

The Concepts of Four-handed Dentistry Including Ergonomic Instrument Transfer and Exercises for Stress Reduction



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Conflict of Interest Disclosure Statement

- Ms. Finkbeiner and Ms. Leeuw report no conflicts of interest associated with this course. They have no relevant financial relationships to disclose.

Introduction – Four-handed Dentistry

The Concepts of Four-handed Dentistry Including Ergonomic Instrument Transfer and Exercises for Stress Reduction is a free dental continuing education course that covers a wide range of topics relevant to the oral healthcare professional community.

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Overview

This course describes and discusses four-handed dentistry; its integration in the modern dental office as well as a review of an ergonomic positioning and efficient instrument transfer for use in four-handed dentistry. In addition, a series of exercises for the dental professional to use for stress reduction is included.

Over the years as new technology has been integrated into the modern dental office, no single product has increased productivity and reduced stress and strain on the dental team as much as using the concept of four-handed

dentistry. The clinical dynamics of four-handed dentistry (and sometimes six-handed dentistry) is an ergonomic chairside concept performed by a well-trained dental team in an organized manner. Combined with the practice of ergonomics in the workplace, the concept of true four-handed dentistry must be revisited by the dental profession and applied to both the clinical and business areas of the office. Young dental students have had minimal exposure to true four-handed dentistry during their educational experiences due to budget cuts in many of the dental schools around the country limiting their use of auxiliaries trained in this technique. The concept of four-handed dentistry was born in the 1960s to overcome a manpower shortage. Demands were made on the dental profession to provide more services to more people due to the creation of third-party payment. As the years have passed, this single concept, when executed properly, has become even more important. Some demands may have diminished but the impact of regulatory agencies, managed care, infection control guidelines, the global pandemic due to COVID-19, and quality assurance of skills places even greater demands on the practicing dentist to implement efficient clinical practice methods to ensure a safe, comfortable environment for the entire team.

Learning Objectives

Upon completion of this course, the dental professional should be able to:

- Identify the basic tenets of true four-handed dentistry.
- Describe motion economy.
- Identify the basic zones of activity.
- Explain why the concepts of true four-handed dentistry can increase productivity.
- Identify dental team responsibilities to ensure effective four-handed dentistry.
- Examine equipment to increase visibility.
- Understand how the concepts of motion economy and ergonomics can apply to both the clinical and business areas of the dental practice.
- Describe and discuss each team member's responsibilities during an instrument transfer.
- Recognize and discuss specific instrument transfer techniques including the single-

handed transfer, two handed transfer, hidden syringe transfer, pen grasp, modified pen grasp, palm grasp and palm thumb/thumb to nose grasp.

- Discuss the benefits of a proper instrument transfer technique.
- Discuss the required commitment on the part of the members of the operating team to specific work practices before and during a dental procedure.
- Describe the role of an additional set of hands as used in six handed dentistry.
- Explain exercises to reduce stress.

Introduction

Consider a typical schedule in the dental practice and ask yourself at the end of the day, "Am I physically tired tonight? Did I feel stressed during the day?" Then consider if the staff both clinical and business is being inundated by regulatory agency requirements and are also feeling exhausted at the end of the day. "If there were some other way I could practice all day and overcome my daily fatigue, would I want to do this?" As a dentist or expanded-functions dental assistant, think about a single procedure and count the number of times you must raise your head to look for an instrument – five, ten, or even more? Then ask yourself how many times you had to extend your arm to reach for some piece of equipment? How often do you need to refocus your eyes from the oral cavity to an instrument, or to a mixing pad with a dental material on it?

Do you want to modify your practice style and work smarter and not harder? Then this course is for you. This course will focus on the concepts of true four-handed dentistry and how these concepts can bring about change in thinking that promotes organization, practices ergonomics, and can increase productivity all that result in reducing stress and strain on the dental team.

Musculoskeletal disorders (MSDs) are quick or cumulative injuries that can affect muscles, tendons and nerves. Risk factors for MSDs are posture, repetition, force. This means how the dental team repeatedly positions for patient treatment will determine their risk for injury and longevity in the profession.⁵ Overall, ergonomics

should be an integral focus of the office wellness program supporting physical and mental well-being

True four-handed dentistry is the methodology of a team comprised of highly skilled clinical practitioners working together in an ergonomically designed environment to improve productivity of the dental team and improve the quality of care for dental patients while protecting the physical well-being of the operating team.² More simply stated, to watch a dental team practice true four handed dentistry is like watching a soccer game. Each team member keeps their eye on the ball (site of the procedure) and is prepared to perform the next assignment at the proper time until a goal is achieved (the procedure completed.) In the case of a successful soccer play, the ball is passed and a goal is scored. For a dental procedure, the chairside treatment is completed with efficient success.

Four-handed dentistry is not simply transferring instruments from one person to another nor is it "hurry-up" dentistry. True four-handed dentistry is the way to work smarter, not harder. Many dental teams over the years have learned to exchange instruments with each other but have not studied the research that defined the tenets of true four-handed dentistry. The reader of this course would benefit much by returning to the literature of one or more of the experts who founded four-handed dentistry to learn how these concepts were developed.

Despite the keen interest in the issue of ergonomics in the dental workplace by the Occupational Safety and Health Administration (OSHA), few dental schools teach the concepts of true four-handed dentistry as part of the curriculum. A few dental schools have allocated funds in their budgets to provide skilled clinical assistants to work at chairside with the dental students throughout an entire procedure, but, unfortunately, this tends not to be a mandate for all dental schools today.

Basic Tenets of Four-handed Dentistry

Many dental teams claim they practice four-handed dentistry, yet they still suffer the

results of physical stress due to the use of inappropriate equipment and techniques that fall short of meeting the basic tenets of the true

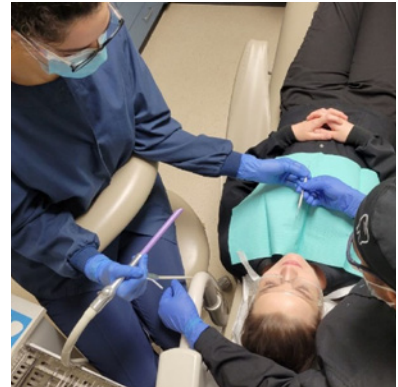
four-handed dentistry concept. Dentists can still be observed changing their own burs, reaching for an instrument, refocusing their eyes after



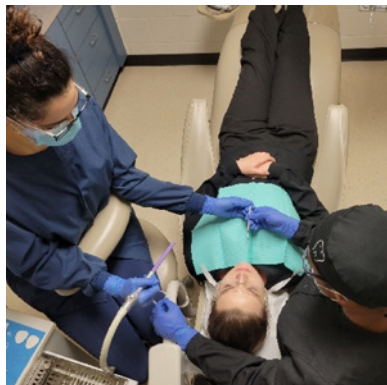
1. Use ergonomically designed equipment to minimize unnecessary motion. This is a showroom photograph for patients and barriers would need to be placed for patient treatment.



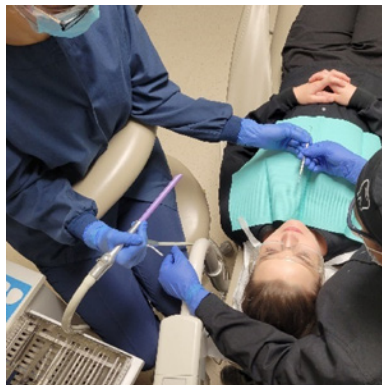
2. Place the patient in supine position. Has the patient donned the offered safety glasses? Technically the dental team should wear a disposable gown. Best practices now include safety glasses for the patient to eliminate accidental injury during treatment.



