heat-sterilized all their handpieces after every use. She discussed this with Dr. D, and he said: “That’s crazy! We would need to buy at least twice as many handpieces. Why we’ve never had a problem in making people sick with our handpieces, and besides, the alcohol kills all the germs.”

Potential Consequences

Although handpieces have not been shown to be a major spread of disease, basic and clinical research have shown that handpieces can serve as a mode of cross-contamination. Patient fluids and microorganisms may be retracted into the handpiece. Thus, wiping down the outside surfaces will not eliminate the internal con-

Learning Objectives

After reading this publication, the reader should be able to:
► define research.
► describe how research is important to a dental practice.
► describe the scientific method.
► describe how to evaluate a research article.

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Empower by Connecting with Research

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What is Research?
The broad definition of research is the gathering of information for the advancement of knowledge. Scientific research is using the scientific method to obtain empirical and measurable evidence to advance knowledge.

Four Types of Research
► Basic
(i.e., fundamental research) is carried out to increase understanding of fundamental principles.

► Translational 1
(i.e., “bench to bedside” research) bridges the gap between basic and applied research.

► Applied
(i.e., clinical) addresses practical problems and employs empirical methods.

► Translational 2
(i.e., “bedside to community” research) adapts applied or basic research results for use by clinicians, public health professionals and the general public.

All of these forms of scientific research are important to the dental office, not because offices need to conduct scientific research, but because they need to connect with research to:
► review the results of scientific research (when available) in order to perform evidence-based infection prevention (i.e., select proven procedures, products and equipment);
► apply the general methodology used in scientific research (i.e., the scientific method) for decision making on topics for which scientific results may not be available; and
► ensure that dental office procedures are effective and aligned with current knowledge.

Prevention and Empowerment
One of many examples of evidence-based infection prevention procedures established through research involves the heat sterilization rather than disinfection of dental handpieces. For years handpieces were just wiped down with alcohol or some other liquid germicide until basic and applied scientific research found that high-speed and low-speed handpieces may retract patient materials into the internal parts of the handpieces, and that this material may be expelled into a subsequent patient’s mouth.1-6

Thus, just wiping off the outside surface of handpieces with a disinfectant will not prevent the possible spread of retracted pathogens. This not only relates to high-speed handpieces but also to slow-speed motors. For example, contamination can pass through the reusable or disposable prophylaxis angle to contaminate the motor. Handpieces (including all reusable attachments and motors) need to be the cleaned and heat sterilized to prevent cross-contamination from microbes residing in and on the handpiece.

PS: Review of Dr. Duerre’s office by the local dental school as an acceptable site for extramural training slipped through the cracks. Had the review occurred, it is doubtful that the school would have approved the office as a training site.
The Importance of Research Articles

Independent research studies conducted by objective researchers using the scientific method provide one of the strongest pieces of evidence on the quality of procedures, products, and equipment. The results of such studies may be published in a variety of formats, and those that are placed in peer-reviewed research journals are particularly significant in establishing evidence-based procedures. Also valuable is manufacturer research that guides product use instructions. Thus, it becomes important for the dental team to understand the scientific validity of a research paper that may relate to infection prevention procedures, products, or equipment to be used in the office. The following are suggestions on how to evaluate a research article.

1. The journal preferably should be a peer-reviewed journal.
2. The main author preferably should be an independent researcher (usually associated with a not-for-profit institution).
3. The literature review must be up to date and address the purpose of the study.
4. There should be a specific purpose of the study and hypothesis stated in the introduction.
5. The methods should carefully describe the measurements and materials used and be of sufficient detail that someone else could read the methods and repeat the study.
6. The results should be presented clearly with statistical analyses where appropriate.
7. The discussion should relate the results to the original purpose and hypothesis for the study; describe any shortcomings of the study; and relate the findings to previously known information.
8. The conclusions must be based on the results of the study.

How the Scientific Method Applies to the Dental Office

The dental office staff actually conducts their own research from time to time when they systematically address a problem and gather information to find a solution. In fact, in some instances, a form of the scientific method is used in the office. An example is presented in the following table.

