ABSTRACT

Aims
To document the types of imaging modalities that are commonly prescribed during dental implant therapy in South Africa.

Material and methods:
The radiographic preferences were obtained from practitioners via an electronic survey that was disseminated during local dental conferences, electronic channels (e.g., email lists) of multiple dental schools and local dental scientific societies, and personal interviews. The survey consisted of multiple-choice questions which were designed to investigate the most common radiographic prescriptions during various treatment phases of implant therapy.

Results
The responses of one hundred and forty-two participants (General practitioners and dental specialists) practising in different South African provinces were collected and assessed. Principally, panoramic radiographs combined with cone beam computed tomography (Pan + CBCT) followed by CBCT, as a single examination (ASE), were the most preferable modalities during the implant planning phase (39% and 29%, respectively). During and directly after the surgery, periapical radiographs (ASE) were the most preferred (67% and 65%, respectively).

Conclusion
The most widely preferred radiographic examination during the planning of implants was panoramic radiographs combined with CBCT. Periapical radiographs (ASE) were favoured during, directly after the treatment, and during the follow-up of asymptomatic patients by the majority of participants. However, CBCT (ASE) was preferred in the follow-up of symptomatic patients. Factors related to extra anatomical information and superior dimensional accuracy provided by three-dimensional volumes (e.g., CBCT volumes), were the most indicated influencing factors on the radiographic prescriptions during implant planning.

Keywords
Dental implant, radiographic prescription, survey, CBCT.

INTRODUCTION

Dental radiology is an integral part of dental implant therapy, providing information on the anatomy, boundaries, possible jaw pathologies, and remaining bone quantity and quality of the potential implant site.1,2 Various imaging modalities can be utilized during implant therapy with panoramic radiographs being widely used.2 During implant treatment, the use of panoramic radiographs was reported3–5, and even as a single examination.6 The panoramic radiographs do provide multiple advantages which include lower costs, reduced radiation exposure (compared with three-dimensional modalities), ease of use, and availability.3–6

Cone-beam computed tomography (CBCT) is a relatively recent and promising technology that has become increasingly popular during various dental treatments including implant placements.7 This modality provided a three-dimensional perspective on the surgical site while exposing the patients to dosages that are much less than Computed Tomography (CT).7

Multiple organizations and scientific committees have released guidelines/advisory recommendations which are specific for a geographical region (e.g. the American Academy of Oral and Maxillofacial Radiology (AAOMR), the European Association for Osseointegration (E.A.O.), the European Commission, the International Congress of Oral Implantologists (ICOI)).7–11 There is a paucity of compelling evidence to support the efficacy of using cross-sectional radiographic techniques over conventional counterparts (i.e. 2D imaging) during implant planning.7,12 Treatment methodologies and information acquired from educators
at various educational levels, competent knowledge of handling recent imaging modalities, and economic strains influence a clinician’s radiographic prescription.13

In South Africa (SA), CBCT was reported to become a common procedure and even a routine procedure in some practices for screening purposes.14 This is especially true particularly with the absence of rigorous local radiographic guidelines which could inform specific criteria for the management of patients requiring implant therapy. In this article, the authors report on the radiographic prescriptions, preferences and clinical opinions of a sample of dental practitioners who perform implant therapy in various South African provinces.

MATERIAL AND METHODS

An electronic questionnaire was developed and published online using Google® Forms® after obtaining ethical approval for degree purposes (Number: BM19/1/20, University of the Western Cape, South Africa). The survey was constructed with 17 open-ended multiple-choice questions. All the information with respect to the research and the questionnaire (information sheet) was attached to the survey. A consent form was presented at the beginning of the online survey. No names nor personal information was required and anonymity of the participants was maintained.

