WILEY | CLINICAL ORAL IMPLANTS RESEARCH

European Association for Osseointegration Delphi study on the trends in Implant Dentistry in Europe for the year 2030

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Funding information
The European Association for Osseointegration (EAO) funded this study.

Abstract

Objectives: To assess the potential trends for the year 2030 in dental implant dentistry in Europe using the Delphi methodology.

Material and methods: A steering committee and a management team of experts in implant dentistry were created and validated a questionnaire including 60 questions, divided in eight topics. The survey was conducted in two rounds using an anonymous questionnaire, which provided the participants in the second round with the results of the first. Each question had three possible answers, and the results were expressed as percentages.

Results: A total of 138 experts were invited to participate in the survey. From all the invited experts, 52 answered in both the first and second rounds. Three different consensus categories were established based on the percentage of agreement: no

consensus (<65%); moderate consensus (65%–85%); and high consensus (≥86%). Within the topic categories, a consensus was reached (mainly moderate consensus) for the majority of questions discussed among experts during a face to face consensus meeting. However, consensus was not reached for a small number of questions/topics.

Conclusions: About 82% of the questions reached consensus. The consensus points towards a lower number of implants to replace chewing units, with implants surfaces made of bioactive materials with reduced micro-roughness using mainly customized abutments with polished surfaces and an internal implant–abutment connection (85%). CBCT-3D technologies will be the main tool for pre-surgical implant placement diagnosis together with direct digital restorative workflows. There will be an increase in the incidence of peri-implantitis, although there will be more efficient interventions its treatment and prevention.

1 | INTRODUCTION

The Delphi method is a widely used and accepted method for collecting data from complex topics, where knowledge is unclear or incomplete. It is based on information gathered by experts using the subjective-intuitive method of foresight, and it is especially useful for long-range forecasting (20–30 years). This method was developed from a series of studies that the RAND Corporation conducted in the 1950s with the objective to develop a technique to obtain the most reliable consensus of a group of experts (Dalkey & Helmer, 1963).

This method is characterized by allowing a structured group of individuals to deal with complex problems through structured communication, individual feedback, group judgement and discussion (Linstone & Turoff, 1975). It typically builds the consensus by using expert surveys in two or more "rounds" in which in the second and later rounds of the survey, the results of the previous round are given as feedback in order to allow for multiple iterations with controlled opinion feedback (Woudenberg, 1991). Once the collected data from the surveys are analysed, the final prediction is developed through consensus by a group of selected experts. This method has the advantage of collecting data by electronic communication, what facilitates confidentiality, anonymity and geographical dispersion, as well as avoids some of the downsides of open group discussions, where dominant individuals may exert certain degree of manipulation or coercion to adopt specific viewpoints.

Modern implant dentistry is relatively a new field, with scientific evidence limited to the last 50 years, although the rapid research and technological advances have placed this mode of therapy as one of the cornerstones of today's dentistry. Since they were first introduced 50 years ago, implant surgical and restorative interventions have changed significantly, and new scenarios and demands have emerged, both in terms of more effective therapeutic outcomes as well as for education and training. The enormous economic impact of implant dentistry has led to a huge industrial development with new implant systems, restorative solutions and technological advances being released every year. The document "Overview of dental implant market trends in major European economies" describes the current scenario of the implant market in Europe (Millennium Research Group, Inc., 2015). Similarly, since enough dental implants have been placed in many patients for long periods of time, new challenges have emerged, mainly the advent of complications and peri-implant diseases, which were not so evident during the first decades of implant dentistry. In fact, the emergence of implant-related pathologies such as peri-implantitis will demand new approaches to diagnosis and treatment planning. Using as a simile the "*Amalberti's theory*", current implant dentistry has shifted from its phase of "innovation and effective design" to the phase, known as the "safe design" where there is an increased emphasis in the legal exposure, in light of likely complications and the improvement of the existing solutions (Amalberti, 2012; Figure 1).

In light of these current and foreseen changes, scientific societies in Implant Dentistry such as the European Association for Osseointegration (EAO) must provide guidelines on implant education and practice and should seek the foresight of these future trends based on scientifically proven methods, such as the Delphi methodology. Similar initiatives using similar Delphi Methodology have been done in the field of Periodontology, both at national level, by the Spanish Society of Periodontology (Noguerol & Llodra, 2011), and at European level by the European Federation of Periodontology (Madianos et al., 2016).

It was, therefore, the main aim of this study endorsed by the European Association for Osseointegration to assess the potential future trends in Implant Dentistry in Europe for the year 2030.
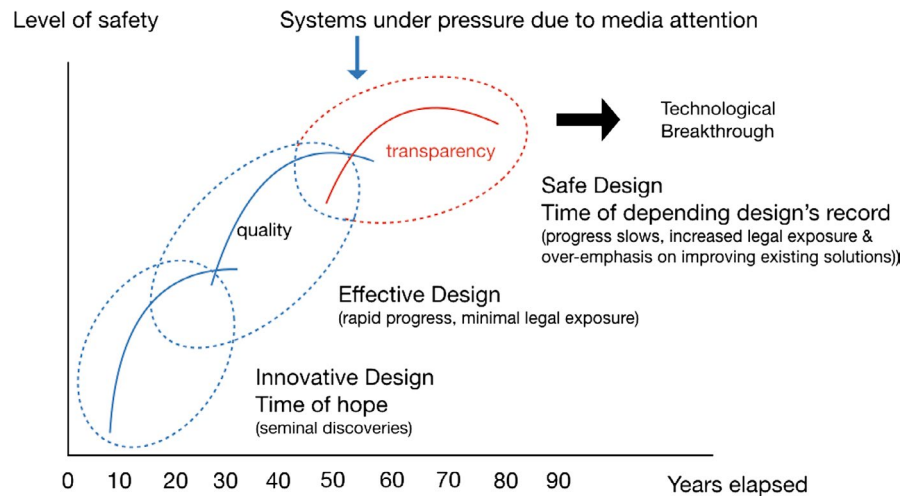
FIGURE 1 Graphic depicting the Amalberti's phases in system's design and implementation