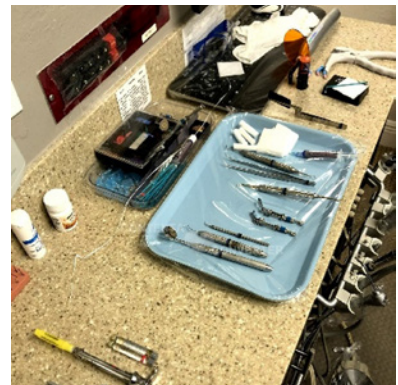
3. The operator and dental assistant are seated comfortably using their ergonomically-designed equipment.



4. Practice motion economy.



5. Seat the operating team as close to the patient as possible with the legs of the assistant parallel to the patient chair. Seated dentistry is important for the chairside team to relieve stress, strain, and fatigue. The ideal is to begin in a neutral position with weight evenly distributed, legs comfortably apart, and feet flat of the floor or footrest.¹



6. Position equipment, instruments, and materials in advance.

- Minimize the number of instruments to be used.
- Place instruments in sequence of use in order from left to right or top to bottom as preferred.
- Place additional equipment such as material tubs and UV light within a forward reach that does not require over stretching or body twisting.



7. Dentist utilizes qualified dental assistants to assign all legally delegable duties based on the state's guidelines.

8. Patient treatment is discussed with the patient and planned in a logical sequence to minimize time and motion waste.

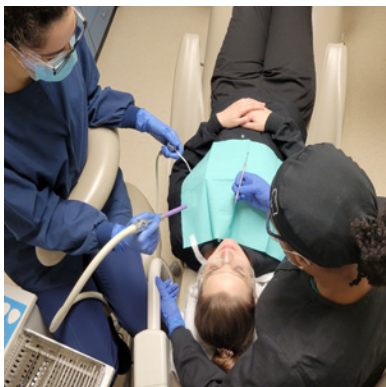
looking away, or twisting and turning to reach equipment on their side of the operator. If the clinical assistant is not in charge of all instrument transfers, and the equipment is not within reach of the assistant, true four-handed dentistry cannot be practiced.

The concept of true four-handed dentistry is based on a set of criteria that define the conditions under which efficiency can be attained. To practice true four-handed dentistry, the following criteria must be met:²

Additionally, the application of these concepts must not be overlooked in the dental business office. Though this course is designed primarily for the clinical area of the dental practice, business assistants should take time to evaluate their movement and efficiency practices possibly finding many of these principles easily applied to the business office.

Principles of Motion Economy

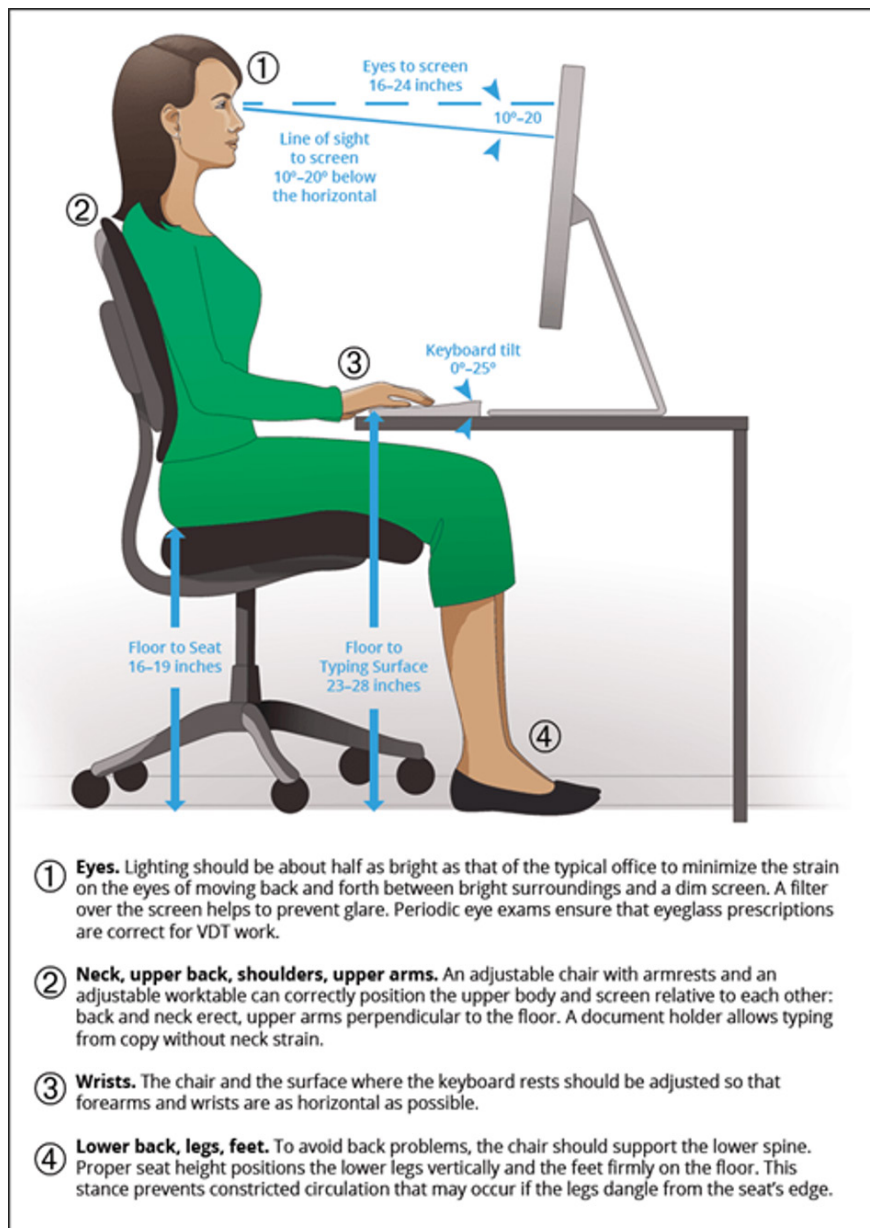
Motion economy refers to the way in which human energy is conserved while performing a task. The objective in all areas of the dental office, clinical, business or laboratory setting should be to minimize the number and magnitude of motions and conserve energy while working. Ask yourself the following questions:



1. How many times do you turn your body or reach for an instrument? Does the assistant eliminate operator stress with efficient transfers of the instruments and materials to the operator?

2. Does the assistant have primary responsibility for transfer of materials and instruments or is the assistant often unoccupied while the dentist reaches for an instrument or changes a bur?

3. Are the handpieces and instruments within a 21-inch radius of the assistant?



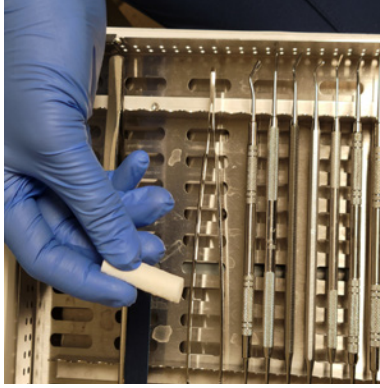
4. Are ergonomic concepts applied to the dental business office to minimize unnecessary motion and reduce stress?

Examine the dental assistant's daily activities and decide how modifications can be implemented to the routine to reduce motion. Planning the treatment room set-up and anticipating possible scenarios is important to ensure all materials are prepared in advance in a motion effective environment. Preparedness of additional materials within a normal reach, such as a desensitizing material, will save

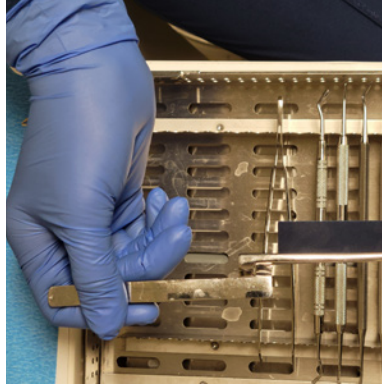
time and motion if requested. If the chairside assistant did not organize the set-up, it will be necessary for them to adjust or rearrange materials to achieve this goal. In the business office, it is important to examine the location of equipment and modify the location as necessary to reduce the need to reach or strain the body to gain access to commonly used materials and equipment.