The questions were formulated to allow for anonymous and scenario-based investigations on the radiographic analysis executed/preferred during implant therapy in South Africa (in various phases of the treatment). The questions probed data on the most used imaging modalities, personal experiences, clinical preferences, and the possible factors that may influence radiographic prescriptions. Only two questions were allowed to record multiple selections (answers). The level of formal training received (e.g., general dentist, postgraduate student, specialist) and the province where participants practised, were captured.

The imaging modality preferences were assessed during different clinical situations, various anatomical regions, and embraced all the phases of dental implant therapy (planning, intra-operative, and follow-up phases). The anatomical regions that were assessed during the planning phase include the posterior mandible (unilateral, distal to first premolar region), anterior region of the maxilla/mandible (canine to canine region), posterior maxillary region (unilateral: distal to the first premolar), one jaw (mandible/maxilla) or both jaws (full mouth), and the mental foramen (uni/bilateral). The imaging modality options were: periapical radiograph/s (PA) only, panoramic radiograph (PAN) only, PAN + PA, PA + CBCT, PAN + CBCT, CBCT only, and no radiographs. Motivating factors for the selection of radiographic examinations, such as cost, availability, radiation dose concerns, broad coverage (i.e., the extent of the anatomical area depicted in a single radiographic examination), dimensional accuracy (3D volumes), additional anatomical information (3D volumes), and special procedures (e.g., 3D volumes for guided implant surgery) were also explored.

Inclusion criteria:

1. Clinicians, academics, specialists, and senior residents in the Departments of Periodontology, Prosthodontics, Oral maxillofacial surgery, and Oral and Maxillofacial Radiology, who are engaged in dental implant therapy in the South African dental schools.

2. Dental specialists who perform implant treatments in private practice.

3. Dental practitioners in private practice with experience performing dental implantology not less than three years.

The survey was disseminated online via email list of the South African dental association (SADA) and scientific societies (SA society for Periodontics, Implantology & Oral Medicine, and SA society of Maxillofacial & Oral Surgeons). Also, the online survey was provided by email or personal interviews (where was applicable) to academics in various related departments at SA dental faculties, and practitioners who participated in several conferences held in SA (including the ITI implant Congress (Cape Town, SA, July 2019) and the SADA congress (held in Durban, SA, September 2019). A hard-copy format of the survey was offered upon request from the participant. The interviewers (where applicable) were trained and calibrated to the format and questions of the questionnaire, and, if necessary, answers to any inquiries, were provided without impacting the participant’s choices. Descriptive statistics were used to describe the collected survey data.

RESULTS

142 dental clinicians participated in the survey (Table I) with the majority of them practising in the Western Cape province (Chart 1; this excluded 47 surveyees where their practice location was failed to be captured).

Sixty-three participants (44%) were general dentists with implant experience (3 years min.), followed by 28 periodontists (20%), 16 registrars (11%), 15 maxillofacial surgeons (11%), 12 prosthodontists (8%), and 8 maxillofacial radiologists (6%), (Chart 2).

Panoramic radiograph accompanied by CBCT examination were the most selected imaging modalities (39%) during the implant planning phase (in all anatomical regions in the jaws). This was followed by CBCT as a single examination (29%), periapical radiograph (PA) with CBCT (19%), PAN + PA (8%), PAN only (2%), other (2%), and PA only (1%). Table II and Chart 3 (A-E) shows in detail the imaging modalities preferred for each questioned anatomical site. In general, “Three-dimensional modalities provide more anatomical information necessary for the success of the therapy” followed by “Better dimensional

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| Table I. Number of participants from different survey dissemination platform used. |
|---------------------------------|---------------------------------|
| Survey dissemination channel/platform | Number of surveyees |
| Conference and academic meetings | 40 |
| Online channels (e.g., mailing lists) | 71 |
| Academic institutions (interviews and online) | 31 |
| Total number of participants | 142 |
accuracy (if three-dimensional modalities, e.g., CBCT, were selected previously), and followed by broad coverage of the anatomical region were the most chosen factors to influence the prescriptions of radiographic techniques during the implant planning phase (Table III and Chart 4).