Focus was placed on assessing the trends in implant treatment demands, future implant designs, diagnostic procedures, surgical and restorative protocols, peri-implant diseases, professional practice and education/training.

2 | MATERIAL AND METHODS

2.1 | Study design

The *Delphi* methodology, based on expert opinion to achieve a consensus, was used to predict the future trends in Implant Dentistry for the year 2030. An Advisory Committee (MS, AS, BN, IS, CH & HS) was established by the EAO to define the context and time frame of the projection, to design the questionnaire and to set up the needed resources needed for the project. A steering committee was then established consisting on the Advisory Committee plus the EAO Board to approve and finalize the questionnaire and to select the expert panel.

The online questionnaire was sent to the selected experts. The responses were collated, and the questionnaires were sent in second round to the experts, this time providing a summary of the results from the first round. Once these answers were collected and summarized, a systematized descriptive data analysis was carried out to describe the different opinions and the achieved consensus. The answers achieving a minimum of 65% consensus among the expert panel were not further discussed, while those below this threshold were thoroughly discussed at the final at the final face to face consensus meeting.

2.2 | Questionnaire

A questionnaire with possibility to write open comments, which contained 60 questions, was developed by the Advisory Committee and further approved and validated by the Steering Committee.

The structured questionnaire was expected to be completed in approximately 20 min. It was structured in the following eight sections, specifically dealing with the following trends (Table 1):

1. Implant treatment demands and patient's implications (6 questions)
2. Implant types (11 questions)
3. Diagnostic approaches (7 questions)
4. Surgical approaches (12 questions)
5. Prosthetic approaches (6 questions)
6. Peri-implant diseases (6 questions)
7. Professional practice (9 questions)
8. Education and training (3 questions)

Three well-defined options for answer were provided to all questions, except in one where four options were provided. Furthermore, an open-end space was always provided in each question, in case the expert would like to answer differently or make any clarification on the question. These comments were provided in the face to face consensus meeting to clarify the responses.

2.3 | Selection of experts and questionnaire rounds

Experts were selected based on two main criteria: (a) the geographical area using the recommended five distinctive models of oral healthcare in Europe (Nordic, Bismarkian, British, Southern European and Eastern European; Widstrom & Eaton, 2004); (b) according to the expert's professional profile (mainly working in universities, in hospitals in the public sector or in clinical practice in the private sector). Using these criteria, 138 experts received an invitation to participate and the online link to the questionnaire. All these selected experts received a communication including an invitation letter to participate in the study, as well as the online address where the questionnaire should be answered.

The questionnaire was sent on December 2017, and once the first round of answers was collected, the same exact questionnaire was sent in the second round on January 2018, but on this occasion those participants that answered this questionnaire were also provided with the descriptive analysis of the answers from the first round. So, the experts in the second round were asked to answer the

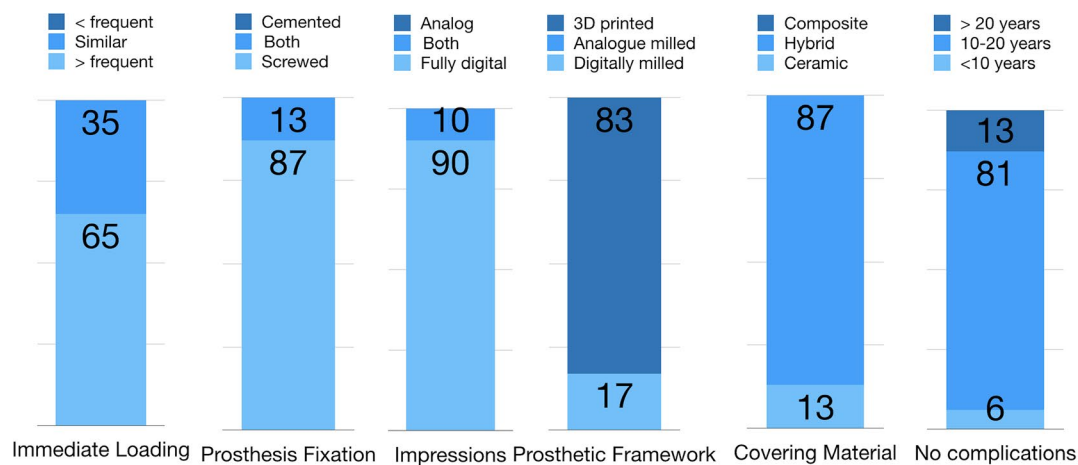**TABLE 1** Open-ended questionnaire validated by the Steering Committee

