MICAP: An Anatomical Tooth Notation with Potential Clinical Applications in Multidisciplinary Head and Neck Cancer Care

Dr. Mahum Anjum*[1], Dr. Muhammad Hamza Nadeem*[2] (MBBS), Dr. Ashfaq Akram[2] (Supervisor)

1. Army Medical College, Rawalpindi • 2. University of Health Sciences, Lahore

***Corresponding Authors:** Mahumanjum36118@gmail.com, Hamzanadeem1022@icloud.com

1 BACKGROUND & COMMUNICATION CHALLENGE

1.1 Accurate Tooth Identification in Oral Cancer Care

Accurate tooth identification is important for dental assessment, treatment planning, referrals, and multidisciplinary communication in patients with oral cancer.

1.2 Tooth Notation & Multidisciplinary Communication

Different tooth notation systems use the same numbers or symbols to represent different teeth.[1–3] Although the system is often understood from clinical context, this may create confusion when dental information crosses clinical disciplines or care settings.

Tooth Notation	Tooth No	Tooth Identified
FDI	32	Mandibular left lateral incisor
Universal	#32	Mandibular right third molar
Palmer	8⌋	Maxillary right third molar
Universal	#8	Maxillary right central incisor

SAME NUMBER, DIFFERENT TEETH — the same number may represent different teeth, so the notation system must be clearly identified when findings are documented, referred, or communicated across disciplines.

2 MICAP NOTATION

2.1 An Anatomical Approach to Tooth Identification

MICAP uses standard tooth names as core identifiers for tooth identification and dental communication.

M Molar | **I** Incisor | **C** Canine | **P** Premolar

2.2 How to read the number

Upper right ^{2}P	Upper left P^{2}
Lower right $_{2}P$	Lower left P_{2}

- **Superscript** = upper (maxillary) arch; **subscript** = lower (mandibular).
- **Number before the letter** = patient's right; **after** = patient's left.
- **Number** = position within its type, counted from the midline.

3 OBJECTIVE

To evaluate MICAP's accuracy, perceived ease of learning, and usability among undergraduate dental and allied health students, and to assess its potential applicability to multidisciplinary clinical communication.

4 METHODOLOGY

4.1 Study design

Cross-sectional, single-group post-test-only educational study

4.2 Participants

78 undergraduates: 2nd-year BDS (n = 39) and allied health (n = 39)

4.3 Instruction

1-hour interactive lecture + video demonstration of MICAP

4.4 Assessment

8-item mock dental chart: 4 MICAP identification and 4 conversion tasks

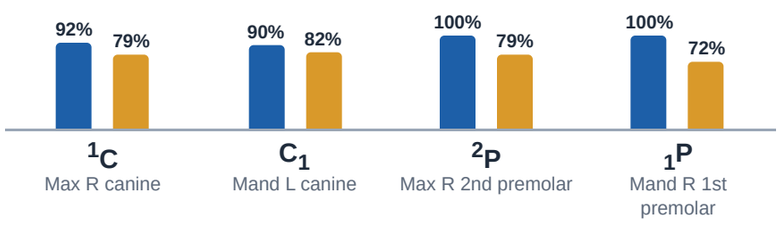
4.5 Ethics

Voluntary; informed consent from students and the patient (case). Identifiers removed.

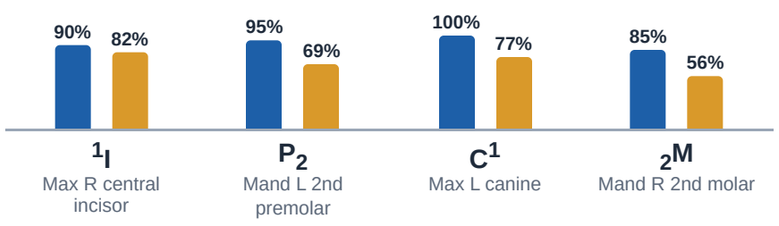
5 RESULTS

Dental (n = 39) Allied health (n = 39) • % correct, descriptive only

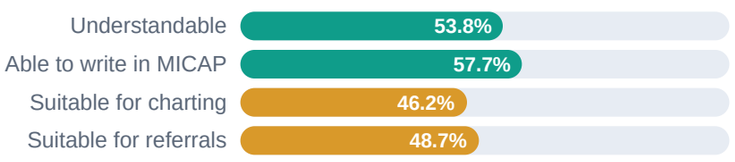
5.1 Identification tasks



5.2 Tooth → MICAP conversion



5.3 Perceived learnability & usability (% Agree / Strongly agree, n = 78)



85–100%
Dental students: % correct across the 8 tasks

56–82%
Allied health: more variable, lowest on 2nd molar conversion

46–58%
Agreed on understandability and usability items

REPRESENTATION

MICAP is represented as:



C CLINICAL CASE: MISCOMMUNICATION IN PRE-RADIATION DENTAL EXTRACTION

1 Patient profile & diagnosis

58-year-old male, heavy smoker. **Diagnosis:** Stage II SCC of the left lateral tongue border and adjacent floor of mouth. **Plan:** primary resection, then IMRT to tumour bed and left neck.



2 Pre-radiation dental assessment

Referred for pre-radiation dental evaluation to prevent osteoradionecrosis (ORN). A non-restorable, deeply carious lower tooth lay in the beam path. General dentist (**Universal**) wrote: *"Advise extraction of tooth #18"* = **mandibular left second molar**.