Classification of Motion

Motions can be classified into five categories according to the length of the motion as shown below:



Class I. Movement of the fingers only. Example: when picking up a cotton roll or pen.



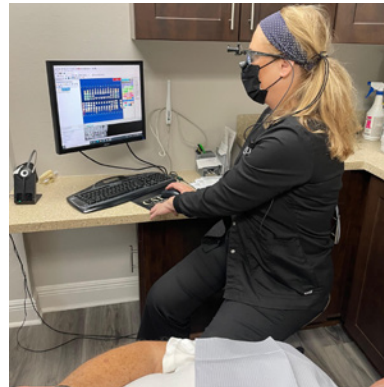
Class II. Movement of fingers and wrist. Example: when transferring an instrument to the operator.



Class III. Fingers, wrist, and elbow as when reaching for a handpiece.¹



Class IV. The entire arm and shoulder as when reaching to change the light position.

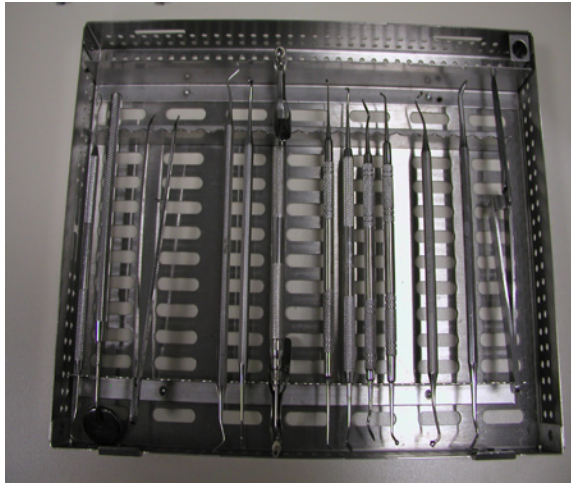


Class V. The entire torso as when turning around to reach for equipment from the fixed cabinetry.¹

Strategies for Conserving Motion¹

Motion economy should be the primary consideration when purchasing and positioning dental equipment. This concept reduces or

eliminates the number and length of motions used during basic treatment procedures. To improve motion economy at chairside, consider the following suggestions:



1. Decrease the number of instruments used for a procedure by maximizing the use of each one for multiple functions.



2. Position the instruments on a preset tray/cassette in the sequence that they will be used.



3. Position instruments, materials, and equipment in advance, whenever possible.



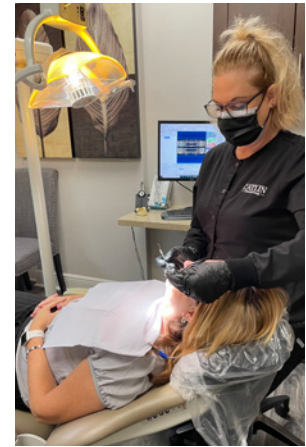
4. Have back up supplies and larger armamentarium located in easy reach to avoid Class IV and/or Class V motion or the need to leave the operative site. Also, having a roving dental assistant to assist the team when unexpected items is now necessary.



5. Place the armamentarium as close to the patient as possible.



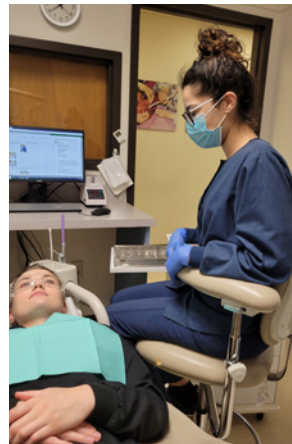
6. Place the patient in a supine position.



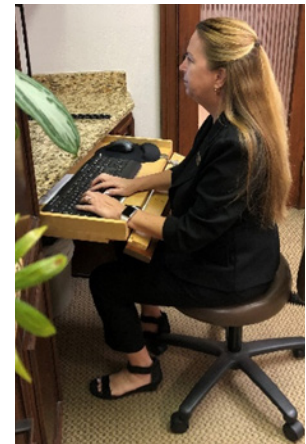
7. Seat the operating team as close to the patient as possible.



8. Place the assistant's legs parallel to the patient chair to ensure the assistant is close to the patient and will not need to reach. The assistant must maintain both feet on the attached footrest to ensure balance, comfort, and safety while seated for treatment.



9. Use appropriate stools that promote good posture and provide back and/or abdominal support. The operator stool allows thighs to be parallel to the floor while the assistant stool adjusts vertically to allow the assistant to be seated 4-6 inches higher than the operator. The dental assistant stool also provides abdominal support for the assistant to lean against for stability on the seat.



10. Provide work areas that are 1 to 2 inches below the elbow. Notice, too, the business assistant's thighs are parallel to the floor regardless of the height of the stool.³

11. Minimize the number of eye movements between the close and brightly lit operating field. Objects that are more distant in the treatment room receive less illumination.
12. Reduce the length and number of motions made by the operator and the dental assistant to accomplish routine and repetitive tasks.
13. The ultimate goal is to avoid Class IV and V motions.¹

Zones of Activity

All treatment activity evolves around the patient. Before equipment selection can be considered, the dental team must be aware of spatial relationships around the patient at chairside. The work area around the patient is divided into four “zones of activity.” Zones of activity are identified using the patient’s face as the face of a clock. The four zones are: the operator’s zone, assistant’s zone, transfer zone, and static zone.^{1,5}

The operator’s zone for a right handed operator extends from 7 to 12 o’clock, the assistant’s zone from 2 to 4 o’clock, the instrument transfer zone from 4 to 7 o’clock, and the static zone from 12 to 2 o’clock.¹ The operator changes position dependent upon the dental arch and tooth being treated. The assistant seldom moves much in the zone of activity but may find it necessary to raise the operating stool when working on the

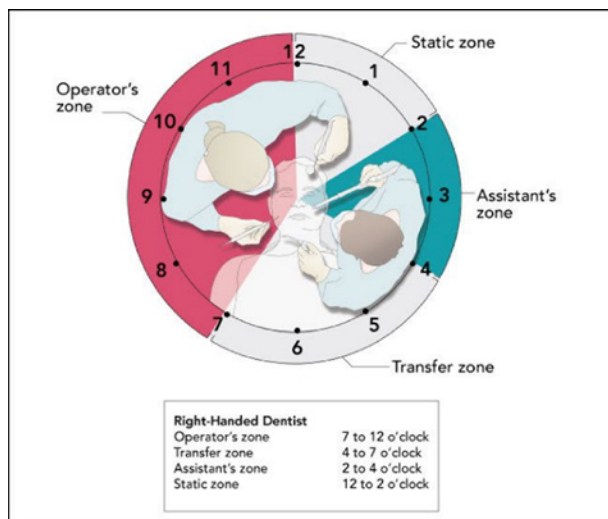
mandibular arch to improve the line of sight into the oral cavity.

These zones are self-explanatory except for the static zone. It is called the static zone but could be renamed the set-up zone. This is where the tray set up will be located for the assistant to retrieve the instruments, materials, and small equipment used during the patient procedure. There may be an additional countertop space in this area. Instruments such as a timer or curing light can be accessible in this area.