During and directly after surgery (Table IV and Chart 5 A&B), periapical radiography (ASE) was the most selected modality (67% and 65%, respectively). During follow-up (Table V and Chart 6) of asymptomatic patients, PA (ASE) was also the most selected by 46%; Nonetheless, in the presence of postoperative complications, CBCT (ASE) was mostly preferred (32%). The CBCT was preferred the most during follow-up of symptomatic patients due to the extra information it provides regardless of any radiographic artefacts that could occur (caused by implants). Besides, the participants also claimed that broad coverage, availability and ease of access are factors that influence the imaging modality of choice during the follow-up phase (Table VI).

The majority of surveyees (56%) indicated that radiographic follow-up frequency (i.e., after the prosthesis) was “After the first 6 months, 12 months, and then every year for a 10-year period” (Chart 7).

Comparisons between the level of formal training and the most frequently selected radiographic examination during various treatment phases, along with the motivating factors for their choice, were noted (Tables VII-IX).

**DISCUSSION**

It is evident from the results of this survey, that panoramic radiographs and CBCT were the most preferred combinations for implant planning purposes among South African dentists. The CBCT modality was predominantly selected as a single examination or in combination with other modalities during the planning phase with an average of 91% of selections. Nevertheless, a variation of the preferred modalities depending on the anatomical region of the implant site was noted. Minor variations in the preferred radiographic examination were found between various dental speciali-

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**Table II. Participants’ radiographic preferences during implant planning phase in various anatomical regions (Reprinted from Beshtawi 2021)**

| Modality            | Region 1 | Region 2 | Region 3 | Region 4 | Region 5 |
|---------------------|----------|----------|----------|----------|----------|
| PA only             | 0        | 2        | 0        | 0        | 1        |
| PAN only            | 4        | 4        | 4        | 2        | 2        |
| PAN + PA only       | 10       | 10       | 12       | 14       | 10       |
| PA + CBCT           | 26       | 40       | 29       | 14       | 28       |
| Pan + CBCT          | 60       | 46       | 56       | 69       | 48       |
| CBCT only           | 39       | 38       | 38       | 40       | 50       |
| No Radiographs      | 0        | 1        | 0        | 0        | 0        |
| Other modalities    | 3        | 1        | 3        | 3        | 3        |

- Region 1: Posterior mandible (Unilateral, distal to first premolar region)
- Region 2: Anterior region of the Maxilla/Mandible (Canine to Canine region)
- Region 3: Posterior maxilla region (Unilateral: distal to the first premolar)
- Region 4: One jaw (Mandible/Maxilla) or both jaws (Full mouth)
- Region 5: Mental foramen region (Uni/bilateral).
- PA: Periapical radiograph, PAN: Panoramic radiograph, CBCT: Cone beam computed tomography.

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**Table III. Participants’ indicated factors that impact the radiographic modality choice during planning phase (Reprinted from Beshtawi 2021)**

| Factors (Multiple answers were allowed) | Participants (n= 142) |
|----------------------------------------|-----------------------|
| Lower costs for the patients (if the conventional modalities PAN and/or PA were preferred previously) | 12                    |
| Availability and ease of access of the radiographic modality (if the conventional modalities PAN and/or PA were preferred previously) | 18                    |
| Radiation dose concerns of three-dimensional modalities (if the conventional modalities PAN and/or PA were preferred previously) | 7                     |
| Broad coverage of the designated anatomical area (if PAN and/or CBCT were preferred previously) | 71                    |
| Better dimensional accuracy (if three-dimensional modalities, e.g., CBCT, were selected previously) | 87                    |
| Three-dimensional modalities provide more anatomical information necessary for the success of the therapy | 110                   |
| Only three-dimensional modalities (e.g., CBCT), if guided implant surgery is considered | 29                    |
| Other reasons | 5                     |