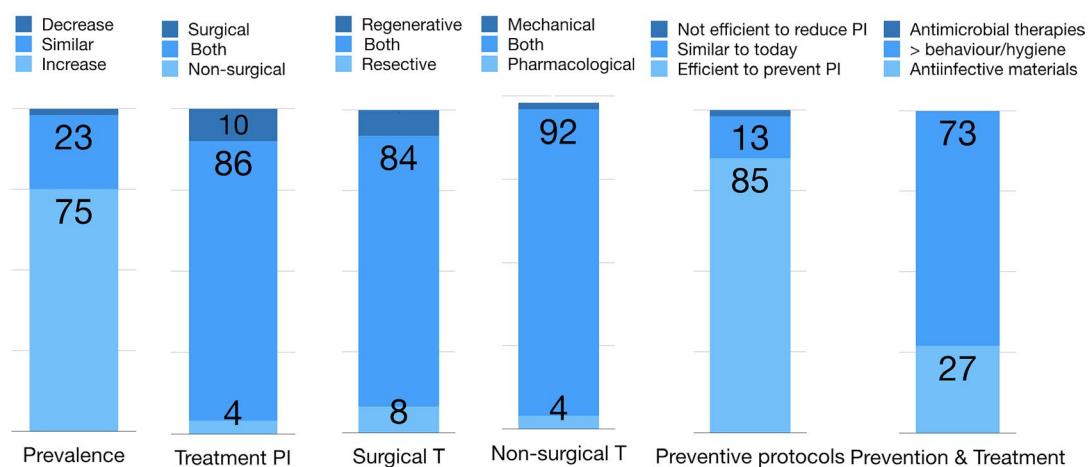| Section	Questions	Possible answers	Consensus achieved
Implant treatment demands and patient's implications	• How do you think implant treatment demands will evolve? • Treatment demands for single-tooth implants: • Treatment demands for short span implant supported fixed restorations: • Treatment demands for fully edentulous patients with fixed implant supported restorations: • Treatment demands for fully edentulous patients with removable implant supported restorations (overdentures): • Treatment demands for fully edentulous patients with fixed implant supported restorations with a reduced number of implants (all on four/six):	• Increase/be maintained/diminish • Increase/be maintained/diminish • Increase/be maintained/diminish • Increase/be maintained/diminish • Increase/be maintained/diminish • Increase/be maintained/diminish	• Moderate (69%) • High (94%) • Moderate (83%) • No consensus • No consensus • No consensus
Implant types	• In regard to the implant macro-design. How do you think dental implants would look like? • In regard to the design of the implant neck. How do you think dental implants would look like? • In regard to the length of the implant, how do you think dental implants would look like? • In regard to the diameter of the implant, how do you think dental implants would look like? • In regard to the number of implants placed to replace chewing units, how do you think the tendency will be? • In regard to the material dental implants are made of, how do you think the tendency will be? • In regard to the material dental implant surfaces are made of, how do you think the tendency will be? • In regard to the micro-topography dental implant surfaces are made of, how do you think the tendency will be? • In regard to the connection between the implant and the abutment, how do you think the tendency will be? • In regard to the design of the abutments, how do you think the tendency will be? • In regard to the micro-topography of the abutment surface, how do you think the tendency will be?	• Cylindrical/both/tapered • Soft tissue level/both/bone level • Shorter/similar to today/longer • Narrower/similar to today/wider • More/similar/less • Titanium/both/ceramic • Bioactive/similar to today/inert • Reduced roughness/similar to today/increased roughness • Internal/both similar/external • Customized/both/standard • Polished/both/textured	• Moderate (69%) • Moderate (73%) • No consensus • No consensus • Moderate (71%) • Moderate (69%) • Moderate (85%) • No consensus • High (86%) • Moderate (65%) • Moderate (77%)
Diagnostic approaches	• How do you think we shall we make the pre-surgical implant diagnosis in the majority of the cases? • Do you believe CBCT-3-D analysis will be generalized for pre-surgical implant diagnosis? • Do you believe in the future peri-implant bone-level stability will be measured by the changes at the interproximal crestal bone levels on peri-apical radiographs? • Do you believe in the future peri-implant tissue health and disease will be measured by means of probing? • Do you believe in the future the use of biomarkers in peri-implant tissue fluid will be part of the standard diagnosis to assess tissue health and disease? • Do you believe direct digital restorative diagnosis will replace the standard diagnostic procedures? • Do you believe that digital impressions will be used as routine procedures, or will conventional impressions remain the standard for treatment planning purposes?	• CBCT 3D/standard radiography/non-ionizing imaging techniques • Yes/both 2D and 3D/no • Yes/similar to today/no • Yes/+innovative methodologies/no • Yes/only in research/no • Yes/only in sophisticated implant practices/No • Digital/both the same/conventional	• Moderate (81%) • Moderate (81%) • No consensus • Moderate (81%) • Moderate (67%) • High (88%) • Moderate (83%)

TABLE 1 (Continued)