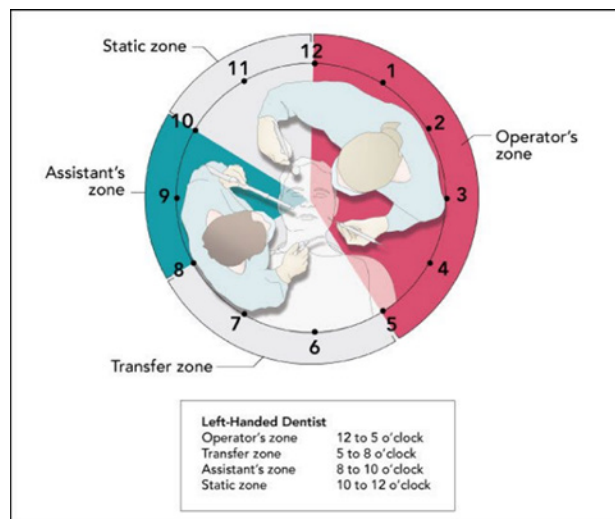
An awareness of the zones of activity is important as they serve as guides for the dental team in locating equipment as well as positioning the patient and operating team to facilitate access to the operative field and improve visibility.

Strategies to Ensure Effective Four-Handed Dentistry Teamwork

To effectively implement the concepts of true four handed dentistry each member of the dental team must assume individual as well as team responsibilities. The team must be aware of each other’s needs, recognize the need to reposition the patient and operating team, as necessary, to reduce strain, improve access and visibility, and reduce unnecessary movement by transferring instruments only within the transfer zone.³



Zones of Activity for a Right-handed Dentist.



Zones of Activity for a Left-handed Dentist.

Strategies for the Operator²

- The dentist/operator must develop a standardized routine for basic dental procedures.
- Develop a nonverbal signal showing need to exchange an instrument.
- When necessary, offer distinct verbal direction to communicate a need for a different instrument or material.
- The dentist/operator must be willing to accept input from the assistant when chair positions need to be adjusted.
- The operator must maintain a working position within the operator's zone.
 - Avoid legs interfering with the static or assistant's zone.
 - Confine eye focus to the field of operation.
 - Confine hand and arm movement to the transfer zone.
- Avoid twisting and turning to reach instruments by relying on the assistant to change burs and to transfer needed instruments.
- Exchange instruments only in the transfer zone.
- Avoid retaining instruments by returning instruments to the assistant after use.

Strategies for the Dental Assistant¹

- Develop a thorough understanding of the procedure.
- Monitor and recognize the patient's needs.
- Anticipate the operator's need and recognize any change in the procedure.
- Be seated as close to the patient as possible with legs parallel to the long axis of the patient's body.
- Be attentive to changes in operator position and determine a nonverbal signal to indicate that chair positioning needs to be improved.
- Maintain the order of both the instruments and dental materials according to their sequence of use.
- When transferring a dental instrument to the operator, orient the working end of the instrument so it is pointing up for maxillary functions and down for mandibular functions. This is known as transferring for the "position of use."
- Work with the operator to establish and follow a safe, standardized, and predictable instrument transfer protocol.

- Employ excellent moisture control techniques including dental dam application, cotton roll isolation, and evacuation with efficient rinsing and drying.
- When practical, the dental assistant should change burs in the handpiece and maintain a "ready position" for delivery of the handpiece.
- Remove debris from instruments before returning them to the preset tray.
- Always maintain a clean and organized work area.

Communication between the operator and the assistant is vital to successfully implement the concepts of true four handed dentistry.

Chair Positioning Using a Microscope

The use of a microscope in dentistry has increased during the past decade. Microscopes improve magnification of the operative field and also provides improved ergonomics, reduced eye fatigue/strain, and improved lighting at chairside. It is wise in many situations to include a microscope for the assistant.

Microscopes deliver on the promise of comfortable sit-down dentistry. Using the microscope, the dentist no longer needs to twist and bend the body to obtain good visibility. The microscope provides its own light source and is directly positioned over the oral cavity like a dental light. Essentially the dentist sits motionless and is able to sit at the 12 o'clock position even while working with mandibular molars by learning to bring the patient closer to them instead of attempting to move their body to the patient.⁴ The assistant using a microscope along the side of the dentist can also maintain good chair positioning while being able to anticipate the next needed instrument. The dentist can adjust the patient's head with minimal movement to improve patient positioning to improve the dentist's operating posture.

Personal loupes also provide enhanced vision for the team. Loupes are fitted to the wearer while in the optimum ergonomic position. Should the wearer move out of an ergonomic position, the view will blur. Loupes not only magnify the view but also adds safety while reducing eye strain.



Instrument Transfer

Skillful instrument transfers are a direct result of time and motion studies in dentistry. Use of an efficient instrument transfer is one of the basic skills every dental team must learn to be productive and stress-free during patient treatment. Instrument transfer is the process of properly transferring instruments and materials to and from the operator, within the transfer zone, at a precise moment of need. Note, in the Zones of Activity section, the transfer zones are indicated for the left and right-handed operator. An important pre-requisite to successful instrument transfer is the ability of each member of the dental team to understand the procedure, anticipate each other's needs, and when necessary, develop some form of communication either verbal or nonverbal to indicate a need for instrument exchange. This concept may seem basic, yet many dentists and assistants struggle to refine a smooth productive technique.

During recent years in dental schools, there has been a diminished emphasis on formal education in the basic principles of a true four-handed dentistry concept including the use of efficient instrument transfer techniques. This has resulted in dentists not learning proper ergonomic strategies in dental school or following graduation due to fewer continuing education courses being offered on the subject. These dentists tend to engage in more time-consuming movements during dental procedures than is necessary. A dental assistant who has graduated from a Commission on Dental Accreditation (CODA) dental assistant

program will be educated in efficient instrument transfer procedures. The assistant can modify this procedure at chairside according to the scheduled procedure. Proper instrument transfer techniques serve to:

1. conserve motion
2. increase the smooth flow of the procedure
3. reduce eyestrain by eliminating the need to look away from the brightly illuminated operative field during the transfer.

It is advisable to re-evaluate the instrument transfer techniques used during a dental procedure. The transfer is dictated according to instrument design to ensure safety during the transfer and ensure that the objectives of proper technique, as listed below, are realized:

- The assistant understands the sequence of the treatment procedure.
- The assistant anticipates the needs of the operator.
- The assistant transfers the dental instrument in the proper hand; from their left hand for right-handed operators and the right hand for left-handed operators.
- The assistant holds the oral evacuator in the hand not being used to transfer the instrument; right hand for the right-handed operator and left hand for the left-handed operator.
 - When not transferring instruments and rinsing is necessary the air/water (A/W) syringe, it is held in the hand opposite the hand holding the oral evacuator.
 - When a quick transfer is necessary when also holding the A/W syringe, the syringe is transferred to the opposite hand holding the oral evacuator and both are held in one hand for a short period of time.
- The instrument is transferred to the operator in the position of use so the operator is able to use the instrument once received without the need to reposition the instrument.
- The assistant delivers the instrument firmly to the operator. The operator must feel the instrument in their hand. The assistant must account for a slight reduction in tactile sense due to wearing gloves.
- The transfer is made without the operator moving their eyes from the restoration thus maintaining vision on the operative field. This reduces eyestrain associated with

changing light intensity and focal length accommodation.

- The used instrument is transferred back to the assistant without any entanglement of instruments.
 - When instruments are returned, the operative side will always be clean, and the next instrument will be ready for use.
- The operating team conserves time and motion during instrument transfers.
- There is a reduction in stress and strain on the operating team due to the uninterrupted flow of the procedure without the delays associated with poor transfers or a disorganized tray.
- Percutaneous injuries associated with use of dental instruments can be minimized using a prescribed transfer technique.

