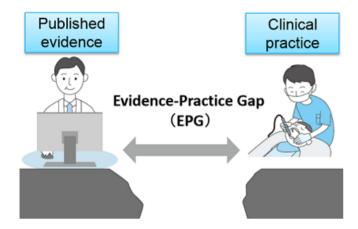
What is the Evidence-Practice Gap (EPG)?

Evidence-based practice is defined as the conscientious, explicit and judicious use of the latest and best evidence in decision making in the care for individual patients. However, there has always been a gap between scientific evidence and actual clinical practice, which is referred to as the "evidence-practice gap (EPG)". A previous study reported that the proportions of patients who received recommended preventive care, acute care, and chronic care are 55%, 54%, and 56%, respectively (Mcglynn et al., N. Engl. J. Med. 2003). In dentistry, an EPG has been shown to exist in about 40% of cases of caries treatment both in Japan and the United States, and improving the EPG issue is an international priority. However, causes and mechanisms of the occurrence of the EPG in the dental practice have not yet been identified.



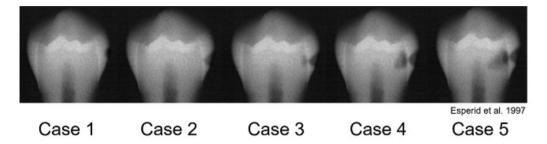
We first of all introduce three cases in which an EPG is considered to have occurred in the next section. We would appreciate it if you could answer each of the three questions and then read our commentary on them.

☐ If you have read the above, please check the box and proceed to "Next".					
	Back	Next			

Please read the scenario and answer Question 1.

[Scenario]

The patient is a 30-year-old female with no relevant medical history. She has no complaints and is in your office today for a routine visit. She has been attending your practice on a regular basis for the past 6 years. Except for the teeth in the photos below, the patient has no dental restorations, no dental caries, and is not missing any teeth.



Question 1: What is the lesion depth at which you think it is best to transfer from preventive therapy to a permanent restoration (e.g., composite resin)? Please choose the one that is most applicable to your opinion among the 5 photos above.

C	Case 1				
C	Case 2				
C	Case 3				
С	Case 4				
C	Case 5				

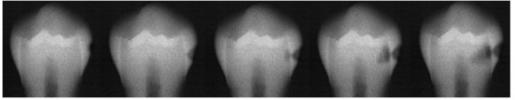
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Commentary on Question 1

[Scenario]

The patient is a 30-year-old female with no relevant medical history. She has no complaints and is in your office today for a routine visit. She has been attending your practice on a regular basis for the past 6 years. Except for the teeth in the photos below, the patient has no dental restorations, no dental caries, and is not missing any teeth.



Esperid et al. 1997

Case 1 Case 2

Case 3

Case 4

Case 5

This Question asks you to choose, among the 5 X-ray photographs that indicate stepwise progression of a proximal carious lesion, the one that corresponds to the lesion depth at which you think it best to do a permanent restoration, such as composite resin. The X-ray photographs of Cases 1 and 2 in this Question indicate caries confined to the enamel. In the 6 items for caries management by Minimal Intervention Dentistry (MID) (FDI, 2016)¹, it is recommended to try to re-calcify the decalcified enamel. The clinical guidelines for treating caries by the Japanese Society of Conservative Dentistry² issued recommendations in response to the following clinical question.

<Clinical question> How far must caries progress before cavity preparation is indicated?

<Recommendation> A restoration is indicated whenever the following findings are noted. Intervention should be done immediately where more than one of findings is evident (Level VI³⁻⁷). (Grade of recommendation B)

- (1) A cavity is visually detected after cleaning and drying the tooth.
- (2) There is pain or discomfort from cold water or food impaction.
- (3) There is unacceptable appearance.
- (4) X-rays reveal lesions penetration of more than one-third of the dentine.
- (5) The patient is at high risk of caries.

Finding no. 4 in the above recommendation indicates that cavity preparation should be performed when "X-rays reveal lesions penetrating more than one-third of the dentine." In addition, it is presumed that the patient in this scenario may be at low risk of caries. In the stage of enamel caries seen in Cases 1 and 2 of this question, the desirable treatment strategy may be not to perform a restorative intervention but to observe progress through the use of preventive measures and regular dental checkups, unless there exists a special reason such as esthetic disorder requiring intervention.

Results of an international comparison between the US and Japan

Results of a comparison of previous studies 8,9 conducted in the US and Japan are described in the table below.