Section	Questions	Possible answers	Consensus achieved
Surgical approaches	• Do you believe in the future implant placement will be mainly: • Do you believe in the future dynamic navigation will be: • Do you believe in the future flapless surgery will be: • Do you believe ridge preservation approaches will be: • Do you believe immediate implant placement after tooth extraction will be: • Do you believe implant placement with simultaneous bone regeneration will be: • Do you believe implant placement with simultaneous soft tissue reconstruction will be: • Do you believe implant placement after staged bone regeneration will be: • Do you believe vertical bone regenerative procedures using bone blocks will be: • Do you think the use of zygomatic implants for the treatment of the atrophic maxilla will be: • How do you think the future regenerative technologies will be based? • What do you think will be the standard bone replacement graft?	• Fully guided/guide oriented/brain guided • Routinely/selected cases/seldom • Routinely/selected cases/seldom • More frequent/similar/less • More frequent/similar/less • More frequent/similar/less • More frequent/similar/less • More frequent/similar/less • More frequent/similar/less • More frequent/similar/less • Biomaterials + cell therapies/biomaterials + biological/biomaterials alone • Auto/allogeneic/xenogeneic/synthetic	• Moderate (84%) • Moderate (73%) • Moderate (79%) • Moderate (75%) • No consensus • Moderate (69%) • High (87%) • Moderate (73%) • Moderate (71%) • Moderate (81%) • Moderate (81%) • No consensus
Prosthetic approaches	• Do you believe immediate loading protocols will be? • What will be the tendency regarding the prosthesis fixation? • What will be the tendency regarding the impressions? • In restorations based on a covered structure, what will be the tendency regarding the prosthetic framework? • In restorations based on a covered structure, what will be the tendency regarding the covering material? • Under normal circumstances, what would be the expected longevity of implant treatments without complications?	• More frequent/similar/less • Screw/both/cemented • Fully digital/both/analog • Digitally milled/analogue milled/3d printed • Ceramic/hybrid/composite • <10 years/10–20/>20 years	• Moderate (65%) • High (87%) • High (90%) • Moderate (83%) • High (87%) • Moderate (81%)
Peri-implant diseases	• The prevalence of periimplantitis will: • The treatment of Periimplantitis will be mainly: • The surgical treatment of Periimplantitis will be mainly: • The non-surgical treatment of Periimplantitis will be mainly: • The preventive interventions in peri-implant diseases will be efficient? • Prevention and treatment of peri-implant diseases will be reached by means of?	• Increase/similar/decrease • Non surgical/both/surgical • Resective/both/regenerative • Pharmacological/both/mechanical • More/similar/not efficient • Anti-infective materials/patient behaviour & hygiene/antimicrobial therapies	• Moderate (75%) • High (86%) • Moderate (84%) • High (92%) • Moderate (85%) • Moderate (73%)
Professional practice	• Implant surgeries will be performed mainly by: • Implant prosthesis will be performed mainly by: • Will there be a need of a specific specialist in implant therapies (implantologist)? • The time allocated to implant dentistry in relation to the global activity of a general dentist will tend to be: • The economic return to implant dentistry in relation to the global activity of a general dentist will tend to be: • How do you foresee the costs of implants to the practitioner in the future? • How do you foresee the costs of implant prosthesis to the practitioner in the future? • How do you foresee the expected costs of implant treatment for the patient? • How do you see the horizon of implant dentistry practice?	• General dentist/both/specialist • General dentist/both/specialist • More/similar/less • More/similar/less • Higher/similar/lesser • Higher/similar/lesser • Higher/similar/lesser • Higher/similar/lesser • More generalist/similar/more specialised	• Moderate (71%) • Moderate (75%) • No consensus • Moderate (73%) • No consensus • Moderate (79%) • Moderate (75%) • High (88%) • Moderate (71%)
Education and training	• Implant education and training within the university will be delivered: • Postgraduate implant education will be delivered mainly: • Postgraduate implant education will be delivered mainly by means of:	• > undergraduate/both/> postgraduate • University/scientific organisations/industry • Presence courses/both/online	• Moderate (77%) • Moderate (67%) • High (92%)