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**Table VI. Participants’ indicated factors that impact the radiographic modality choice during follow-up phase (Reprinted from Beshtawi 2021)**

| Factors (Multiple answers were allowed) | Participants (n= 142) |
|----------------------------------------|-----------------------|
| Conventional radiographs (especially PA) are preferred, as the CBCT is of limited value if radiographic artefacts (caused by implants e.g., beam hardening) are evident in the volume | 37                    |
| CBCT provides more information regardless of the limitations of possible beam radiographic artefacts caused by the implants | 67                    |
| Availability and ease of access of the radiographic modality | 37                    |
| Broad coverage of the designated anatomical area | 40                    |
| Other reasons | 8                     |
| Three-dimensional modalities provide more anatomical information necessary for the success of the therapy | 110                   |
| Only three-dimensional modalities (e.g., CBCT), if guided implant surgery is considered | 29                    |
| Other reasons | 5                     |
Table IV. Participants’ radiographic preferences during and directly after the surgery (Reprinted from Beshtawi 2021)\(^{12}\):

| Modality                   | During the implant surgery | Directly after the implant surgery |
|----------------------------|----------------------------|-----------------------------------|
| Periapical radiograph(s)   | 123                        | 92                                |
| Panoramic radiograph       | 2                          | 26                                |
| CBCT only                  | 7                          | 18                                |
| No radiographs             | 10                         | 6                                 |

Table V. Participants’ radiographic preferences during the follow-up of symptomatic and asymptomatic patients (Reprinted from Beshtawi 2021)\(^{12}\):

| Modality                   | Asymptomatic | Symptomatic |
|----------------------------|--------------|-------------|
| Periapical radiograph(s)   | 66           | 11          |
| Panoramic radiograph       | 20           | 5           |
| PAN + PA only              | 25           | 21          |
| PA + CBCT                  | 1            | 37          |
| Pan + CBCT                 | 8            | 17          |
| CBCT only                  | 12           | 46          |
| No Radiographs             | 6            | 0           |
| Others                     | 4            | 5           |

During the follow-up of asymptomatic patients, PA only was preferred by periodontists, GP, registrars, and OMFR, while most prosthodontists and OMFS preferred PAN (ASE). However, during the follow-up of symptomatic patients, the prosthodontists, OMFS, OMFR, and registrars concurred on CBCT (ASE), while most GPs favoured a combination of PA and CBCT examinations. Moreover, PA and CBCT volumes and CBCT (ASE) were preferred by periodontists (39%, 39%, respectively) during the follow-up of symptomatic patients.

Fifty-six percent of participants indicated a follow-up frequency to be after 6, 12 months and annually afterwards for ten years.

Three-dimensional volumes were claimed to allow proper examination during the planning phase by providing extra anatomical details that are vital for the treatment success and, at the same time, advocating better dimensional accuracy. Moreover, broad coverage provided by a given imaging modality was a non-negligible factor; while cost-related factors and radiation dose concerns were the least to affect their radiographic choices. On the other hand, 47% of participants advocated the useful use of CBCT regardless of any possible radiographic artefacts (e.g., beam hardening, caused by the implant body) during the assessment of symptomatic patients.

Table VII. Most preferable radiographic examinations by various dental GPs and specialists during planning phase (Reprinted from Beshtawi 2021)\(^{12}\):

| Region | GP (63) | Periodontists (28) | Prosthodontists (12) | OMFS (15) | OMFR (8) | Registrars (16) |
|--------|---------|--------------------|----------------------|-----------|----------|-----------------|
| Region 1 Overall | PAN+CBCT (52%) | CBCT (53%) | PAN+CBCT (59%) | CBCT (46%) | PAN+CBCT (62%) | PAN+CBCT (56%) |
| Region 2 Overall | PAN+CBCT (52%) | CBCT (53%) | CBCT (53%) | CBCT (63%) | 8 (100%) | 15 (93.75%) |
| Region 3 Overall | PAN+CBCT (52%) | CBCT (53%) | PAN+CBCT (67%) | CBCT (60%) | PAN+CBCT (50%) | PAN+CBCT (63%) |
| Region 4 Overall | PAN+CBCT (52%) | CBCT (53%) | PAN+CBCT (67%) | CBCT (53%) | PAN+CBCT (63%) | PAN+CBCT (62%) |
| Region 5 Overall | PAN+CBCT (52%) | CBCT (53%) | PAN+CBCT (50%) | CBCT (67%) | PAN+CBCT & CBCT only (50%) | PAN+CBCT (50%) |

