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Solutions for Staffing Shortages in 2024

Gordon's Clinical Observations: Hiring dental assistants and hygienists has been almost impossible in recent years. The global recession followed by Covid has significantly reduced the workforce and the desire to work. How should dental practices respond to this situation? Are there ways to stimulate potential team members to return to work and to find fulfillment and enjoyment in doing so? What can be done to find excellent potential candidates? *Experienced CR practitioners have developed ideas for you in this issue that will help to overcome this challenge.*

It is Monday morning, you are sitting in your office, excited about a great week of possibilities. Then there is a "knock, knock" followed by "Doctor, do you have a minute?" Your heart sinks, because this can only mean one thing: A staff member is leaving and your week is suddenly looking a whole lot less exciting.

This event can range from a major catastrophe in some offices to a minor bump in the road in others. **How can we mitigate the damage from these staffing changes, how do we make them less likely, and how do we attract quality people? This article provides potential solutions for these critical tasks.**

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3D-Printed Ceramic Crowns—A First Look

Gordon's Clinical Observations: Interest in 3D printing has been growing over the past few years. Most dental laboratories have incorporated the concept into some of their procedures, and a few dental practices are accomplishing 3D printing in their offices. How do 3D-printed crowns compare? Are they faster, easier, better, and at lower cost than those made by conventional methods? Will this concept become a clinical procedure, or will it remain primarily in laboratories? *CR Scientists and Clinicians explain the state of the art of 3D printing in this issue.*

3D-printed ceramic crowns ready for post-processing

In January of 2023, the ADA amended its definition of porcelain/ceramic crowns (CDT D2740) removing specific manufacturing method requirements that they be "pressed, fired, polished, or milled." This allows 3D-printed resin-based crowns containing >50% inorganic filler (refactory compounds) to be classified as "ceramic" crowns for insurance reimbursement, implying permanent or definitive use. This has resulted in a surge of marketing of "3D-printed permanent ceramic crown" materials. Clinicians should be aware of how these materials compare to those already in use.

This report examines the potential advantages and limitations of 3D-printed ceramic materials, and compares current brands with other popular materials.

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Is It Time to Return to Conventional Glass Ionomer Cement?

Gordon's Clinical Observations: Are we overlooking the successful historical performance of previous dental cements? In the past, almost ***no*** crowns came off in service. Popular resin cements are strong but flexible, and they have ***no*** cariostatic properties. They are allowing crowns to come off, and dentists report recurrent caries on margins. Is it time to return to rigid and highly cariostatic ***conventional glass ionomer cements*** (GI) with a successful history of almost no recurrent caries and high retention of restorations? BUT—can we reduce the infrequent post-op tooth sensitivity known for these cements? *CR Scientists and Clinicians make a logical evaluation of this question and provide suggestions for you and your patients in this issue.*

Restoration failure resulting from cement inadequacy is not uncommon. The crowns of today have margins farther open than previous generations. Cariostatic cement is highly recommended!

Every cement for cementation of indirect restorations since the beginning of dentistry has had significant strengths and weaknesses. This task appears to be a difficult challenge for manufacturers since current cements are still having problems. Popular crown types do NOT have margins comparable in fit compared with previous metal restorations—the margins are open. It seems logical that cements must be cariostatic. Popular current cements are resin or resin-modified glass ionomer (RMGI), and although RMGI is better than resin, it is clear they are not retaining crowns adequately. We need cements with more rigidity and cariostatic properties.

This article suggests the need to re-evaluate cements and suggests some changes.

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Products Rated Highly by CR Scientists and Clinical Evaluators

The following products were rated excellent or good by CR Evaluator clinical use and CR Science evaluations.

- Swedent Low Speed Handpiece, *Swedent Wholesale*
- EtchPro, *Pac-Dent/Gingi-Pak*
- J-TEMP, *Ultradent*
- Maxima Copter Composite Polishers, *Henry Schein*

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Solutions for Staffing Shortages in 2024 *(Continued from page 1)*

Loss Prevention: Tips to Keep your Staff from Wanting to Leave

Gallup estimates the cost of replacing an employee ranges from one half to two times their annual salary!

- **Be grateful:** Thank your staff members daily for all that they do!
- **STRIVE to have a positive culture which is supportive of all:** Cross train your staff to help each other.
- **Create value with staff** by having staff outings, shopping sprees, etc.
- **Minimize negativity and drama:** Do not tolerate a disruptive team member. Tactfully mentor, change job description to be a better fit, or replace.
- **Bi-annual performance reviews that focuses on STAFF'S dreams and desires for their career** (January, July). Set GOALS and, over the next six months, help them realize the excitement of achieving their goals. Do this for THEM, not YOU. If you do, you will benefit, too.
- **A separate yearly salary and benefits review with every staff member** (November). Staff members that KNOW salary and benefits will be reviewed yearly stop worrying about wage levels. They know this will be discussed and not ignored!
- **Empathy** with time off for family challenges.
- **Get information from your community** (beyond dentistry) on pay and benefits (see blue box at right). Note that dentistry has traditionally lagged behind in benefits, but corporate dentistry and non-dental options have raised the bar. Today, benefits need to be competitive.
- **Get staff feedback from the team regularly on the culture and work environment.** What would make them want to stay? Likes and dislikes of working here? etc.
- **Grade yourself and your office yearly:** How competitive are you with the labor market (not just dental)?