		US (Virginia	US (Virginia
	US (National	Commonwealth	Commonwealth
Japan	Dental PBRN,	University School	University School
Concordance	practitioners)	of Dentistry,	of Dentistry,

	(2017)	Concordance (2009)	faculty members) Concordance (2014)	students) Concordance (2014)
01	53%	51%	72%	35%
Q1	(109/206)	(297/588)	(28/39)	(27/77)

These results suggest that in both the US and Japan, an EPG exists in treatment strategies for enamel caries, indicating that there is room for improvement.

Innes et al. ¹⁰ conducted a meta-analysis in 2017 by integrating the results of previous studies in 17 countries and reported that the proportion of dentists who chose restorative interventions was 21% for proximal carious lesions confined to the enamel and 48% for proximal lesions extending up to the enamel-dentin junction. The authors therefore concluded that restorative interventions are carried out internationally in the treatment of early carious lesions and suggest that excessive treatment needs to be reduced.

[References]

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- 9. Chiang HK, Best AM, Sarrett DC. Concordance Between Clinical Practice and Published Evidence: Findings From Virginia Commonwealth University School of Dentistry. J Evid Based Dent Pract 2017;17:169-176.
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If you have read the above, please check the	he box and proceed to "Next".
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Please read the scenario and answer Question 2.

[Deep Caries Patient Scenario]

Patient Edwards is a 25-year-old male with a visible cavitation into the dentin in the central fossa of tooth #30 (right mandibular first molar according to the ADA coding system). Overall patient Edwards has just two enamel lesions on smooth surfaces, in addition to the lesion on #30, which the bitewing radiograph indicates is deep. The tooth responds to cold and the pain lasts < 3 seconds. The bitewing radiograph of the tooth #30 is shown below.



Reprinted from Practice Impact Questionnaire with permission

Question 2: Upon opening the tooth and during excavation of the caries, you realize that the lesion is deeper than anticipated and may involve the mesial buccal pulp horn. In this situation, what would you usually do?

Continue and remove all the decay.
Stop removing decay near the pulp horn and remove it elsewhere.
Perform endodontic treatment or refer to an endodontist

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Commentary on Question 2

[Deep Caries Patient Scenario]

Patient Edwards is a 25-year-old male with a visible cavitation into the dentin in the central fossa of tooth #30 (right mandibular first molar according to the ADA coding system). Overall patient Edwards has just two enamel lesions on smooth surfaces, in addition to the lesion on #30, which the bitewing radiograph indicates is deep. The tooth responds to cold and the pain lasts < 3 seconds. The bitewing radiograph of the tooth #30 is shown below.



Reprinted from Practice Impact Questionnaire with permission

This Question asks you to choose one of the following options, i.e., "nonselective caries removal," "stepwise caries removal/selective caries removal," or "endodontics," when the carious lesion is so deep that its removal by a single intervention could result in pulp exposure.

This patient suffers from mild pulpitis and the symptoms of the pulp may be reversible. On the basis of the policy of MID (Minimal Intervention Dentistry) proposed by the FDI¹, it is not appropriate to choose "endodontics" as the first-line treatment. Next, let us discuss "stepwise removal/selective caries removal" and "nonselective removal" of the decay. An article on randomized controlled trials by Bjørndal et al.² in

2017 compared clinical success between "stepwise removal" and "nonselective removal" in radiographically identified carious lesions extending into three-quarters or more of the dentin. "Stepwise removal" was associated with a lower probability of pulp exposure, and in addition provided an approximately 14% higher rate of success (as evaluated by radiolucency at the apex and by the presence or absence of pulpal reaction).

In a Cochrane Database Systematic Review³ published in 2013, a meta-analysis comparing the "stepwise removal" and "nonselective removal" of permanent teeth demonstrated that the risk of pulp exposure was lower by 49% in "stepwise removal" than in "nonselective removal." In cases without pulp exposure, no significant difference was noted between the two techniques in terms of incidence rates of postoperative pulpal symptoms.

Regarding "selective caries removal," which does not require cavity re-opening, a metaanalysis reported in 2020 by Barros et al.⁴ showed that "selective caries removal" also had a significantly higher success rate than "nonselective removal" (RR: 1.09 [1.02-1.17]). Furthermore, a Cochrane Database Systematic Review⁵ published in 2021 concluded that both "selective caries removal" and "stepwise removal" had higher success rates than nonselective removal [ORs (95%CIs): 11.32 (1.97-65.02) and 2.06 (1.34-3.17), respectively].

Therefore, based on the concept of MID, it is desirable to perform "stepwise caries removal" or "selective caries removal" in patients in whom caries removal may lead to pulp exposure.