- Percentage of selections included CBCT (as a single examination or combined with other techniques)
- Region 1: Posterior mandible (Unilateral, distal to first premolar region)
- Region 2: Anterior region of the Maxilla/Mandible (Canine to Canine region)
- Region 3: Posterior maxilla region (Unilateral: distal to the first premolar)
- Region 4: One jaw (Mandible/Maxilla) or both jaws (Full mouth)
- Region 5: Mental foramen region (Uni/bilateral)
- GP: General practitioners. OMFS, OMFR: Oral and Maxillofacial Surgeons and radiologists, respectively.
Table VIII. Most preferable radiographic examinations by various dental GPs and specialists during surgical and follow-up phases (Reprinted from Beshtawi 2021)

| Phase                          | GP (63)          | Periodontists (28) | Prosthodontists (12) | OMFS (15) | OMFR (8) | Registrars (16) |
|-------------------------------|------------------|--------------------|----------------------|-----------|----------|-----------------|
| During the surgery            | Overall          | PA (60%)           | PA (96%)             | PA (83%)  | PA (67%)  | PA (75%)        |
|                               | % CBCT*          | 3 (4.76%)          | 1 (3.57%)            | 0         | 1 (6.66%) | 1 (12.5%)       |
| Directly after the surgery    | Overall          | PA (70%)           | PA (64%)             | PA (50%)  | PA (40%)  | PA (82%)        |
|                               | % CBCT*          | 8 (12.69%)         | 6 (21.42%)           | 0         | 2 (13.33%)| 2 (25%)         |
| Follow-up (Asymptomatic patient) | Overall      | PA (59%)           | PA (60%)             | PAN (25%) | PAN (53%) | PA (82%)        |
|                               | % CBCT*          | 8 (12.69%)         | 3 (10.71%)           | 2 (16.66%)| 2 (13.33%)| 1 (12.5%)       |
| Follow-up (symptomatic patient) | Overall     | PA + CBCT (32%)    | PA + CBCT and CBCT only (99%) | CBCT (41%) | CBCT (40%) | CBCT (43%) |
|                               | % CBCT*          | 38 (60.31%)        | 23 (82.14%)          | 9 (75%)   | 10 (66.66%)| 6 (75%)         |

* Percentage of selections included CBCT (as a single examination or combined with other techniques)

Table IX. Number of GPs and specialists versus the indicated motivating factor of to select a certain radiographic modality during planning phase (Reprinted from Beshtawi 2021)