What are COMPETITIVE benefits and pay?

Benefits and compensation that are AT LEAST as good, if not better, than a candidate can get elsewhere. Be careful to NOT just consider other dental offices; survey the entire labor market in your area! Know that this is a LOCAL situation; this can change greatly depending on your geographical area.

CR Note: The pandemic and the resulting transformed labor market have changed the playing field. Dental offices need to be more competitive with benefits than they have in the past!

Ways to determine a competitive benefit package:

1. Ask a dental consultant with HR experience about your geographical area.
2. Call the HR department of companies (non-dental) in your region and ask what they offer for similarly paid employees. Perhaps you have patients that work in HR in nearby companies: Can they give you this info?
3. Look at dental and non-dental want ads. Call on positions and pretend to be an applicant: What benefits do they offer?

How to Afford these increased wages

This is the cost of business, but well educated/trained staff that feel well compensated can be VERY productive and more than compensate for these additional costs.

Make Education and Training of Staff one of your Key Competencies

See green box at right for discussion of a "Key Competency."

- **Please see *Clinicians Report* January 2024**, "Elevate Your Dental Assistants and Enhance Your Practice."
- **Put as much effort into creating excellent training systems and materials** as you do at creating excellent dentistry.
- **Have a yearly evaluation of the training systems by the staff.** Are these systems effective? Thorough enough? Are we giving training the attention it needs? Is there staff buy-in?
- **Pay training bonuses to both trainees AND trainers**. Make goals and dates to finish levels.

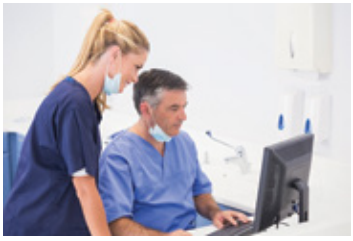
Key Competencies (KC)

- Top businesses define the 3–5 things that they MAKE SURE that they do better than their competitors in order to be market leaders. These are their "Key Competencies" (KC).
- These should be things that lead to business success or customer appreciation well beyond your competition. Avoid opaque goals such as "be the best dentist." Be specific.
- **"Market-leading" education/training of staff is a must KC!**
- Other KCs could include market-leading customer service, best physical environment for customers, market-leading emergency and same-day dentistry care, and any other KC that gives an office a ***market advantage***.
- KCs should be written down, recited by all in the organization, and worked on and tracked daily.
- Fewer KCs are better: Allows more focus on what is important.

The Advance Notice Bonus: Smooth your Transitions

Make it well known to your staff that you will guarantee that they can work to their chosen date and you will honor their notice period. Sign an agreement with ALL staff stating your expectations for four weeks notice (or more) minimum. Discuss openly at staff meetings how two weeks notice is NOT OK.

- **Give a bonus** of $250 if a four-week notice is given and observed.
- **Bonus** $1000 if a three-month notice is given and observed.
- **Offer** to hand them a letter of reference if they leave in the agreed-upon way.
- If at all possible, **NEVER terminate someone early** that has given you notice. Make their remaining time with you pleasant! This builds trust with your team.



The Farm System: Ways to have Good People Waiting "in the Wings"

Wouldn't it be nice to have someone ready to "step in" when someone needs to leave the team? Excellent offices always look for ways to have potential staff members "ready-to-go."

- **Volunteer** to teach at or provide externships for local RDH, DA, or front desk (FD) programs.
- **While interviewing for one spot, look for other future possibilities**; maintain contact. Maybe create an extra position just to hire someone with good potential. One busy office created a part-time position with a very young single mother that just seemed to have something special. She worked her way into a full-time position, and twenty years later, she was running the office as an outstanding office manager.
- **Consider hiring an extra low-cost "swing" employee** who is training in both front desk and assisting. It could be a sort of "internship" position. This is ideal for someone considering a dental career. High school counselors often have access to interested students for these positions.