(a) Prosthetic Protocols

(b) Peri-implant Diseases

(c) Education & Training

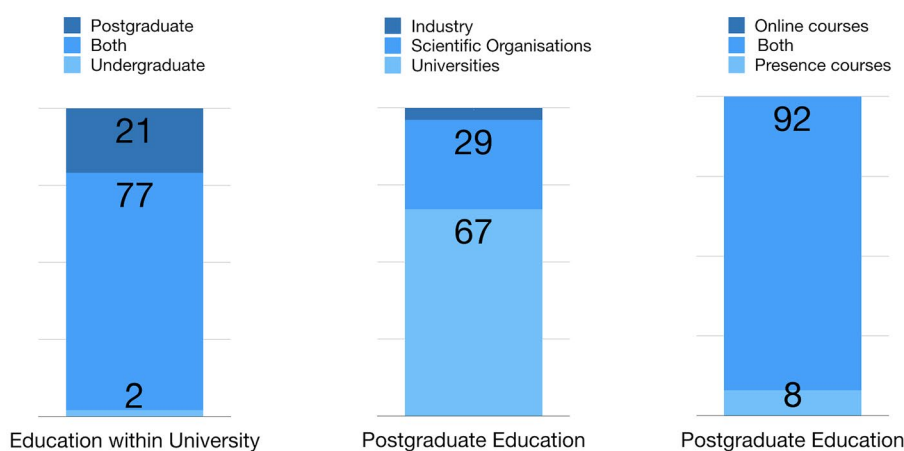**FIGURE 2** Results with consensus attained for all the questions (No consensus <65%; moderate consensus 65%–85%; high consensus >85%). (a) Questions with consensus in the field of prosthetic protocols. (b) Questions with consensus in the field of peri-implant diseases. (c) Questions with consensus in the field of education and training
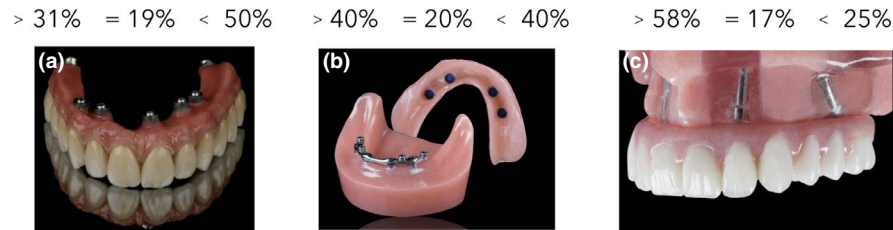
> 31%   = 19%   < 50%   > 40%   = 20%   < 40%   > 58%   = 17%   < 25%

FIGURE 3 Results with no consensus (<65%) attained for full edentulous patients (> means that it will increase; = means that it will remain stable; < means that it will decrease). (a) Results for the use of fixed prosthesis with more than 6 implants. (b) Results for the use of overdentures. (c) Results for the use of fixed prosthesis with a reduced number of implants (4–6)
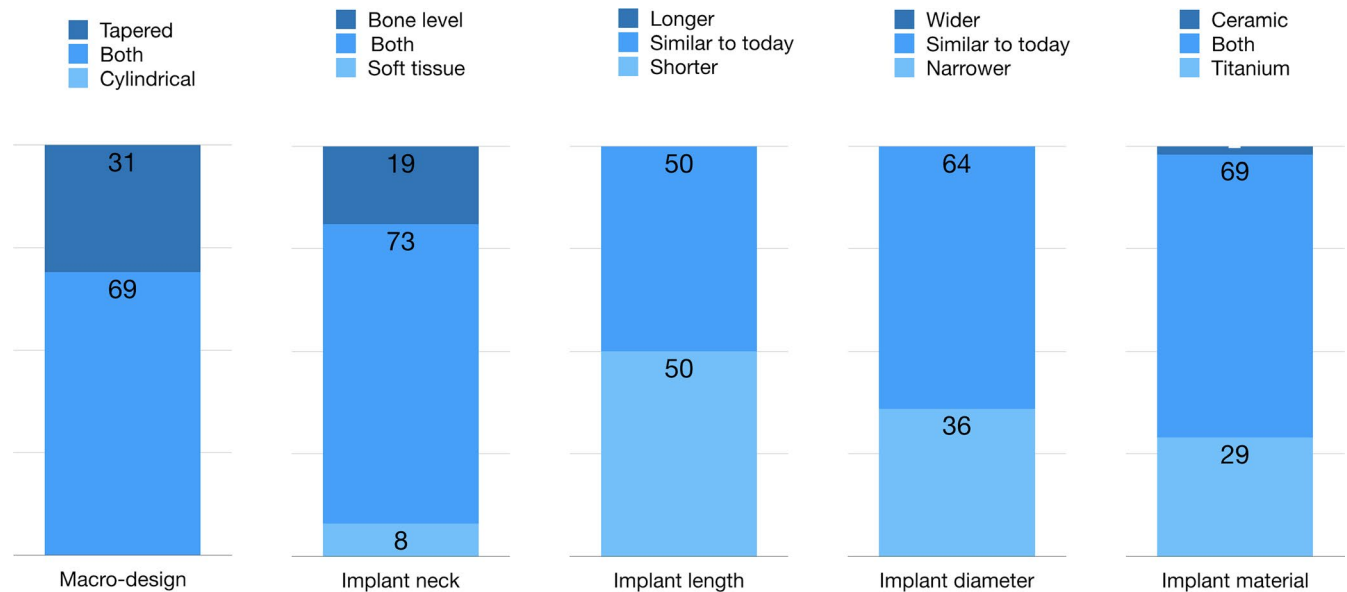

FIGURE 4 Results with or without consensus in the field of implant type (No consensus <65%; moderate consensus 65%–85%; high consensus >85%)

questionnaire after considering the collective results from all participants who responded to the first round. Therefore, the experts could either confirm or change their original answers.

By convention, the following consensus levels were established: (a) no consensus when the threshold of 65% was not attained in second round; (b) moderate consensus when achieving 65%–85%; and high consensus when reaching between 86%–100%.

2.4 | Consensus conference

A consensus conference was held in Pfaffikon (Switzerland) on 7 February 2018 in conjunction with the 5th EAO Consensus Conference. During this meeting, the results from the second-round answers to each question were presented; however, discussion during the meeting specifically dealt with those answers not reaching the 65% level of consensus after the second round and those issues requiring further explanation. These questions were further discussed until reaching consensus from those present at the conference. During this consensus meeting, the final conclusions based on the results were discussed forming the basis for this report.