| Motivating factor                                                                 | GP (% of 63) | Periodontists (% of 28) | Prosthodontists (% of 12) | OMFS (% of 15) | OMFR (% of 8) | Registrars (% of 16) |
|----------------------------------------------------------------------------------|--------------|-------------------------|---------------------------|---------------|--------------|----------------------|
| Lower costs for the patients (if the conventional modalities PAN and/or PA were preferred previously) | 10 (15.9%)   | 0 (0%)                  | 1 (8.3%)                  | 0 (0%)        | 0 (0%)        | 0 (0%)               |
| Availability and ease of access of the radiographic modality (if the conventional modalities PAN and/or PA were preferred previously) | 15 (23.8%)   | 0 (0%)                  | 0 (0%)                    | 2 (13.3%)     | 0 (0%)        | 2 (12.5%)            |
| Radiation dose concerns of three-dimensional modalities (if the conventional modalities PAN and/or PA were preferred previously) | 2 (3.2%)     | 2 (7.1%)                | 0 (0%)                    | 1 (6.7%)      | 1 (12.5%)     | 1 (6.25%)            |
| Broad coverage of the designated anatomical area (if PAN and/or CBCT were preferred previously) | 29 (46%)     | 12 (42.9%)              | 7 (58.3%)                 | 7 (46.7%)     | 6 (75%)       | 8 (50%)              |
| Better dimensional accuracy (if three-dimensional modalities, e.g., CBCT, were selected previously) | 37 (58.7%)   | 13 (46.4%)              | 10 (83.3%)                | 11 (73.3%)    | 7 (87.5%)     | 8 (50%)              |
| Three-dimensional modalities provide more anatomical information necessary for the success of the therapy | 41 (65.1%)   | 24 (85.7%)              | 10 (83.3%)                | 13 (86.7%)    | 6 (75%)       | 14 (87.5%)           |
| Only three-dimensional modalities (e.g., CBCT) if guided implant surgery is considered | 11 (17.5%)   | 4 (14.3%)               | 1 (8.3%)                  | 5 (33.3%)     | 5 (62.5%)     | 2 (12.5%)            |
| Other reasons                                                                  | 3 (4.8%)     | 0 (0%)                  | 1 (8.3%)                  | 1 (6.7%)      | 0 (0%)        | 0 (0%)               |

* Percentage of selections included CBCT (as a single examination or combined with other techniques)

Multiple answers were allowed.

Chart 1. Participants’ provinces of practice.
**Chart 2. Distribution of the formal training of the surveyees.**

- General dentist with implant experience (3 Years Min.): 44%
- Periodontist: 11%
- Prosthodontists: 11%
- Oral and Maxillofacial radiology: 8%
- Oral and Maxillofacial surgeon: 6%
- Registrar (Perio., Prosth., OMFS): 5%

**Chart 3. Distribution of the preferred radiographic modalities during planning phase (A-E).**

**Chart 3A: Posterior mandible (Unilateral, distal to first premolar region)**

- Periapical radiograph/s (P.A) only: 32%
- Panoramic radiograph (PAN) only: 27%
- PAN + P.A only: 18%
- P.A + CBCT: 7%
- PAN + CBCT: 9%
- CBCT only: 2%
- No Radiographs: 1%
- Others: 3%

**Chart 3B: Anterior region of the maxilla/mandible (Canine to Canine region)**

- Periapical radiograph/s (P.A) only: 28%
- Panoramic radiograph (PAN) only: 32%
- PAN + P.A only: 18%
- P.A + CBCT: 7%
- PAN + CBCT: 9%
- CBCT only: 2%
- No Radiographs: 1%
- Others: 3%

**Chart 3C: Posterior maxilla region (Unilateral: distal to the first premolar)**

- Periapical radiograph/s (P.A) only: 18%
- Panoramic radiograph (PAN) only: 27%
- PAN + P.A only: 9%
- P.A + CBCT: 3%
- PAN + CBCT: 2%
- CBCT only: 0%
- No Radiographs: 2%
- Others: 1%

**Chart 3D: One jaw (Mandible/Maxilla) or both jaws (Full mouth)**

- Periapical radiograph/s (P.A) only: 35%
- Panoramic radiograph (PAN) only: 28%
- PAN + P.A only: 20%
- P.A + CBCT: 7%
- PAN + CBCT: 3%
- CBCT only: 1%
- No Radiographs: 0%
- Others: 1%

**Chart 3E: Mental foramen region (Uni/bilateral)**

- Periapical radiograph/s (P.A) only: 34%
- Panoramic radiograph (PAN) only: 20%
- PAN + P.A only: 20%
- P.A + CBCT: 1%
- PAN + CBCT: 1%
- CBCT only: 7%
- No Radiographs: 1%
- Others: 2%
Chart 4. Indicated factors impacting the radiographic preference during implant planning phase.