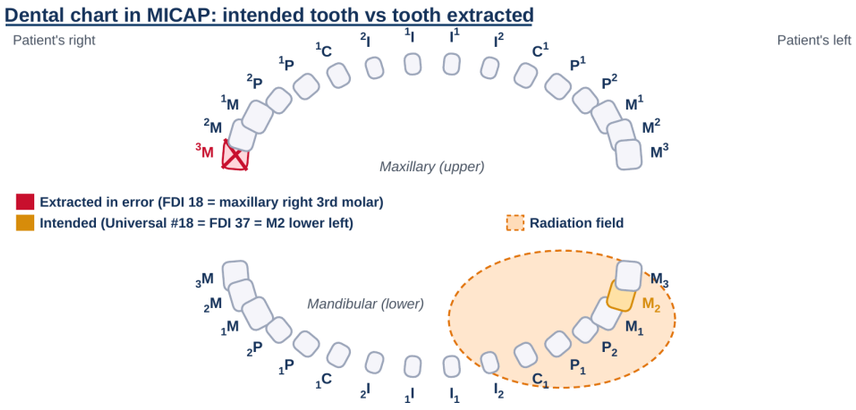


3 Interdisciplinary miscommunication

Referral went to oral-maxillofacial surgery and head & neck radiation oncology. The dental resident charted it in **FDI** without verifying the notation: **FDI 18 = maxillary right third molar**.



Dental chart in MICAP: intended tooth vs tooth extracted



Consequences and wrong treatment

Incorrect extraction
Surgical resident removed the **maxillary right third molar** (FDI 18): asymptomatic, outside the primary radiation target. The high-risk **mandibular left second molar** (Universal #18 / FDI 37) stayed in place.

Complication during radiotherapy
Left mandible received >60 Gy.[4] The unextracted tooth developed **severe periapical abscess and pulpal necrosis**.

Emergency post-radiation extraction
Extraction through heavily irradiated bone; the socket failed to heal.

Severe mandibular ORN
Debridement, prolonged hyperbaric oxygen therapy, and **segmental mandibular resection with fibular free flap**.

Key takeaways: why systems like MICAP matter

System	Notation issue	Risk in cancer care
Universal	#18 = lower left 2nd molar	Numerical overlap → wrong-site extraction
FDI	18 = upper right 3rd molar	Single numbers misinterpreted
MICAP	M_2 = explicit side, arch, tooth	Reduces ambiguity across teams

Same referral, as it would read in MICAP
"Advise extraction of M_2 (non-restorable deep caries)." Side, arch and tooth type are in the notation, so dentist, surgeon and oncologist all read the mandibular left second molar.

Real clinical case; patient details anonymised. Dental chart is schematic.
Clinical exam, radiograph or surgical time-out could also have caught this error.

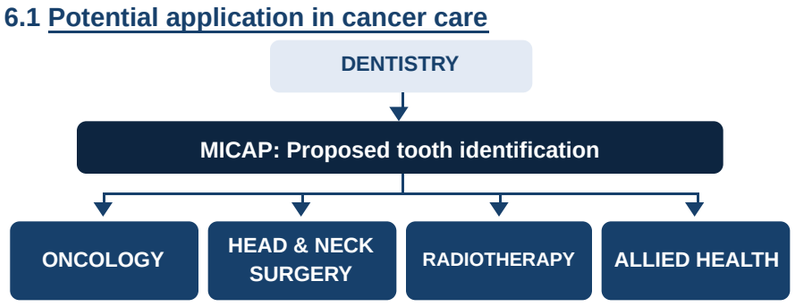
6 CONCLUSION, LIMITATIONS, FUTURE DIRECTION & REFERENCES

- High accuracy among dental students
- Variable accuracy among allied health students
- Variable perceived usability

MICAP offers a potential approach to tooth identification.

Key message: one symbol carries side, arch and tooth type, reducing ambiguity across teams.

6.1 Potential application in cancer care



6.2 Potential applications

- Dental charting
- Head & neck cancer treatment planning
- Multidisciplinary referrals

6.3 References

1. ISO 3950:2016. Dentistry — Designation system for teeth and areas of the oral cavity. ISO; 2016.
2. Peck S, Peck L. A time for change of tooth numbering systems. J Dent Educ. 1993;57(8):643–647.
3. Harris EF. Tooth-coding systems in the clinical dental setting. Dent Anthropol. 2005;18(2):43–49.
4. Nabil S, Samman N. Incidence and prevention of osteoradionecrosis after dental extraction in irradiated patients: a systematic review. Int J Oral Maxillofac Surg. 2011;40:229–243.

CONCLUSION

MICAP showed high accuracy among dental students, more variable accuracy among allied health students, and 46–58% agreement on usability items. These preliminary findings warrant further evaluation for multidisciplinary cancer communication.

6.4 Limitations

- Small single-institution sample (n = 78)
- Immediate post-test only
- No comparison group or statistics
- Plain text loses super/subscripts
- M, I, P overlap surface abbreviations

6.5 Future direction

Evaluation of MICAP in real-world multidisciplinary head & neck cancer care settings is warranted.

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To be presented at **25th Shaukat Khanum Cancer Symposium**
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