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Solutions for Staffing Shortages in 2024 (Continued from page 2)

The Farm System: Ways to have Good People Waiting "in the Wings" (Continued)

- **Approach excellent local service people:** "Consider working with us some day" (and keep track of these offers). Sell them on what is great about your office and their potential career. ***Candidates who know excellent customer service make GREAT dental staff as long as you have excellent dental training systems.*** Places to find these people include:
  - – Restaurants and bars
  - – Bank tellers (in banks that teach great customer service)
  - – Hotels, front desk and concierge
  - – Virtually any other service setting
- **Consider hiring an extra RDH one day a week that could eventually be full time**. One office had five hygienists scheduled 8–2 one Saturday a month (the doctor only did exams). Many hygienists from other offices, especially those with young children, were happy to grab these part-time positions. The dental office management made sure that it was a fun environment for all as a way to "recruit" these folks. They in turn became the "hiring pool" for future full-time hygiene positions in that office.
- **For good ex-employees, offer to do free dentistry on them (and their family?) as a way to keep in touch with them**. This "professional networking" can yield leads to possible hires—or even allow a possibility that they return to the team!

Where to Find Good Candidates

Widen the potential candidates away from just those with extensive dental experience.

- Website, Facebook, and other social media (practices AND staff)
- Staff bonuses for referrals
- Digital sources (Indeed, Zip Recruiter, Glass Door, etc.)
- Hygiene and Assistant Schools
- High School "Externship Programs"
- Service position people as mentioned above. Hire people that are passionate about caring for others. With FD and DAs, having great SYSTEMS for training eliminates the absolute need for dental experience.
- In some areas, such as smaller towns, newspaper ads still work (see "attractive want ad").

Make your "Want Ads" Attractive, Exciting!

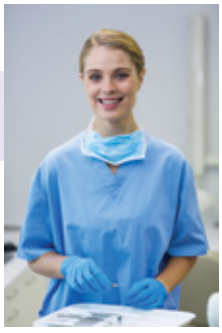
Make the ad attractive to the potential candidate, BUT make sure it is accurate regarding your practice. Don't claim something that you are not! **The key today is to WIDEN the potential audience well beyond those with dental experience—this enhances your chance of finding a great candidate**. Having staff education/training as a KC (see previous box) allows this to work. Consider leaving the ad permanently in the digital sources. ***On interviews, have the applicant meet key staff members and coach your team to "warmly sell" these prospective team members!*** Here are some sample alluring want ads:

FRONT DESK POSITION: Enthusiastic, charming teammate desired for state-of-the-art dental practice in the _____ area (don't be TOO specific, give a general area). We love passionate people that play well with others and LOVE to learn. Experience is a plus, BUT we are happy to train the right person. Excellent pay and benefits package!

CR Note: *A thorough phone interview is very important for potential front desk candidates: Do they sound excited, happy over the phone?*

DENTAL ASSISTANT POSITION: Do you LOVE caring for others and making people feel good? Are you looking for an exciting and rewarding career with continuous learning? Our outstanding practice in the _____ area (don't be TOO specific, give a general area) is seeking a passionate person that plays well with others and loves to learn. Experience is a plus, BUT we are happy to train the right person. Excellent pay and benefits package!

CR Note: *The phone interview is not AS important as with front desk. You really need to meet as many of these people "in person" as you can. Are they personable, warm one-on-one? Do they seem like they would "play well with others?"*



DENTAL HYGIENIST: Enthusiastic hygienist passionate about helping others wanted for our team-oriented practice. We believe great hygienists are the center of an outstanding dental team! Experience is valuable, but is not necessary; learning and teaching is what we love! Excellent pay and benefits package.

CR Note: *In addition to phone and in-person interviews, consider asking the RDH if he/she would like to have a paid "Experience Day." Schedule a day of great patients, (perhaps staff, family, and "friends" of the practice), schedule ample time and give the RDH an assistant or another RDH to help them set-up and break-down rooms, do charting, etc. This is a day to "SELL" the RDH on the office, not just to "evaluate" him/her! Also, promise a training/orientation period (one week?) when they are allowed extra time and help to adapt to the new team and procedures.*

CR CONCLUSIONS:

- No practice can treat patients well if the staff is not excellent. Retaining well-trained staff is not "luck," it requires excellent, passionate, and caring professional management. This article suggests ways to do this and to increase the odds that adequate notice is given if someone has to leave.
- The importance of spending practice time and resources on creating and employing excellent SYSTEMS focused on staff education and training is highlighted.
- Outstanding professional management widens the potential pool of applicants, constantly grooms potential future staff members, and prioritizes keeping existing staff happy and motivated.

3D-Printed Ceramic Crowns—A First Look (Continued from page 1)

Printed Ceramic Crowns

Recent innovation in 3D printing technology has led to the incorporation of ceramic fillers into the resin-based liquid used to fabricate printable ceramic crowns (in addition to existing materials for dental models and wax-ups, surgical guides, splints/nightguards, try-in dentures, temporaries, orthodontic applications, etc.). After intraoral scanning, offices may choose to have staff members 3D print crowns immediately in-office rather than using analog techniques, milling, or outsourcing to a dental lab.