- Cost
- Availability and accessibility
- Broad coverage
- Dimensional accuracy
- Radiation dose concerns
- 3D scans provide more anatomical information
- 3D scans for Guided implant surgery
- Other reasons

Chart 5. Radiographic modalities preference during and directly after surgery (A&B).

Chart 5A: During the surgery
- Periapical radiograph/s (P.A) only: 87%
- Panoramic radiograph (PAN): 5%
- PAN = P.A only: 7%
- PAN + CBCT: 13%
- CBCT only: 65%
- No Radiographs: 1%

Chart 5B: Directly after the surgery
- Periapical radiograph/s (P.A) only: 4%
- Panoramic radiograph (PAN): 3%
- PAN + CBCT: 8%
- CBCT only: 8%
- No Radiographs: 3%
- Others: 32%

Chart 6. Radiographic modalities preference during the follow-up of asymptomatic and symptomatic patients (A&B).

Chart 6A: Follow-up (Asymptomatic patient)
- Periapical radiograph/s (P.A) only: 46%
- Panoramic radiograph (PAN): 14%
- PAN = P.A only: 18%
- PAN + CBCT: 6%
- CBCT only: 8%
- No Radiographs: 3%

Chart 6B: Follow-up (Symptomatic patient)
- Periapical radiograph/s (P.A) only: 32%
- Panoramic radiograph (PAN): 15%
- PAN = P.A only: 12%
- PAN + CBCT: 26%
- CBCT only: 8%
- No Radiographs: 3%
- Others: 3%
Panoramic radiographs (ASE) were shown to be the most popular technique during the planning phase in India15–18 due to mainly the availability and broad coverage factors. Panoramic radiographs (ASE) were also found to be the most popular during the planning phase in surveys conducted in Brazil19, Palestine20, and Libya21. In Saudi Arabia22, 20.2% (the highest percentage) preferred PAN, PA, and CT during the pre-operative phase. In Turkey23, CBCT prescriptions were mostly indicated for implant planning. In Italy24, 84% of participants in a survey indicated the use of intraoral periapical radiographs, 8.8% preferred panoramic radiographs and 6.9% preferred CBCT during the follow-up phase.

Inconsistency related to radiographical prescriptions for implant planning at the international level was mentioned13 for being independent of social wealth and the level of "dental health".

In the light of international guidelines
The AAOMR2 advised in 2012 that “cross-sectional imaging be used for the assessment of all dental implant sites and that CBCT is the imaging method of choice for gaining this information”. On the other hand, the E.A.O guidelines published in 2012 stated that in case of the presence of adequate bone width after clinical evaluation, along with sufficient bone height and clear demarcation of the anatomical boundaries observed on conventional radiographs, then there is no need for further imaging.

Nevertheless, E.A.O mentioned the advantages of cross-sectional imaging e.g., better anatomical structure demarcation, promoting the prosthetic outcomes, assessment of bone defects, in case of bone augmentation, special techniques (e.g., zygomatic implants), and during computer-guided implantology. The ICO11 advised the use of CBCT must be justified on an individual basis and after a full clinical assessment. Nevertheless, “…it is virtually impossible to predict which treatment cases would not benefit from having this additional information before obtaining it11.

The findings of this investigation aimed at enriching the pool of evidence in South Africa with regards to the local imaging practices. Such type of evidence would help the decision-makers at local radiation regulatory authorities to formulate imaging guidelines that adapt/harmonize with the needs of the clinicians and the local working environment.

CONCLUSION
The majority of the surveyed south African dentists preferred the combination of panoramic radiographs and CBCT volumes for the implant planning phase, while the vast majority concurred on the use of periapical radiographs (ASE) during and immediately after surgery. Periapical radiographs were also mostly chosen during the follow-up of asymptomatic patients and, by contrast, CBCT for those who appear with symptoms. The surveyed clinicians believe that CBCT provides extra anatomical information that is dimensionally more accurate.

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