2.5 | Data analysis

After the first and second round, the answers to each question were individually analysed following descriptive statistics with data presented as absolute values and percentages, as well as means and standard deviations. In addition to statistical descriptors, the expert's testimonies and personal observations of those experts who remained opposed to the consensus achieved for some questions were included in the analysis and were provided to the consensus conference.

3 | RESULTS

A total of 138 experts were invited to participate: 34 Nordic, 36 Bismarkian, 23 British, 29 Southern Europe and 16 Eastern Europe. From these invited experts, in the first round, 56 participants (47.45%) answered the questionnaire and 52 participants, from those participating in the first round (44.06%) finally participated in the second round.
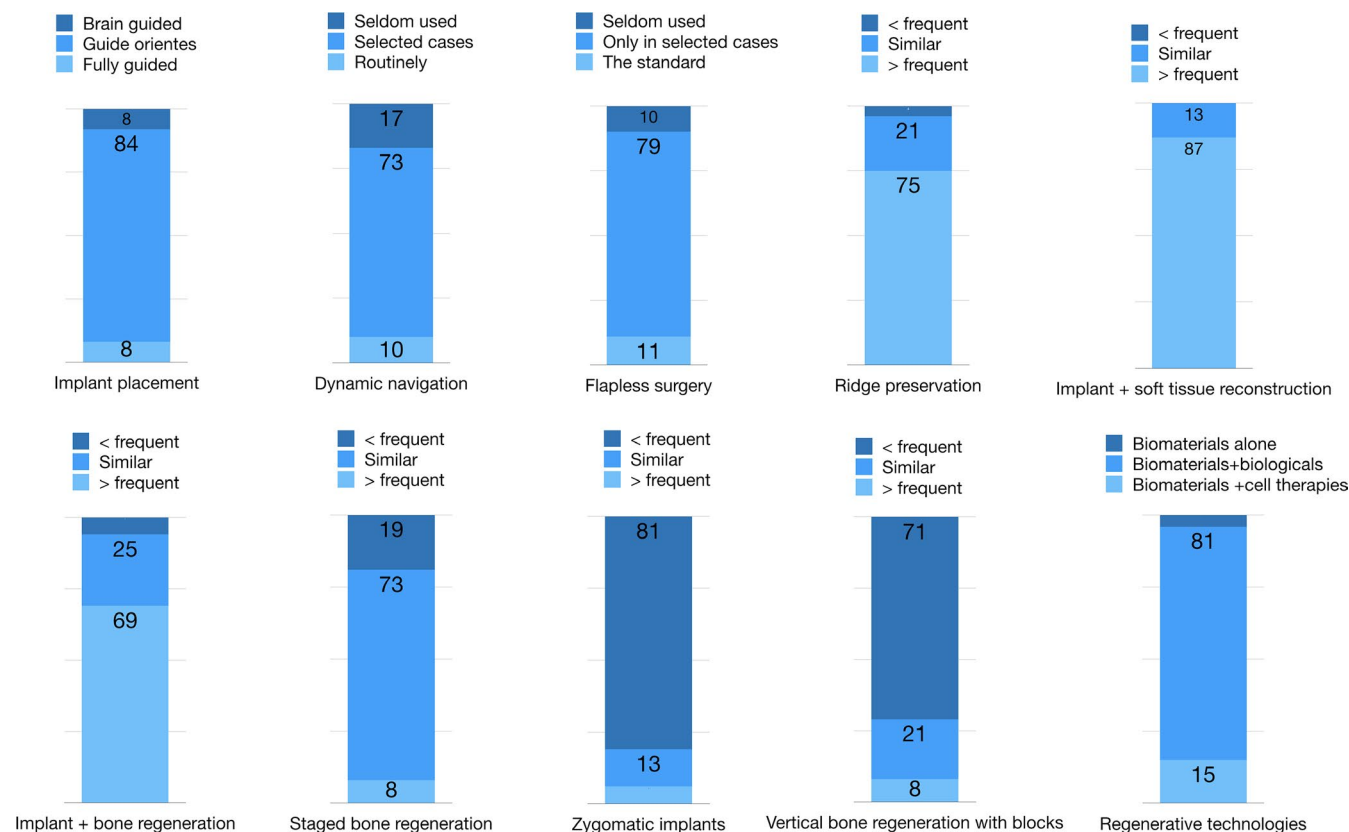
FIGURE 5 Results with consensus in the field of surgical approaches (Moderate consensus 65%–85%; high consensus >85%)

In the first round, the established threshold for consensus (65%) was achieved in 16 questions (26%). In the second round, this level was achieved in 49 questions (81.6%), having, therefore, this consensus increased by a factor of approximately 3 after the second round. The questionnaire and the consensus achieved are depicted in Table 1.

Consensus was obtained in all questions in three fields: prosthetic protocols, peri-implant diseases and education & training (Figure 2a–c). The lowest level was attained in those questions related to "dental implant treatment demands." Implant treatment demands were thought to increase for 69% of the respondents, while 31% estimated that would remain or decrease. There was moderate to high consensus that short span bridges and single-tooth indications will increase (more than 80%), although consensus was not clear in regard to fully edentulous cases irrespective of the type of restoration (fixed or removable) and the number of implants placed (full arch or all on 4/6 concept; Figure 3a–c).