<table>
<thead>
<tr>
<th>Steps of the Scientific Method</th>
<th>Steps Applied to the Dental Office</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification of research problem</td>
<td>Identify a problem. (e.g., the office staff wants to change surface disinfectants)</td>
</tr>
<tr>
<td>Review what is already known about the problem (e.g., a literature review)</td>
<td>Review why a change is desired. (e.g., they don’t like the disinfectant color, odor, the need to dilute, contact time, spectrum of microbial activity, etc.)</td>
</tr>
<tr>
<td>Specify the purpose of the research</td>
<td>Decide if a change should be considered and, if so, indicate that different disinfectants will be reviewed.</td>
</tr>
<tr>
<td>Determine specific research questions or hypotheses</td>
<td>Determine what needs to be known in order to select a new disinfectant that will satisfy the office staff (e.g., does it have an odor; does it have to be diluted; does it have a reasonable contact time). A hypothesis would be that a new disinfectant can be identified that will satisfy the office staff.</td>
</tr>
<tr>
<td>Data collection (experimentation to test the hypothesis)</td>
<td>Review Environmental Protection Agency (EPA) registered disinfecting products by gathering data from catalogs, Web sites, sales representatives, other offices, and colleagues. Obtain samples for the staff to try out. Test the new surface disinfectant and collect information from each staff member on the criteria identified for change.</td>
</tr>
<tr>
<td>Analyze and interpret the data</td>
<td>Analyze the review data and staff comments, and identify a product or products that will satisfy the hypothesis (please the office staff).</td>
</tr>
<tr>
<td>Make conclusions and report the results</td>
<td>Report the finding to the office staff for a final decision.</td>
</tr>
</tbody>
</table>
Scenario 2

The Incident

Dr. Redbase, a general practitioner, wanted to reduce his overhead. He told his office manager (Ginsel) to contact his brother-in-law (Marply) who distributes dental and office supplies and find the least expensive disinfectant, sterilization bags, gloves, masks and gowns. He wanted the new supplies in place by the following week, and he asked Ginsel to pursue returning some of the supplies currently on hand for refunds.

Marply met with Ginsel and recommended a disinfectant (an alcohol-free quaternary ammonium disinfectant) that he said was the least expensive Occupational Safety and Health Administration (OSHA) approved disinfectant available and can be used for all disinfecting procedures. Marply showed her some inexpensive paper sterilization bags and said they were good for sterilizing all types of items. He told Ginsel that she shouldn’t cut corners on gloves and showed her powdered latex gloves he said were the best available. He made similar comments about masks and gowns. Since Dr. Redbase wanted these new products right away, Ginsel decided to go ahead with Marply’s recommendations.

Potential Consequences

Buying items without conducting any research on the products chosen may cause problems. Without adequate research and office participation in the selection process, the products purchased might perform poorly and/or be unacceptable to the office staff. Ginsel was placed in a very difficult position. Blindly accepting Marply’s recommendations, simply because he was related to Dr. Redbase was risky, but Ginsel felt she had no choice.

Prevention and Empowerment

Analyzing or conducting research is an excellent way to empower yourself in making fair decisions. Ginsel probably felt that her job might be threatened if she didn’t accept Marply’s recommendations. What the office needed was an infection prevention consultant to explain a few things to Dr. Redbase about the importance of research in selecting products. This would have taken the pressure off Ginsel and likely saved the office grief and money.

Most offices develop a good rapport with sales representatives, and over time can learn to trust their recommendations. Even so, products need to be researched before being purchased. Marply was not up-to-date on the products he was promoting, and Ginsel had to accept his anecdotal information about the personal protective barriers being the “best available”. Anecdotal information cannot be a part of evidence-based decisions.

Also, OSHA does not approve products, and Marply erroneously recommended a quaternary ammonium compound (without alcohol) for all the office’s disinfection procedures. This type of disinfectant is a non-tuberculocidal, low-level disinfectant that should be used only on surfaces not contaminated with blood. The Centers for Disease Control and Prevention (CDC) recommend using an intermediate-level disinfectant (i.e., tuberculocidal) on surfaces visibly contaminated with blood. Using a high-level disinfectant for this purpose is not recommended.

Reader’s Poll Question

Do you do product evaluations based upon specific criteria (evidence-based research) on products before incorporating them into work procedures?

Text your response to 22333 as follows:

YES = 595546
SOMETIMES = 595548
NO = 595547

(Regular text costs apply.)

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Check out the fresh graphics, new home page layout and easier page navigation at www.OSAP.org.

Check out OSAP.org’s new look and access the ICIP Reader’s Poll Question results by hovering on the blue “Knowledge Center” bar and clicking the “ICIP Reader’s Poll Question” link.
What’s Wrong with this Picture?

Can you identify any breach in infection prevention and safety procedures in this photo? Check your answers below.