3D-Printed Ceramic Crown Workflow

Scan: Requires intraoral scanner, many of which now easily integrate with design software and 3D Printer.

Design: Most skill/expertise-dependent step. Many offices prefer to outsource this step for a fee. An area of rapid advancement with evolving software utilizing AI technology to design and collaboration with 3D printers and scanners.

Print: 3D printers vary in size, cost, ease of use, resolution, resin compatibility, etc. Print time varies significantly depending on resolution, printer type, resin, etc.

Clean/Wash: Removal of excess uncured resin is critical to ensure an accurate fit. Isopropyl alcohol is used *sparingly* to clean excess resin by hand as it will etch and weaken the restoration.

Cure: Restorations must be post-cured prior to seating for optimal strength and to ensure maximum conversion of resin.

Characterization: Companies recommend a final polish or stain and glaze to smooth the crown and for optimal esthetics.

▶ Clinical applications may include:

- **Same-day crown:** Some offices desiring to offer a same-day option to patients may find this an appealing option compared to more costly milling equipment, especially if these restorations are found to serve well long-term. Many busy patients and patients who travel long distances appreciate a same-day option.
- **Cases with abusive occlusion** (implant supported crowns, bruxism, etc.) may benefit from using a softer polymer crown material which may wear quickly (long-term temporary application), but would be less harmful to opposing dentition.
- **Underserved populations:** Potential cost savings could be passed on to patients making treatment possible to patients who may otherwise be unable to afford care.

▶ Required Materials and Equipment for Printed Ceramic Crowns

Example Brands	Resin					3D Printer			Curing Unit	
	Shades*	Bottle	Cost/ Crown	Flexural Strength	Flexural Modulus	Cost	Footprint	Print Time	Cost	Cure Time
Ceramic Crown (SprintRay)	7	250 g	~$7	140 MPa	6.4 GPa	Pro 95S $9500	15 × 16 in	12+ min †	ProCure 2 $3,000	7 min
Rodin Sculpture (Pac-Dent)	6	300 g, 600 g, 1.2 kg	~$3	170 MPa	6.3 GPa	Asiga MAX $5,000	10 × 15 in	23+ min	Otoflash ‡ $2,700	8 min

- **SprintRay:** Fast and easy to use; optimized for the dental office
- **Pac-Dent:** Low-cost system uses popular Asiga printer; open system allows more control and adjustability of settings

** A1, A2, A3, B1, C2, **D2**, Bleach † Optional Crown Kit ($1250) has smaller build plate (6 crowns); decreases waste and print time*
‡ Otoflash G171 (NK Optik) uses nitrogen gas; improves cure/strength

Comparison of Permanent/Long-term Dental Crown Materials

The following table shows physical and clinical properties of 3D-printed ceramic materials compared to other popular crown materials.

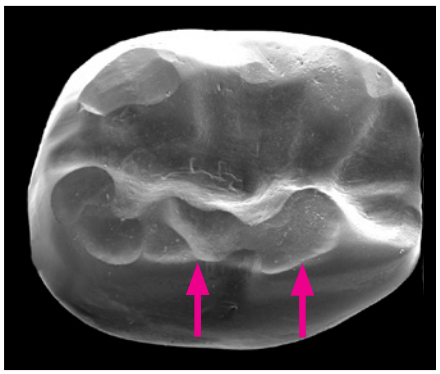
		Material	Fabrication Time (approximate)	Equipment Cost	Cost/ml	Strength (MPa)	Modulus (GPa)	Material Wear		Esthetics
								Crown	Opposing	
Resin-Based Polymer	3D Printed	**3D-Printed Crown** Ceramic Crown (SprintRay) Rodin Sculpture (Pac-Dent)	45+ min	$8,000–$14,000	$1–$4	140–170	6	Unknown *(see page 5)*		Unknown
	Chairside	**Temporary Crown** (long-term) LuxaCrown (DMG)	10–15+ min	none	$8	110	4	Moderate	Low	Good–Fair
		Dual-cure Resin Crown HyperFIL (Parkell)	15+ min	none	$11	130	9	Moderate	Low	Good–Fair
		Direct Resin Restoration Filtek Supreme Ultra (3M)	15–45+ min	none	$72	130	12	Moderate	Low	Excellent
	Milled in-office, Lab	**Milled Polymer Crown** CAMouflage NOW (Glidewell)	30+ min	$40,000–$120,000+	$25/block	200	12	Moderate	Low	Excellent–Good
Other Ceramic		**Lithium Disilicate** e.max (Ivoclar), Tessera (CEREC)	45+ min	$40,000–$120,000+	$29/block	500	80	Low	Mod–High	Excellent
		Zirconia* BruxZir; BruxZir NOW (Glidewell)	60+ min	$55,000–$120,000+	$48/block	800–1200	180+	Very Low	Low–High	Excellent–Fair