The questions related to the "dental implant macro and micro design" did not provide a high consensus for innovative designs since most of the respondents estimated that in terms of macro-design (cylindrical vs. conical), implant neck (soft tissue vs. bone level), length (shorter vs. longer), diameter (narrower vs. wider), implant material (titanium vs. ceramic) the trend will be similar to today (Figure 4). Most of the respondents, however, estimated that there will be a clear tendency towards a lower number of implants to replace chewing units (71%), with implants surfaces made of bioactive materials (85%)

and with reduced micro-roughness (58%). There was consensus that abutments will be mainly customized (65%), with polished surfaces (77%) and with an internal implant–abutment connection (85%).

There was consensus in those questions related to the "diagnostic procedures" estimating that CBCT-3D technologies will be the main tool for pre-surgical implant placement diagnosis (81%) together with the use of direct digital restorative diagnosis tools (88%). Similarly, most of the respondents (67%) also estimated the study of biomarkers in the peri-implant environment will have an important diagnostic role in the future and that digital impressions will be used as the standard procedure (83%). On the contrary, most of the respondents estimated that the current methodologies to assess peri-implant tissues, either by periodontal probing (81%) or by evaluation of peri-implant interproximal bone levels (63%), would change when more sensitive and objective methods to evaluate the changes in peri-implant tissues are developed.

In regard to the questions related to "protocols for implant placement", moderate to high consensus was reached in 10 out of the 12 questions (Figure 5). However, there was no consensus for immediate implant placement after tooth extraction (61% answered that it will increase whereas 31% that it will be similar) and for the standard of bone replacement graft (52% answered that it will have a xenogeneic origin, whereas 42% responded that it will be synthetic).

The "longevity of future dental implants" was estimated between 10–20 years (87%), but there will be an increase in the incidence of

peri-implantitis (75%), although there will be more efficient interventions to prevent this disease (85%), mainly through the improvement of patient's behaviour (73%). The treatment of peri-implantitis will be through a combination of surgical and non-surgical interventions (80%), with the non-surgical approach incorporating a combination of mechanical and pharmacological strategies (92%) and the surgical protocols including both regenerative and resective approaches (84%).

Most of the respondents estimated that "professional time dedicated to implant dentistry" will increase (73%), and these treatment needs will be rendered by both specialists and general dentists, both in the surgical placement of the implants (71%) and in their restoration (75%). It was, however, estimated that more generalists would be involved in the future in implant therapy (71%). There was no consensus on the need of specialists in implantology and whether the economic return for implant dentistry will be higher (50%), similar (38%) or lower (12%), in spite of a clear consensus for a decrease in implant costs (79%), restorative costs (75%) and lower cost for the patient (71%).

4 | DISCUSSION

The results from the present qualitative study have provided relevant and useful information in respect of the future trends of implant dentistry in Europe. The relevance of these results lies lay in the fact that opinions and estimations were gathered from a wide range of "experts" in implant dentistry from across Europe and from a variety of environments, from purely academic to those working primarily in private and public health sectors. These personal estimations were collected using the Delphi Technique that is a widely used and accepted method for gathering data from respondents within their domain of expertise (Woudenberg, 1991). Although the selection of "experts," and their expressed opinions may be considered as subjective, this might be mitigated by the structured communication, individual feedback, group judgement and discussion that characterizes the Delphi methodology (Linstone & Turoff, 1975), and hence, these results should be considered as relevant and useful information concerning the expected course of implant dentistry in Europe into the next 15 years. While the panel of experts involved is considered to be representative of European implant dentistry, the low response rate obtained may limit the validity of the results.

4.1 | Treatment demands

Treatment demands should clearly follow demographic and epidemiological trends, as well as changes in the oral health manpower distribution and training of professionals providing implant therapy. There is a clear tendency towards a decrease in the prevalence of edentulism (Muller, Naharro, & Carlsson, 2007), and therefore, it seems reasonable that fully edentulous cases will decrease in the future. This clear demographic growth towards an increasingly elder population with more remaining teeth in the mouth could be affected by the economic pressure of a part of the dental profession favouring dental extractions and implant restorations. The results from this study indicate that the single-tooth implant restorations will clearly predominate, while there was no high consensus in regard to the different options of implant-supported restorations for fully edentulous cases. It is not clear from these results whether the expected increase in peri-implantitis and its consequences will impact treatment tendencies towards more conservative approaches aiming to preserve the natural dentition and hence reduce the need for implant therapy. In the European Implant Market Report published in 2014, there is a tendency towards a decrease in implant treatments, which the authors argue it was due to the economic crisis in Europe and the consequent diminution in patient's oral treatment demands (Millennium Research Group, Inc., 2015).