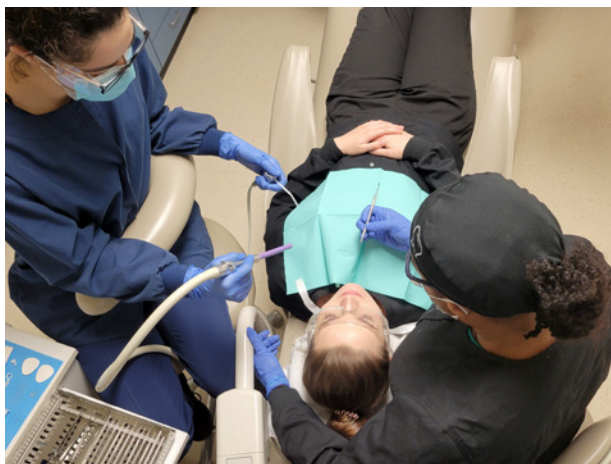
Team Responsibilities During Instrument

Basic Principles

Successful instrument transfer is predicated on a set of principles that require organization and planning in advance. These principles include:

1. Work from a well-defined treatment plan so that instruments and materials required for a planned procedure can be prepared in advance.
2. Team members must thoroughly understand the procedure to be performed to anticipate the sequence in which the instruments and materials will be used.
3. Develop a standardized routine for the performance of most dental procedures that is followed routinely.

Additional strategies such as the delegation of all material preparation and instrument transfer to the assistant as well as the delegation of expanded/advanced functions to legally qualified clinical assistants will maximize the use of the dentist's time. Using ergonomically designed equipment and placing the patient in a supine position improves access and visibility for the operating team. Placing supportive equipment and supplies within a 21 inch radius of the assistant's hands as well as confining movements to the oral cavity and the adjacent transfer zone over the patient's chest will result in the conservation of time and motion during the procedure.²

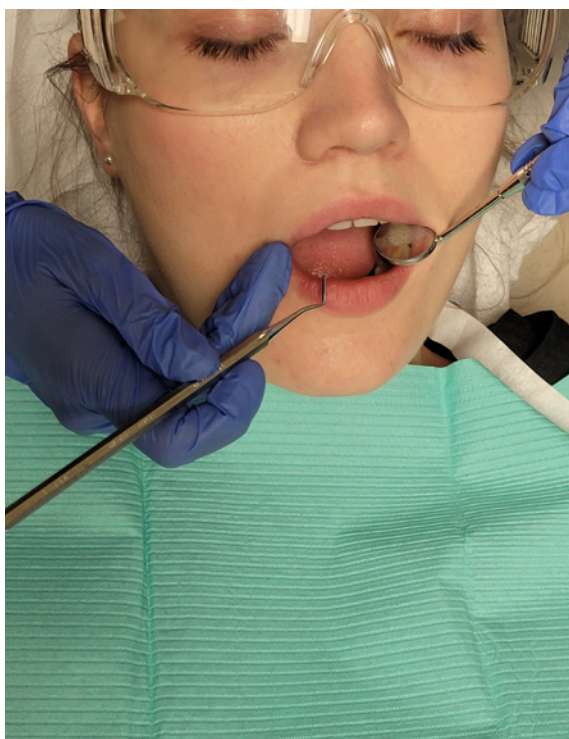


To ensure a successful instrument transfer, each member of the team must assume specific but often related responsibilities.

To maximize the efficiency of an instrument transfer technique, the operator should maintain a fulcrum for his/her working hand in the oral cavity so the actual location of the transfer between team members will be predictable. The number of instrument exchanges during a typical restorative procedure may exceed 100. By making an instrument exchange predictable, there is no need for the operator to look away from the oral cavity during the procedure. Follow these guidelines for smooth safe transfers.

Operator Responsibilities

- Use a nonverbal signal to indicate a need to exchange an instrument; this avoids tedious and repetitious verbal communication throughout the workday.
- Withdrawal of the used instrument from the operative field often serves as a nonverbal signal and it repositions the used instrument for better access by the dental assistant.
- Place the used instrument in their hand in a position that enables the assistant to safely retrieve it.
 - The assistant grasps the used instrument and transfers the next instrument.
- Maintain eyes on the operative field.
- Refrain from removing instruments from or replacing instruments onto the pre-set tray.



Assistant Requirements

To maximize the efficiency of an instrument transfer technique the assistant needs to follow these guidelines:

- Maintain instruments on a pre set instrument tray or cassette in the sequence of use to facilitate rapid location of needed instruments during a procedure.
- Anticipate the need for the next instrument.
- Stay alert, with eyes on the operative field, for any change in the procedure.
- Be ready to modify the instruments when necessary.
- Place the instrument to be transferred in proper position of hand.
- Position the working ends of instruments need for the proper dental arch, up for the maxilla and down for the mandible.
- Receive the used instrument from the operator.
- Use positive pressure during the transfer of the instrument to ensure the operator senses that the instrument has been delivered; this eliminates the operator from looking away from the site or fumbling the delivered instrument.

- Move used instrument back into hand and remove debris from the instrument.
- Replace on the tray in the appropriate position or into transfer position if the instrument is to be used again.

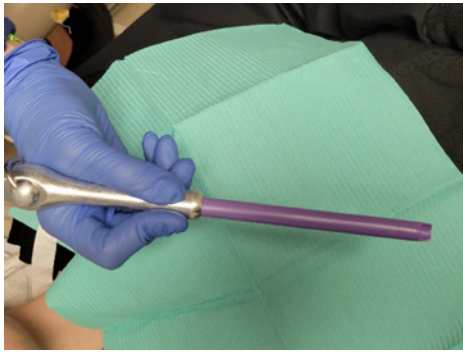
Team Requirements

To maximize efficiency and safety during an instrument transfer it is advisable for the operating team to observe patient movement, especially during the exchange of an anesthetic syringe or other sharp instruments.

Following a safe standardized transfer procedure should be used to avoid injuries. Safe techniques always include the maintenance of firm control of the instrument, exchanging instruments only in the transfer zone over the patient's chest and avoiding unpredictable movements during the transfer. Laying instruments or material on the patient's napkin should be avoided to prevent injury and potential litigation.

Instrument Grasps

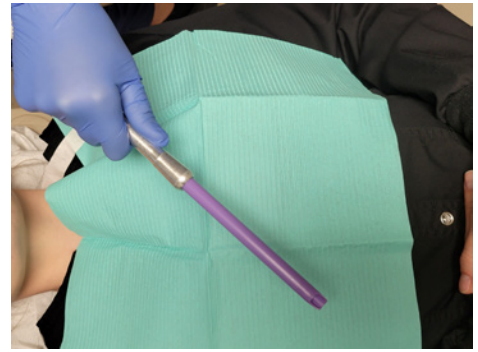
- The **pen grasp** resembles the position commonly used to hold a pen or pencil and is widely used for most operative instruments. This grasp has received more attention with the development of textured and wider barreled instruments. These designs help the dental professional to grip the instrument with less force to reduce fatigue and strain.
- The **modified pen grasp** is like the pen grasp except the operator uses the pad of the middle finger on the handle of the instrument. Some operators prefer this method since they feel it provides more strength and stability in some procedures.
- The **palm grasp** is used for bulky instruments. It is commonly used for surgical forceps, dental dam clamp forceps, straight chisels, and the A/W syringe.
- The **thumb**, or **thumb to nose grasp**, is used by the assistant for holding the oral evacuator. The operator may use this with instruments that require a more vertical movement.