Results of an international comparison between the US and Japan

Results of a comparison of previous studies^{6,7} conducted in the US and Japan are

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	Japan Concordance (2017)	US (National Dental PBRN, practitioners) Concordance (2009)	US (Virginia Commonwealth University School of Dentistry, faculty members) Concordance (2014)	US (Virginia Commonwealth University School of Dentistry, students) Concordance (2014)
Q2	54%	33%	53%	32%
Q2	(112/206)	(190/578)	(20/38)	(26/81)

These results indicate that the evidence-practice gap exists in treatment strategies for deep caries in both the US and Japan.

[References]

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If you have read the above, please check the box and proceed to "Next".
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Please answer Question 3.

Question 3: Do you assess caries risk for individual patients in any way?

	YES (If YES, please specify how you assess caries risk)
0	NO
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Commentary on Questions 3

Question 3: Do you assess caries risk for individual patients in any way?

YES (If YES, please specify how you assess caries risk)

NO

This Question asks you to determine if you assess caries risk. The assessment of caries risk not only means saliva testing but also comprehensive evaluation of caries in individual patients. As an example, the American Dental Association (ADA) has proposed the 19 items listed below for caries risk assessment¹.

11. Active orthodontic treatment
12. Irregular dental care
13. Suboptimal fluoride exposure
14. Developmental or acquired enamel
defects
15. Prolonged nursing (bottle or breast)
16. Presence of exposed root surfaces
17. Restoration overhangs and open
margins
18. Physical or mental disability with
inability or unavailability of performing
proper oral health care
19. Xerostomia (medication, radiation, or
disease-induced)

Previous studies regarding caries $risk^{2-4}$ have demonstrated that caries risk assessment in individual patients is effective in predicting "future occurrence of caries" or "progression of existing caries." Furthermore, caries risk assessment has been reported to be effective in predicting not only crown caries in children and adults, but also root caries in the elderly⁵.

Therefore, it is considered desirable to perform some form of comprehensive caries risk assessment in individual patients in the diagnosis and treatment of caries.

For your reference, the major comprehensive assessment tools for caries risk that are internationally available are listed below².

- 1) Caries Risk Assessment Form (American Dental Association: ADA)
- 2) CAT (Caries-risk Assessment Tool) (American Academy of Pediatric Dentistry: AAPD)
- 3) CAMBRA (Caries Management By Risk Assessment)
- 4) Cariogram
- 5) Dundee Caries Risk Assessment Model

Results of an international comparison between the US and Japan

Results of previous comparisons 6,7 conducted in the US and Japan are described in the table below.

		US (Virginia	US (Virginia
	US (National	Commonwealth	Commonwealth

	Japan Concordance (2017)	Dental PBRN, practitioners) Concordance (2009)	University School of Dentistry, faculty members) Concordance (2014)	University School of Dentistry, students) Concordance (2014)
03	51%	85%	90%	96%
Q3	(106/206)	(463/545)	(35/39)	(80/83)

These comparison results between the US and Japan indicate that concordance regarding caries risk assessment is higher in the US than in Japan. It is therefore suggested that caries risk assessment is highly likely to require improvement in Japan.

[References]

- Guidelines for fluoride application by the American Dental Association (ADA): http://ebd.ada.org/~/media/EBD/Files/ADA_Evidencebased_Topical_Fluoride_Chairside_Guide.pdf?la=en
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- 7. Chiang HK, Best AM, Sarrett DC. Concordance Between Clinical Practice and Published Evidence: Findings From Virginia Commonwealth University School of Dentistry. J Evid Based Dent Pract 2017;17:169-176.

☐ If you have read the above,	please check	the box and	proceed to "Next".
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Question: Regarding the mechanism of occurrence of the Evidence-Practice Gap (EPG)

For each of the following 20 items below, please choose the one that is best applicable to the possible cause of the EPG.

5: strongly agree, 4: agree, 3: neither agree nor disagree, 2: disagree, 1: strongly disagree