** Properties vary by zirconia type*

Key Findings

- **3D-printed ceramic materials are less expensive** and require less costly equipment than stronger milled materials, but have similar material properties to polymer materials used for rapid fabrication chairside using traditional techniques.
- **Polymer materials are less abusive to opposing dentition** than other ceramic materials, but experience significant wear affecting longevity (see photo). *Long-term clinical performance and material wear of 3D-printed ceramic crowns is unknown.*

Characterized 3D-printed ceramic resin crown



Wear facets on polymer resin crown

3D-Printed Ceramic Crowns—A First Look (Continued from page 4)

How will 3D-Printed Resin-Ceramic Crowns Serve Long Term?

Long-term clinical performance is unknown. CR is observing the long-term durability of 3D-printed materials. CR and TRAC Research have abundant long-term clinical research on similar formulations of polymer materials, and it is anticipated that 3D-printed ceramics will exhibit similar characteristics because of their resin content. The following are ***potential advantages and limitations.***

- **Potential Advantages**
  - **Polymer materials are gentle on opposing dentition,** yet are relatively tolerant to abuse (TRAC Research).
  - **Low cost:** 3D printing has a low initial cost to implement and maintain compared to other in-office fabrication methods.
  - **Good esthetics:** Monolithic material available in a variety of shades; blends well with surrounding dentition.
  - **Fracture resistance:** Prior polymers tested had high survival rates and few fractures.
- **Potential Limitations**
  - **Polymer materials wear during service**: Surface characterization may not be long lasting and may serve best in non-esthetic areas.
  - **Retention failure (debonds):** TRAC Research has noted debond rates ranging from 4% to as high as 39% with previously studied polymer crown materials (see *Clinicians Report* September 2020).

    The following protocol (CAMouflage NOW) resulted in best retention of resin crowns:

    Tooth: Two 60-second applications of glutaraldehyde/HEMA; apply two-bottle adhesive system (e.g., Optibond XTR primer + adhesive) air thinned with gentle then strong pressure, and light cured. *Inadequate air thinning may prevent crown from seating.*

    Restoration: Sandblast, clean, apply adhesive (air thin and light cure), and cement with resin cement (e.g., Maxcem Elite).
  - **Time and labor requirements:** As with most tasks, speed and proficiency grows with experience and training. *Fabrication and troubleshooting ideally delegated to staff persons.*
  - **Office presence:** Although impressive to many patients, the footprint and size of 3D printing equipment can present a challenge.

CR CONCLUSIONS: 3D-printed resin-ceramic restorations can be fabricated relatively easily and inexpensively in-office by skilled staff members, and cost savings could be passed on to patients who may otherwise be unable to afford treatment. Long-term clinical performance of 3D-printed ceramic crowns is unknown, but years of research on similar formulations of polymer crowns have demonstrated relatively low incidence of fractures and lower wear to opposing teeth than zirconia, but a higher number of debonds and wear during service. Printable dental resins, scanning technology, and design software are constantly evolving and improving. CR will continue to observe the long-term clinical performance of these materials and report the findings.

Is It Time to Return to Conventional Glass Ionomer Cement? (Continued from page 1)

Summary and Critique of CR Survey

Resin-modified glass ionomer (RMGI) is the most used cement for zirconia and as an overall cement. This category has been proven by CR/TRAC in-vivo research to be more retentive than resin alone. Although strong, resin's flexibility is the cause of crowns coming off in service.

- **Resin** is the most used cement for lithium disilicate (IPS e.max), and this choice is correct because lithium disilicate is weaker than some zirconia types. As a positive characteristic, it has significantly more mechanical retention to the cement than zirconia because of hydrofluoric acid etching of the intaglio surfaces of the restorations, and only a few of these crowns are coming off in service.
- **RMGI** can be used for lithium disilicate if the crown prep has at least 1 mm of thickness on all axial walls and the occlusal surface. However, most labs are spacing the internal of crowns thus reducing the thickness of the restorative material the dentist intended when making the prep. Be careful when making the decision to use RMGI unless the restoration has adequate thickness. The cariostatic properties of RMGI help to overcome the caries inducing open margins of current crowns, and its rigidity significantly reduces the frustrating problem of crowns coming off in service.
- **Conventional GI** is used minimally, probably related to the historical observation that unpredictable post-operative tooth sensitivity is present on some teeth when GI is used.