Pen Grasp



Palm Grasp

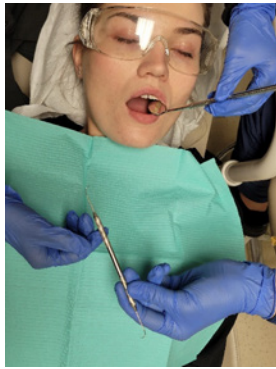


Palm-Thumb Grasp

Types of Instrument Transfer

The Single-handed Transfer

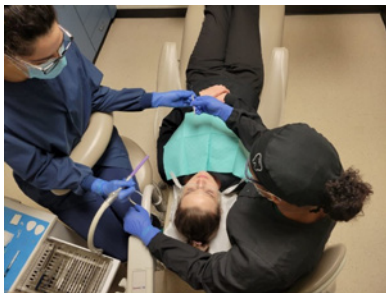
The single-handed instrument transfer with a right-handed operator is illustrated in the following procedural outline.



- Assemble instruments in sequence of use and place the instrument tray as close to the patient as possible. The tray may be positioned in a vertical or horizontal position.



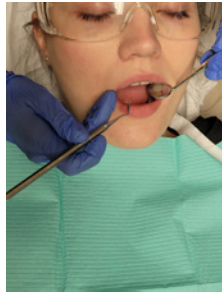
- Place auxiliary equipment such as the anesthetic syringe or dental dam materials on the mobile cabinet farthest from the patient.
- At the beginning of the procedure, pick up the mirror and explorer from the tray with the mirror in your right hand and the explorer in your left for a right-handed operator.



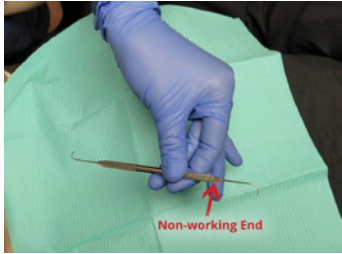
- If a tray or cassette is not used as in some dental specialties, prepare the materials in a logical sequence of use.



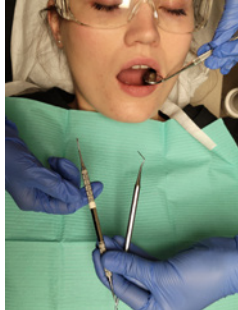
- Simultaneously pass the mirror with the right hand and the explorer with the left hand.



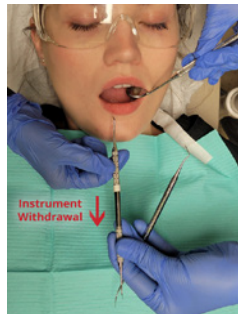
- Pick up the instrument to be transferred in the left hand and position it between the first finger and thumb at the non-working third of the instrument.



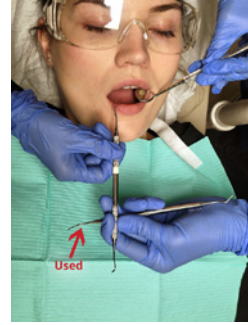
- Rest the instrument on the middle finger, making certain that the working end is positioned for the correct arch and position it within 10-12 inches from the operator's hand in readiness for a transfer when needed.



- The operator signals for an exchange by moving the instrument being used from the tooth and bringing it outside the mouth. When possible, a finger rest should be maintained.



- The assistant grasps and tucks the used instrument toward the wrist with the pick-up portion of the hand.¹



- The new instrument is delivered into the operator's hand with the delivery portion of the hand and the operator returns to the mouth with the new instrument.



- With the thumb, the assistant rolls the instrument from the palm up to the ring finger until it is above the first knuckle. Take care to avoid puncturing the gloves.



- Fold the index and middle fingers under the handle and return the instrument to the holding position.

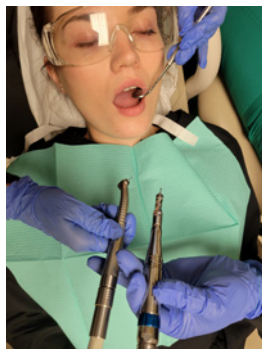


- If the instrument is not to be used again, it can be returned to the proper position on the tray.
- When the A/W syringe and the oral evacuator are used, the assistant places the A/W syringe in the right hand to free the other for the instrument transfer.

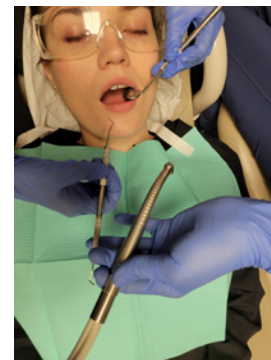


Bulky instruments can be transferred in the same single-handed exchange as described above. Many dental units, such as the split unit, prohibit effective handpiece transfer since the handpiece is outside the 21-inch radius of the assistant's hand. This unit placement leads to decreased effectiveness in terms of time and motion. When a transthorax or rear unit is used and handpieces are within the transfer zone, the assistant should then utilize the following procedure:²

- The handpiece is made parallel with the instrument to be exchanged.



- The return of the handpiece in the pick-up portion of the assistant's hand is done in the same manner as any other instrument even though it is bulkier. For this reason, the two fingers used in the pick-up method provide greater stability. This same exchange can be used when switching from one handpiece to another but may need to be done in an opposite motion to avoid hose tangling.



- The handpiece is then returned to the dental unit.

The Two-handed Transfer

The two-handed transfer is used when transferring bulky instruments such as the dental dam, clamp forceps or surgical forceps. Due to the bulk or weight of certain instruments, this is sometimes necessary for safety. This transfer requires the assistant to pick up the used instrument with one hand and deliver the new instrument with the opposite hand. This exchange requires more movement and limits the use of the HVE and A/W syringe.



Syringe Transfer

The syringe transfer takes place while the patient is supine and finds it difficult to see under their chin. It enables the operator and assistant to transfer the anesthetic syringe safely; thus, avoiding undue patient stress. This transfer also occurs within the transfer zone.

This transfer requires that the assistant and operator plan the technique to avoid the potential of a needle stick. Often the operator prefers to transfer the instrument behind the patient. This area is outside the transfer zone, causing the assistant to use a Class V movement and violate safe transfer. This transfer can be adapted to the use of wand type anesthesia very effectively. Care should be taken that the base unit is located near the assistant for easy access. Using a traditional anesthetic syringe, the following steps may be followed:

- Some states allow dental assistants to apply topical anesthetic. When transfer is necessary, a 2 x 2 gauze is passed to dry the site. Topical anesthetic may be applied as a spray, patch, or with a cotton-tipped applicator. The assistant must be trained to place the topical anesthetic at the correct location.

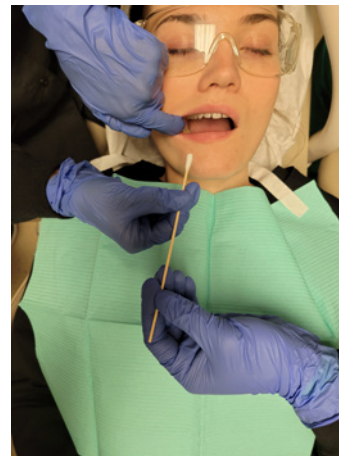


- The syringe is held in the assistant's right hand when assisting a right-handed operator while the assistant stabilizes the operator's hand using a firm grasp. The assistant delivers the syringe out of the

patient's view. The assistant and operator will determine how the needle sheath is removed and recapped to maintain safety.



- The operator completes the injection.
- To maintain safety, it is best for the operator to recap the contaminated syringe in a recapping device. Though it requires a movement out of the operator's zone, this process avoids a potential accident.