	5	4	3	2	1
1. Insufficient knowledge of how to obtain evidence such as guidelines, scientific papers, etc.	0	0	0	0	0
2. Insufficient knowledge of how to evaluate the quality of scientific papers or the evidence level.	0	0	0	0	0
3. Insufficient case reports in which evidence-based dentistry (EBD) is applied to clinical practice.	0	0	0	0	0
4. Insufficient opportunity to learn about evidence in dental education at universities.	0	0	0	0	0
5. Insufficient opportunity to learn about evidence after graduation from universities.	0	0	0	0	0
6. Image-based information and devices used for diagnosis vary depending on individual dentists.	0	0	0	0	0
7. Dentists' own thoughts are sometimes given priority over evidence.	0	0	0	0	0
8. Dentists' own experiences are sometimes given priority over evidence.	0	0	0	0	0
9. Even though dentists understand the evidence, they want to avoid the risks associated with changing the treatment they have used so far.	0	0	0	0	0
10. Dentists have insufficient time to keep up-to-date on evidence in areas other than their own specialty area.	0	0	0	0	0
11. Evidence-based treatments are sometimes not covered by the dental insurance system.	0	0	0	0	0
12. Insufficient time to thoroughly explain and obtain the patient's understanding of an evidence-based treatment strategy.	0	0	0	0	0
13. Dental practice revenues are sometimes given priority over evidence when deciding treatment strategy.	0	0	0	0	0
14. Considering the reputation of the clinic, even non-evidence-based methods may be used to ensure that symptoms such as pain are removed.	0	0	0	0	0
15. The nation and society as a whole do not recognize the importance of EBD.	0	0	0	0	0
16. Evidence-based treatment does not always agree with the patient's need.	0	0	0	0	0
17. Potential overtreatment may be a concern for patients who do not make regular visits for dental checkups; in these patients, follow-up observation cannot be performed.	0	0	0	0	0
18. Insufficient evidence which helps dentists choose an appropriate treatment for a patient after careful consideration of his/her own background.	0	0	0	0	0
19. Evidence-based treatment cannot be proposed to patients who do	0	0	0	0	0

not have a good understanding of evidence.					
20. Depending on the patient, evidence cannot be always prioritized					
because treatment does not always proceed smoothly, as indicated by	0	0	0	0	0
evidence.					

In addition to the 20 items above, is there any other reason why the EPG occurs?

	YES (If YES, please specify)	
0	NO	
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Question: Regarding the mechanism of occurrence of the Evidence-Practice Gap (EPG)

	I. Do you personally take any action to reduce the EPG during your daily clinical practice?							
	0	YES (If YES, please specify how you reduce the EPG)						
	0	NO						
J	niv	o you have anything you want to ask society (e.g., the national government, ersities, scientific societies, dentistry-related associations) to do in order to improve EPG in your country?						
	0	YES (If YES, please specify)						
	\circ	NO						
		Back Next						

Question

Please answer the following questions about yourself.

Q1.	Age (years)							
Q2. Year in which you graduated from the dental school								
	Year (on the western calendar : e.g.,1990)							
U3								
ري. آ	Q3. Gender							
0	Male							
O	Female							
Q4.	Which one of the following best describes your practice arrangement?							
0	Employed by another dentist							
0	Self-employed without partners and without sharing of income, costs, or office space (one type of solo practice)							
0	Self-employed without partners but share costs of office and/or assistants, etc. (but with no income-sharing arrangements; another type of solo practice)							
0	Self-employed as a partner in a complete partnership (both income and expenses shared)							
0	Employed by public dental care facility							
0	Other (please specify)							
Q5. Which of the following best describes your part of the practice during the past 12 months?								
0	Too busy to treat all people requesting appointments							
0	Provided care to all who requested appointments, but the practice was overburdened							
0	Provided care to all who requested appointments, and the practice was not overburdened							
0	Not busy enough - the practice could have treated more patients							
Q6.	Specialty area (Multiple choices allowed)							
	None							
	Conservative Dentistry							
	Prosthetic dentistry							
	Endodontics							
	Periodontal disease							
	Orthodontics							

(Pediatric dentistry					
(Oral surgery					
(Oral medicine					
Others (Please specify)							
Q7	Q7. Country in which your clinic (workplace) is located						
Q8. Name of city in which your clinic (workplace) is located							
L							
		Back Next					

Question

When you seek to answer a question you have in your clinical practice, how frequently do you use the information sources listed below to obtain necessary information? (For each item, please choose the one that is best applicable to your case.)

4: frequently, 3: sometimes, 2: rarely, 1: never

	4	3	2	1
1. Colleague	0	0	0	0
2. Textbook	0	0	0	0
3. Non-academic Journal	0	0	0	0
4. Internet information sources (e.g., websites, blogs)	0	0	0	0
5. Scientific journal articles in non-English language	0	0	0	0
6. Scientific journal articles in English	0	0	0	0
7. Clinical Practice Guideline	0	0	0	0
8. Seminars and workshops	0	0	0	0

Please feel free to describe any comments, opinions or impressions you have in the box below.							

The questionnaire is now completed. Please click the [Submit] button to finalize your response.

Back Submit