  The sensitivity problem can be overcome if the dentist places two 1-minute applications of glutaraldehyde/HEMA containing materials on the prep either on the seating appointment only or at the time of seating the temporary and also at the final seating. Details of cementation to come.
- **Dentists are satisfied with current cements** despite the challenges present. It is apparent that most do not know of the open margins on current crowns produced by dentists scanning in the clinical office or by lab scanning of elastomer impressions and/or the lack of cariostatic properties of resin cement.

Previous Dental Cement Challenges and Advantages

(Listed in order of historical occurrence)

Zinc phosphate
- ✘ Significant post-op tooth sensitivity
- ✘ Technique sensitive
- ✘ Dissolution
- ✘ No cariostatic properties
- ✔ High rigidity
- ✔ No shrinkage or expansion
- ✔ Acceptable strength
- ✔ Historical long-term success
- ✔ Excellent restoration retention

Conventional glass ionomer
- ✘ Significant but infrequent post-op tooth sensitivity
- ✘ Somewhat technique sensitive
- ✘ Mild dissolution
- ✔ High rigidity
- ✔ No shrinkage or expansion
- ✔ Acceptable strength
- ✔ Chelation to tooth (chemical bond)
- ✔ High cariostatic properties
- ✔ Historical long-term success
- ✔ Excellent restoration retention

Polycarboxylate
- ✘ Significant dissolution
- ✘ Short-term success
- ✔ No post-op sensitivity

Resin-modified glass ionomer (RMGI)
- ✘ Mild dissolution
- ✘ Mild shrinkage
- ✔ No or slight post-op sensitivity
- ✔ Moderate cariostatic properties
- ✔ Provides "tack" set reducing water/saliva contamination
- ✔ Acceptable strength
- ✔ Historical long-term success
- ✔ Good restoration retention

Resin
- ✘ Flexibility, resilience (little impact resistance)
- ✘ Mild to moderate post-op sensitivity
- ✘ No cariostatic properties
- ✘ Significant shrinkage on set
- ✘ Significant restorations coming off
- ✔ Acceptable strength
- ✔ No dissolution
- ✔ Fast set
- ✔ High Strength

Is It Time to Return to Conventional Glass Ionomer Cement? (Continued from page 5)

Solving the Major Problems with Current Cements

▶ Problem 1 with Current Cements: RECURRENT CARIES

- **Margins of current crowns are open** microscopically more than restorations of the past (Figure 1).
- **Resin cements have significant shrinkage** on setting and worsen the potential caries problem increasing the already open margins.
- **GI does not shrink on setting**, thus keeping the margins closed on setting.
- **Resin cement has NO cariostatic properties**.
- **GI has an expansion coefficient like tooth structure.** This characteristic combined with the GI low contraction during setting probably explains the favorable lack of gap formation between GI and tooth structure.
- **GI has proven high cariostatic properties** (Figure 2).
- **Historical post-operative tooth sensitivity with GI can be overcome** with the desensitizing and disinfecting properties of glutaraldehyde/HEMA products explained in the following technique.

Figure 1: Open margins, non-cariostatic cements such as resin, and inadequate oral hygiene can soon cause crown failure.

Figure 2: PFM crowns on maxillary (now in service over 30 years). Zirconia-base crowns on mandibular (now in service 24 years). Cemented with conventional GI cement. (Christensen prosthodontist, Archibald CDT).

▶ Problem 2 with Current Cements: CROWNS COMING OFF IN SERVICE

- **Resin cements are flexible**. They are strong but resilient.
- **This flexibility is probably the reason** why crowns cemented with resin come off more frequently than the weaker RMGI cemented crowns (Figure 3).
- **GI is rigid** and has historical evidence of no crowns coming off in service.
- **GI chelates to tooth structure** providing a LONG-TERM chemical bond.
- **GI is bioactive** providing potential tooth repair possibility.

The previous information makes conventional GI a logical replacement for some current cements.

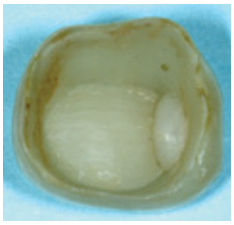


Figure 3: Most dentists have had zirconia crowns come off. The resiliency of current resin cements appears to be one of the reasons. More rigid cements such as GI are suggested when prep retention is questionable.

Conventional GI Technique

GI luting materials are available as both hand mixed and triturator activated.