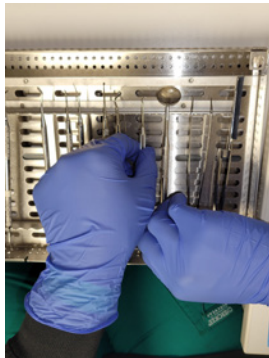
- The mouth should be rinsed to remove any bitter-tasting anesthetic that dripped onto the patient's tongue.

Special Instruments or Situations

There will be times or situations that dictate modification of the single-handed transfer. The following suggestions may aid during these times.

Delivery of the Dental Mirror and Explorer

- These two instruments are transferred simultaneously by the assistant at the beginning of most dental procedures.
- For a right-handed operator, the dental assistant obtains the mirror by picking up the handle end using the right hand. At the same time the explorer is picked up with the left hand at the one third of the instrument handle nearest the assistant.



- Position the instruments in the delivery portion of the hands and when the operator signals, pass in the same manner as described in the section above.

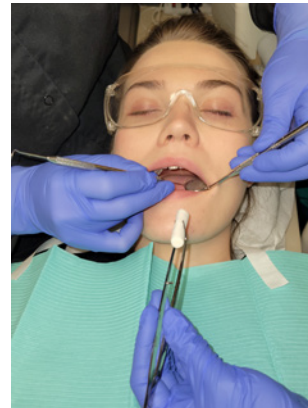


- The mirror can be retrieved with the right hand at the conclusion of the procedure.

Use of Non-locking Forceps

- If non-locking forceps are used, the assistant must maintain a grasp on the forceps to ensure the beaks do not separate during transfer.
- After the material to be transferred has been placed into the forceps beaks, the forceps

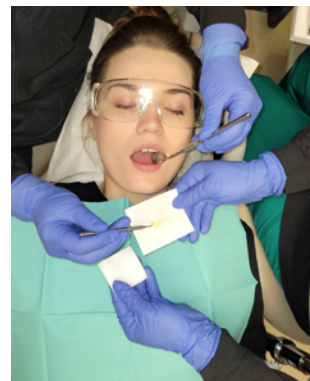
are paralleled with the used instrument that is to be exchanged.



- The instrument is exchanged in the same manner as other instruments.
- When the forceps are returned to the assistant, the working end of the forceps is grasped in the palm of the hand to eliminate dropping the contents.
- The forceps are not rolled back into position, but rather the assistant discards the materials from the forceps and returns the instrument to the tray.

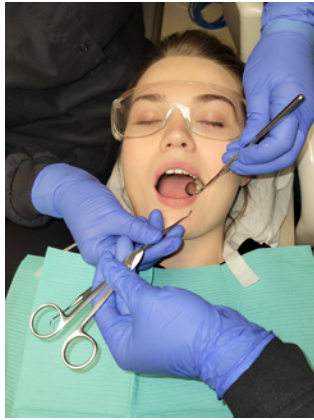
Delivery of Small Items

- Small items such as a cotton applicator can be passed to the operator as any other instrument. A small pad holding a mixed dental material or gauze may be held in the instrument exchange area.

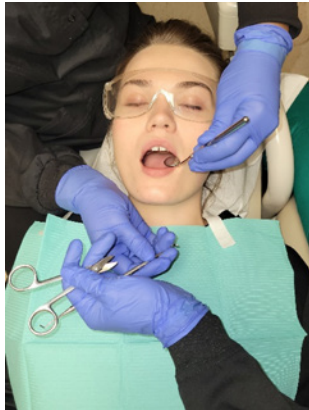


Delivery of Scissors or Hinged Instruments

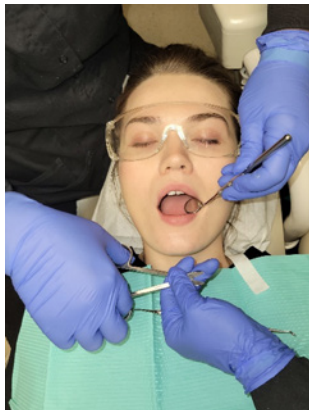
- The assistant picks up the scissors from the tray with the left hand; opens the handles slightly and parallels the scissors with the instrument to be exchanged.



- The operator modifies the hand position by placing the thumb and first or second finger into the rings of the handle.



- The scissors are returned with the beaks pointing toward the assistant. The assistant will palm the beaks to ensure any cut pieces are not dropped.



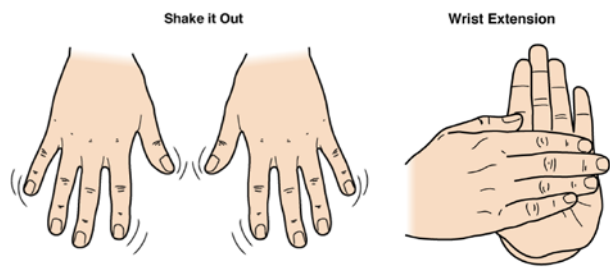
Six-handed Transfer

Often in situations such as endodontic surgery, high powered microscopes are used by both the dentist and assistant for improved visibility.

In this case, a third set of hands becomes valuable in retraction and preparation of materials. While the first clinical assistant is attentive to the treatment on a specific site, the second clinical assistant (sometimes known as a roving or circulating assistant) must anticipate the needs of both the primary assistant as well as the operator. All the previous instrument transfer techniques are still followed during basic instrument transfer. However, the second assistant may need to be on the side of the operator to avoid congestion and to gain improved visual access.

Health Issues

Bodily stress reduction has been a major issue in the discussion in this course. A variety of factors can affect the health and safety of the staff, both in the clinical and business office areas. Though the activity in the office is constant, there should be some time when a person can take a few minutes to periodically perform some ergonomic exercises.³ This is especially important for the business staff as they may find themselves sitting for long periods of time using the computer. Hand exercises are important for both the clinical and business staff. Below are some suggested ergonomic exercises that may be helpful during the day.



Hamstrings Stretch



Overhead Reach Stretch



Source: elsevier.com Practice Management for the Dental Team 9th Edition

Conclusion

In this brief overview the reader has been exposed to the basic concepts of four-handed dentistry. These concepts allow the practitioner to work smarter, not harder. When the chairside and ergonomic concepts are applied to the dental team's daily practice, it is likely that the team will identify areas that relate to increased stress and reduced productivity. If so, keep an open mind and begin today to determine how changes can be made to modify your mode of practice to make it more productive and less stressful. Also, do not forget to take time to use some of the suggested exercises to relieve stress.

Use of standardized instrument transfer techniques can yield significant benefits for the operating team. Like most psychomotor skills, practice is required before proficiency can be achieved. The effort required is worthwhile if the team wants to maximize efficiency, safety, and reduce stress throughout the workday. To be successful in instrument transfer the dental team must practice and establish consistent procedural steps for common procedures. In addition, the dental team must develop a communication system that ensures understanding between the individuals to recognize when an instrument is needed or in what location some type of action must take place.

Course Test Preview

To receive Continuing Education credit for this course, you must complete the online test. Please go to: www.dentalcare.com/en-us/ce-courses/ce643/start-test

- 1. True four handed dentistry is the _____.**
 - A. use of a dental assistant together with the dentist
 - B. concept of dental professionals working in an ergonomic environment to improve productivity, quality of care, and physical well-being.
 - C. use of faster techniques to cut down on chair time
 - D. use of the latest equipment using microscopes
- 2. To practice true four handed dentistry, all the following criteria must be met EXCEPT for one. Which one is the exception?**
 - A. The operating team and patient are seated comfortably in ergonomically designed equipment.
 - B. Motion economy is practiced.
 - C. Preset cassettes/trays are utilized.
 - D. The dentist oversees all instrument transfers.
- 3. Considering the five categories of motion classification, a Class III motion is when _____.**
 - A. the entire arm and shoulder is moved
 - B. fingers and wrist motion
 - C. movement of the fingers only
 - D. fingers, wrist, and elbow are used
 - E. the arm and entire torso
- 4. The zones of activity in four handed dentistry include all the following EXCEPT for one. Which one is the exception?**
 - A. The operator's zone.
 - B. The target zone.
 - C. The assistant's zone.
 - D. The transfer zones.
- 5. The classes of motion that should be avoided to decrease stress during chairside procedures are _____.**
 - A. Class I and II
 - B. Class II and III
 - C. Class IV and V
- 6. Strategies for the operator/dentist in four handed dentistry include all the statements listed below EXCEPT for one. Which one is the exception?**
 - A. Confining their eye focus to the field of operation.
 - B. Avoid twisting and turning to reach instruments.
 - C. Always provide distinct verbal instructions for each instrument exchange.
 - D. Use of non-verbal signals to indicate instrument transfers.