![Image of a patient receiving a dental procedure]

**ANSWERS**

- The patient is not wearing any protective eyewear during a procedure. This is due to the patient not wearing any protective eyewear during the procedure.

Explore and Learn at OSAP.org

Are you having a difficult time keeping updated on guidelines and standards for infection prevention? OSAP can help you connect to resources.

Visit the OSAP.org home page and select “Knowledge Center” in the top blue navigation bar. You will be directed to a pull-down menu of topics specific to CDC, OSHA, EPA and an A to Z index from which you can select a variety of topics. You’ll be amazed at what is available to you.

Looking for more personal guidance? You can easily connect with professionals who provide in-office training or consulting on OSHA compliance, infection control, HIPAA, sterilization center design and ergonomics. Access the following link to find OSAP members listed by state who provide infection prevention and safety consulting services to dental practices at:

http://www.osap.org/?page=OSAP_Consultant_List

**Connect with Others!** If you’re a blogger or tweeter check out the bottom left-hand menu on OSAP’s home page at http://www.osap.org.

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**Glossary**

**Anecdotal information**: Information based on personal unsubstantiated observations rather than on facts or research. Therefore, this type of information is not necessarily correct.

**Empirical**: Denotes information acquired by means of observation or experimentation.

**Evidence-based infection prevention**: The selection and use of infection prevention procedures, products or equipment based upon research studies and accepted methods of interpretation of research results.

**Hypothesis**: A theory needing investigation.

**Independent researcher**: A researcher who is not receiving personal financial gain from a research sponsor to conduct specific research.

**Scientific method**: A systematic investigation based upon empirical and measurable techniques.

**Peer-reviewed research journal**: A journal that publishes previously unpublished articles only after they have been reviewed by members of an editorial board who are peers of the authors.

**Links to Resources**

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For each item, pick the best answer.

1. Anecdotal information is based upon:
   a. well-designed scientific research studies.  
   b. peer-reviewed research publications.  
   c. unsubstantiated personal observations.  
   d. government-sponsored basic research.

2. The last step in the scientific method is to:
   a. develop a hypothesis.  
   b. collect data through experimentation.  
   c. interpret results.  
   d. report the results.

3. A hypothesis is a:
   a. gathering of measurable observations.  
   b. theory needing investigation.  
   c. thorough literature review.  
   d. well-established evidence-based fact.

4. A peer-reviewed research journal:
   a. publishes only previously published papers.  
   b. publishes papers describing anecdotal personal observations.  
   c. uses an editorial board to review papers submitted for publication.  
   d. would be of little importance in evidence-based dentistry.

5. The methods section of a research article:
   a. describes the measurements and materials used in the study.  
   b. states the hypothesis for the study.  
   c. presents the results of the study.  
   d. is a summary of previously published information related to the research.

6. The hypothesis of a research study is initially presented in what section of the published research article describing the study?
   a. Methods  
   b. Introduction  
   c. Results  
   d. Discussion

7. Applied research:
   a. is carried out to increase the understanding of fundamental principles.  
   b. addresses practical problems using empirical methods.  
   c. bridges the gap between basic and clinical research.  
   d. adapts clinical or basic research results for use by clinicians, public health professionals and the general public.

8. Processing a used handpiece by wiping down the outside with a disinfectant before it is used on a subsequent patient:
   a. is not recommended because this does not address the contaminants on the inside of the handpiece.  
   b. is the best way to make the handpiece safe for re-use.  
   c. needs to be performed twice, once for cleaning and a second time for disinfection.  
   d. will eliminate the need to lubricate those handpieces requiring lubrication.

9. Operatory surfaces contaminated with blood need to be decontaminated using:
   a. a quaternary ammonium compound.  
   b. a low-level disinfectant.  
   c. an intermediate-level disinfectant.  
   d. a high-level disinfectant/sterilant.

10. Why should paper sterilization bags not be used for packaging and sterilization of sharp instruments?
    a. Because they are the most expensive type of sterilization packaging material.  
    b. Because they will cause the sharp edges of instruments to become dull.  
    c. Because they will cause the instruments to become corroded.  
    d. Because the sharps may puncture the paper.

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What’s It All About?

This issue presents a discussion of research and how it can be used to help infection prevention. Scenarios describing the consequences and abatement of various breaches of infection prevention and safety protocol in the dental setting are also presented.

Do you know how research relates to your infection prevention program?

Are you aware of the research that is likely being conducted in your office?

Do you need help in reviewing research articles?

Are you performing evidence-based infection prevention?

Read On!

In the next issue: Navigating Your Course to Infection Prevention