- **Clean tooth preps as usual.** Use flour of pumice material rather than standard prophy paste. Preppies (Whipmix), NADA (Preventech), Prolax (Ammdent), etc. are example brands that are previously incorporated with water and dispensed in disposable prophy cups.
- **The following steps eliminate the historical challenge of post-operative tooth sensitivity with conventional GI cement.**

1. **Place a few drops of** glutaraldehyde/HEMA containing material in a prophy cup (Gluma, Microprime G, GluSense, G5, or others).
2. **Dip the smallest micro-applicator** in the liquid (example: Multi-Brush from Denbur).
3. **Blot the micro-applicator** removing most of the liquid.
4. Using magnification and adequate light, **paint the tooth prep** with the micro-applicator leaving only a damp surface of the liquid.
5. **Leave the liquid on the prep** for one minute.
6. **Suction off the liquid**, do not use air or water during the procedure.
7. **Repeat 1-minute application of glutaraldehyde/HEMA procedure**.
8. ***Do not get the liquid on the soft tissue avoiding damage to the soft tissue***.
9. **The GI may be hand mixed** to the appropriate viscosity desired **or triturator mixed** as developed by the manufacturer.
10. **Minimally air dry** the tooth.
11. **Seat the restoration** avoiding contamination.
12. **Let the material set, remove the debris, and check for any remaining cement**.

Physical Property Comparison (24 hr)

Note: Due to their 20% resin composition, RMGI cements absorb water twice as fast as standard glass ionomers. This rapid absorption speeds up the initial acid-base reaction leading to quicker material response. However, it also results in faster material degradation over time.

	GI	RMGI
Shear Bond Strength (Dentin)	5–10 MPa	8–12 MPa
Shear Bond Strength (Enamel)	12–27 MPa	10–15 MPa
Knoop Hardness	35–40 KHN	25–28 KHN
Flexural Modulus	8–11 GPa	4–7 GPa
Flexural Strength	25–35 MPa	50–75 MPa
Fracture Toughness	0.2–0.3 MPa√m	0.5–0.6 MPa√m

Materials Evaluated Include:

GI Cements
- Fuji I, GC America
- Meron GI, VOCO
- Ketac Cem GI, 3M
- Riva Luting, SDI

RMGI Cements
- FujiCem Evolve, GC America
- Meron Plus QM, VOCO
- Nexus RMGI, Kerr
- Riva Cem, SDI

CR CONCLUSIONS:

- Conventional glass ionomer (GI) has the potential to reduce or eliminate the significant challenges observed with currently popular resin cements being used for zirconia—restorations coming off, lack of cariostatic activity, shrinkage of the cement, lack of long-term bond, recurrent caries, etc.
- It is imperative that cements have rigidity and cariostatic properties.
- When properly used, GI has both characteristics when accompanied with the described glutaraldehyde/HEMA applications to eliminate sensitivity.
- ***It is imperative to consider revising your cement selection if you are observing the described challenges.***

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Earn 1 credit hour for successfully completing each test. Tests are also available at CliniciansReport.org. This is a self-instruction program.

At the completion of this test, participants should be able to:

- Attract quality job applicants
- Discuss 3D-printed ceramic materials
- Re-evaluate cement usage
- Evaluate new products and their potential clinical usefulness

Self-Instruction Test, February 2024, 1 CE *Check the box next to the most correct answer.*

1. There are fewer applicants to dental positions currently. Strategies to address this include all ***except***:
   - ❑ A. Widen the field; don't just look at people with dental experience.
   - ❑ B. Become a market-leader at education and training of employees.
   - ❑ C. Lower your standards to accept less-than-desirable people.
   - ❑ D. Spend effort to ensure your pay AND benefits are competitive to all local employers (not just dental employers).

2. Other strategies for staffing in this market include:
   - ❑ A. Improve the atmosphere and culture at your workplace.
   - ❑ B. Develop relationships with potential team members before you need them.
   - ❑ C. Institute an "Advance Notice Bonus" to make transitions easier.
   - ❑ D. All of the above

3. Which of the following statements regarding 3D-printed crowns is ***true***?
   - ❑ A. They are likely stronger than zirconia crowns.
   - ❑ B. They are more likely to wear than zirconia crowns.
   - ❑ C. They are more likely to wear opposing dentition than zirconia crowns.
   - ❑ D. They are more costly to fabricate in-office than zirconia crowns.

4. Which of the following steps are ***not*** required when fabricating 3D-printed crowns?
   - ❑ A. Scanning and designing
   - ❑ B. Printing
   - ❑ C. Desiccating
   - ❑ D. Post-curing

5. Which cement(s) are cariostatic?
   - ❑ A. Zinc phosphate and glass ionomer
   - ❑ B. Polycarboxylate and RMGI
   - ❑ C. RMGI and glass ionomer
   - ❑ D. Resin

6. Use of glutaraldehyde/HEMA containing material on tooth preps:
   - ❑ A. Can eliminate post-op tooth sensitivity.
   - ❑ B. Disinfects the tooth prep.
   - ❑ C. Irritates soft tissue if not controlled.
   - ❑ D. All of the above

7. Swedent Low Speed Handpiece includes the following ***except***:
   - ❑ A. Lower cost.
   - ❑ B. 5-year warranty.
   - ❑ C. Smooth operation.
   - ❑ D. Adequate torque/power for polishing and adjustments.