- 7. Strategies for the dental assistant in four handed dentistry include all of the following EXCEPT for one. Which one is the exception?**
- A. Maintaining the order of both dental instruments and materials according to their sequence of use.
 - B. Developing a thorough understanding of the procedure, recognize the patient's needs, anticipate the operator's need, and recognize any change in the procedure.
 - C. Working with the operator to establish and follow a safe, standardized, and predictable instrument transfer protocol.
 - D. Asking the operator to indicate if there is any change in the procedure.
- 8. If the dental assistant moved their entire torso to reach for an instrument on the back counter, this would be a motion classified as _____.**
- A. Class I
 - B. Class II
 - C. Class III
 - D. Class IV
 - E. Class V
- 9. The team must be aware of each other's needs, recognize the need to reposition the patient and operating team, as necessary to reduce strain, improve access and visibility, and reduce unnecessary movement by transferring instruments only within the transfer zone.**
- A. True
 - B. False
- 10. The business assistant has been complaining about their fingers and hands cramping, after using the keyboard so much lately. Which of the following would be a good exercise to help relieve this stress?**
- A. Forward stretch
 - B. Forward bend
 - C. Backward bend
 - D. Shake it out
- 11. The operator's zone for a right-handed operator extends from _____.**
- A. 12 to 3 o'clock
 - B. 7 to 12 o'clock
 - C. 12-2 o'clock
 - D. 4-7 o'clock
- 12. When using a microscope, the dentist can sit at the _____ position and maintain good vision while moving the patient's head into the path of vision.**
- A. 7 o'clock
 - B. 11 o'clock
 - C. 12 o'clock
 - D. 2 o'clock
- 13. Suggestions for conserving motion in dentistry include all EXCEPT for one. Which one is the exception?**
- A. Place the patient in a supine position
 - B. Provide work areas that are 1 to 3 inches below the elbow
 - C. Reduce the length and number of motions made by the operator and the dental assistant to accomplish routine and repetitive tasks
 - D. Using operating stools with abdominal rests for the operator and assistant

- 14. The computer keyboard should be positioned ___ inches below elbow height.**
- A. 1-2
 - B. 2-4
 - C. 4-6
 - D. Parallel with elbow
- 15. The principles of motion economy include all of the following EXCEPT for one. Which one is the exception?**
- A. May not be practiced in the business office
 - B. May be practiced in the business office
 - C. Reduces stress
 - D. Practiced by the dentist and the assistant
- 16. It is the responsibility of the assistant to anticipate any changes in instrument needs based on _____.**
- A. observations of the procedure as noted in the oral cavity.
 - B. the arch being treated
 - C. age of the patient
 - D. amount of insurance coverage
- 17. In the “single-handed transfers” the assistant’s hand is divided into two parts which consist of _____.**
- A. thumb/finger and palm portions
 - B. fingertips and open hand
 - C. little finger area and thumb-finger area
 - D. pick-up and delivery portions
- 18. When transferring an instrument when the A/W syringe and oral evacuator are both being used _____.**
- A. the A/W syringe is transferred to the hand holding the oral evacuator for a short period of time
 - B. the A/W syringe remains in the same hand and the instrument transfer is modified
 - C. the oral evacuator is placed in the holder until the transfer is completed
 - D. a saliva ejector is used for the transfer to take place
- 19. Which of the following is NOT a benefit of proper instrument transfer techniques?**
- A. Percutaneous injuries associated with use of dental instruments can be minimized using a prescribed transfer technique.
 - B. Reduction of neck strain for the patient.
 - C. The operator can maintain vision on the operative field thus reducing eyestrain associated with changing light intensity and focal length accommodation.
 - D. The operating team conserves time and motion during a procedure.
- 20. Which is NOT part of the procedure used to transfer the dental handpiece to the operator?**
- A. handpiece is made parallel with the instrument to be exchanged.
 - B. return of the handpiece in the pick-up portion of the assistant’s hand is done in the same manner as any other instrument even though it is bulkier.
 - C. handpiece must be transferred to the palm of the operator due to its increased bulk.
 - D. The return of the handpiece in the pick-up portion of the assistant’s hand is done in the same manner as any other instrument.

21. Which statement is true when transferring scissors?

- A. The assistant picks up the scissors from the tray with the right hand.
- B. The operator modifies the hand position by placing the thumb and first or second finger into the rings of the handle.
- C. The handles remain closed during the transfer.
- D. The scissors are made parallel to the operator's hand.

22. To relieve stress reduction, the clinical and business staff should _____.

- A. increase continuing education learning.
- B. perform ergonomic exercises periodically.
- C. rest and remove self from the work site for a short period of time.
- D. increase water intake.

23. Concerning the assistant's requirements during instrument transfers, all of the following are true EXCEPT for one. Which one is the exception?

- A. As the instrument transfer begins, the working end of the instrument needs to be directed up for the maxilla and down for the mandible.
- B. During the transfer, the assistant needs to use positive pressure to ensure the operator senses that the instrument has been delivered.
- C. Immediately after the transfer debris from the used instrument should be removed before returning it to the tray or to the operator for use again.
- D. The operator will confirm instrument need before the instrument transfer.

24. Placing supportive equipment and supplies within a _____ radius of the assistant's hands will result in the conservation of time and motion during the procedure.

- A. 12-inch
- B. 18-inch
- C. 21-inch
- D. 24-inch

25. Six handed dentistry during endodontic therapy may require a clinical assistant to perform all the following EXCEPT for one. Which one is the exception?

- A. Additional retraction
- B. Material preparation
- C. Increased visibility
- D. Final point insertion

References

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Additional Resources

- No Additional Resources Available

About the Author



Betty Ladley Finkbeiner, CDA-Emeritus, BS, MS

Betty Ladley Finkbeiner, was a Faculty Emeritus at Washtenaw Community College in Ann Arbor, MI where she served as Chairperson of the Dental Assisting Program for over three decades. She served as a consultant and staff representative for the American Dental Association's (ADA) Commission on Dental Accreditation and as a consultant to the Dental Assisting National Board. She was appointed to the Michigan Board of Dentistry from 1999-2004.

Ms. Finkbeiner authored articles in professional journals and co-authored several textbooks including: *Practice Management for the Dental Team*, *Comprehensive Dental Assisting: A Clinical Approach*, *Review of Comprehensive Dental Assisting*, and a handbook entitled *Four-Handed Dentistry: A Handbook of Clinical Application and Ergonomic Concepts*. She co-authored videotape productions including: *Medical Emergencies for the Dental Team*, *Four-Handed Dentistry, An Ergonomic Concept, and Infection Control* for the Dental Team and lectured to dental school classes and many dental meetings. In 2010, she was awarded the ADA Journal Award for the article, *Managing Cultural Differences in the Dental Practice*. In 2017 Betty was featured in the DANB Certified Press for her over fifty year career as a Dental Assistant.

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