4.2 | Implant design

The highest level of consensus was reached for the type of implant–abutment connection with 86% of the respondents favoured internal connection. This fact is in agreement with the European Dental Implant Market report (2014) despite lack of evidence to show long-term benefit of internal connection compared to external connection (Caricasulo, Malchiodi, Ghensi, Fantozzi, & Cucchi, 2018; Esposito et al., 2016; Pjetursson et al., 2018). A lesser degree of consensus was reached for preferences in implant design (conical vs. cylindrical or tissue level vs. bone level). Again, here the expert decisions were likely based on professional preference, expected aesthetic results or expected primary stability, despite a clear scientific evidence of superiority. There was a moderate consensus towards a tendency to ceramic materials coexisting with the standard titanium. Although the data from Zirconia-based implants are scarce (Cionca, Hashim, & Mombelli, 2017; Pieralli, Kohal, Jung, Vach, & Spies, 2017; Roehling, Schlegel, Woelfler, & Gahlert, 2018), the "green" tendencies among populations from European Countries provide reasonable expectations for higher demands on non-metal solutions. Similarly, although data on oral biofilm adherence to different implant surfaces are scarce (Sanz-Martin, Sanz-Sanchez, Carrillo de Albornoz, Figuero, & Sanz, 2018; Sanz-Sanchez, Sanz-Martin, Carrillo de Albornoz, Figuero, & Sanz, 2018), it is expected that ceramics may provide more cleansable surfaces. In this regard, there was also a moderate consensus towards a tendency to smoother and bioactive implant surfaces. The demonstrated impact of plaque deposits on implant and abutment surfaces and patient's oral hygiene habits in the aetiology of peri-implant diseases (Berglundh et al., 2018) make the rationale of this tendency very clear. There was no consensus on the future trends in respect to the length or diameter of the implants, since these choices are probably more dependent on the individual patient's diagnosis and treatment planning than on tendencies.

4.3 | Diagnostic procedures

There was a clear consensus (over 80%) on the need for three-dimensional imaging for the appropriate pre-surgical implant

diagnosis. Similarly, the digital workflow is expected to replace the traditional indirect methods used in traditional restorative dentistry. On the other hand, even though there was a clear wish for improved methods to evaluate peri-implant soft tissues or peri-implant disease activity, there was no indication of new technologies to replace traditional probing or evaluation of bleeding or suppuration.

4.4 | Surgical protocols

In spite of the advent of multiple systems of navigation and guidance for supporting surgical implant placement, most of the experts estimated that these systems should be used only in selected cases. This may be due to the lack of demonstrated accuracy accurateness and precision of most of these systems (Sicilia & Botticelli, 2012; Van Assche et al., 2012; Vercruyssen, Laleman, Jacobs, & Quirynen, 2015). Similarly, most experts trust in their surgical experience rather than technological advances for implant placement, since flapless surgeries were only indicated in selected cases. In terms of regenerative interventions, there was a clear consensus towards the use of biomaterials (either xenogeneic or synthetic) rather than autologous or allogeneic grafts. This tendency is in agreement with a recent systematic review on lateral bone augmentation procedures either simultaneous or staged with implant therapy also reporting that most of the published clinical trials in the last 10 years have evaluated bone replacement grafts using biomaterials rather than autologous grafts (Sanz-Sanchez, Ortiz-Vigon, Sanz-Martin, Figuero, & Sanz, 2015). There is a clear tendency towards seeking improved restorative and aesthetic results by surgical interventions for hard and soft tissue augmentations.

4.5 | Prosthetic protocols

There was a very high consensus in regard to the tendency towards screw-retained prosthetic solutions and to the use of digital workflows for the restorative processes. Similarly, the use of improved fabrication methods, hybrid materials (e.g., zirconia/composite) and structures made through 3-D impressions are foreseen by most of the experts as the techniques of the future.

4.6 | Peri-implant diseases

The increasing number of patients with implant-supported restorations together with a higher life expectancy results in an increased expected incidence of peri-implantitis. Although most of the experts (more than 80%) foresee improved preventive and therapeutic methods to manage these diseases, they do not point towards a clear tendency in their treatment, with most favouring both non-surgical and surgical approaches with both resective and regenerative protocols. These results can be justified by the lack of documented long-term efficacy in most of the therapies being rendered today (Figuero, Graziani, Sanz, Herrera, & Sanz, 2014; Muthukuru, Zainvi, Esplugues, & Flemmig, 2012; Renvert, Polyzois, & Claffey, 2012).

4.7 | Professional practice and education

There is a clear view by the experts that implant therapy will become widespread in the future with similar distribution between specialists and generalists. Also, it is expected that costs of implant therapy will be less for the patient, although this decrease is not perceived to match to reduced costs for the professional since it is expected that the introduction of more sophisticated technologies will increase the costs to the practitioner. Experts agreed on the need of appropriate training and education for those providing implant treatments and in light of the widespread provision of these treatments. In order to meet these needs, appropriate education is required at both undergraduate and postgraduate level. This need was already discussed and recommended at a European Workshop of Dental Implant Education (Sanz & Meyle, 2010).

In conclusion, the results from the present study using the Delphi approach have provided relevant and useful information with respect to expected tendencies in the field of implant dentistry in Europe towards the year 2030. The European Association for Osseointegration should closely look at these tendencies and foster research and development in those areas where there is a clear need of improved methods.

CONFLICT OF INTEREST

The authors report no conflicts of interest related to this study.

AUTHOR CONTRIBUTIONS

Ignacio Sanz-Sánchez and Blas Noguerol prepared the protocol and wrote the manuscript. Mariano Sanz led the study, prepared the protocol and wrote the manuscript. The remaining authors actively contributed in all the phases of the study.

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