8. EtchPro phosphoric acid etch has desirable smooth consistency, stays where placed, and lower price.
   - ❑ A. True
   - ❑ B. False

9. J-TEMP is a helpful provisional resin for:
   - ❑ A. Barrier to endodontic irrigation and temporary resin for closing endodontic access.
   - ❑ B. Temporary inlay/onlay.
   - ❑ C. Anywhere visibility to clinician is desired.
   - ❑ D. All of the above

10. The Maxima Copter Composite Polisher produced adequate final polish easily and at a reasonable cost:
    - ❑ A. True
    - ❑ B. False

Take your CE test online and receive immediate results! CliniciansReport.org

To receive credit, all 2024 tests are due by DECEMBER 15, 2024

Submit your test answers online at CliniciansReport.org and receive immediate results; mail to Clinicians Report, Attn CE Tests, 3707 N Canyon Rd, Bldg 7, Provo UT 84604; fax 888-353-2121; or scan and email to CR@CliniciansReport.org

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Products Rated Highly by CR Scientists and Clinical Evaluators *(Continued from page 1)*

Lower Cost, Low-Speed, Air-Driven Handpiece Set

Swedent Low Speed Handpiece
Swedent Wholesale

$149/System with Motor and 2 Attachments

Swedent Low Speed Handpiece is an air driven motor for E-Type attachments. It connects to 4-hole handpiece tubing and has a maximum speed of 17,000–19,000 RPM in forward and reverse. System includes a 1:1 straight attachment with locking chuck for 2.35 mm diameter burs, and a 1:5 contra-angle attachment with external water line and push button chuck for 2.35 mm diameter latch-type burs. Motor and attachments are rated for 250 sterilization cycles at 135° C. Online-only sales and support help achieve low cost.

Advantages:
- Price
- Torque/power good for polish and adjustments
- Smooth operation
- Efficient push button chuck

Limitation:
- Long-term durability is being established by CR

CR CONCLUSIONS: 95% of 19 CR Evaluators stated they would incorporate Swedent Low Speed Handpiece into their practice. 95% rated them excellent or good and worthy of trial by colleagues.

Low Cost Phosphoric Acid Etching Gel With Deep Blue Color for Visibility and Control

EtchPro
Pac-Dent/Gingi-Pak

$64.87/20 1.2 ml Syringes
($2.70/ml)

38% phosphoric acid etching gel with deep blue color. Consistency of gel is uniform and smooth allowing precise placement which is especially helpful for selective etch technique. Viscosity allows self-leveling to penetrate deeply. Formulation prevents separation and maintains consistency through use life.

Advantages:
- Lower cost
- Dark blue color aids visibility; consistency stays where placed
- Etched well with obvious frosted appearance
- Syringe designed with comfortable thumb-rest

Limitation:
- No major limitations noted

CR CONCLUSIONS: 83% of 24 CR Evaluators stated they would incorporate EtchPro into their practice. 92% rated it excellent or good and worthy of trial by colleagues.

Easy-to-Use Temporary Resin with a Variety of Helpful Applications

J-TEMP
Ultradent

$30/Four 1.2 ml Syringes
($6.25/ml)

Temporary methacrylate-based flowable resin with self-leveling, light cure, radiopacity, and purple color for easy identification and removal. Ideal for temporary restorations such as endodontics, walking bleach technique, provisional inlay/onlay, provisional cusp buildup, block-out under-cuts, protective barrier, etc. Also used to provide structure for isolation clamping and as a barrier to endodontic irrigants.

Advantages:
- Easy-to-see purple color
- Delivery is easy from syringe
- Hardens with light cure
- Good strength

Limitation:
- A version with less viscosity was desired by a few users

CR CONCLUSIONS: 65% of 25 CR Evaluators stated they would incorporate J-TEMP into their practice. 80% rated it excellent or good and worthy of trial by colleagues.

Lower Cost, Effective, and Sterilizable Kit of Spiral-Wheel Polishers and Finishers for Composites

Maxima Copter Composite Polishers
Henry Schein

$140/Kit with 12 Polishers

Composite polishing kit has 6 fine grit (blue) and 6 medium grit (red) diamond-infused, flexible spiral-wheels in two sizes (small = 10 mm, large = 14 mm) on RA mandrels. These finishing instruments easily produce a good final polish at a reasonable price.

Advantages:
- Cost effective
- Produced a nice polish and shine
- Durable and effective after sterilization
- Simple two step system with multiple sizes

Limitation:
- A few Evaluators reported the large polishers were too big.

CR CONCLUSIONS: 83% of 24 CR Evaluators stated they would incorporate Maxima Copter Composite Polishers into their practice. 92% rated them excellent or good and worthy of trial by colleagues.