

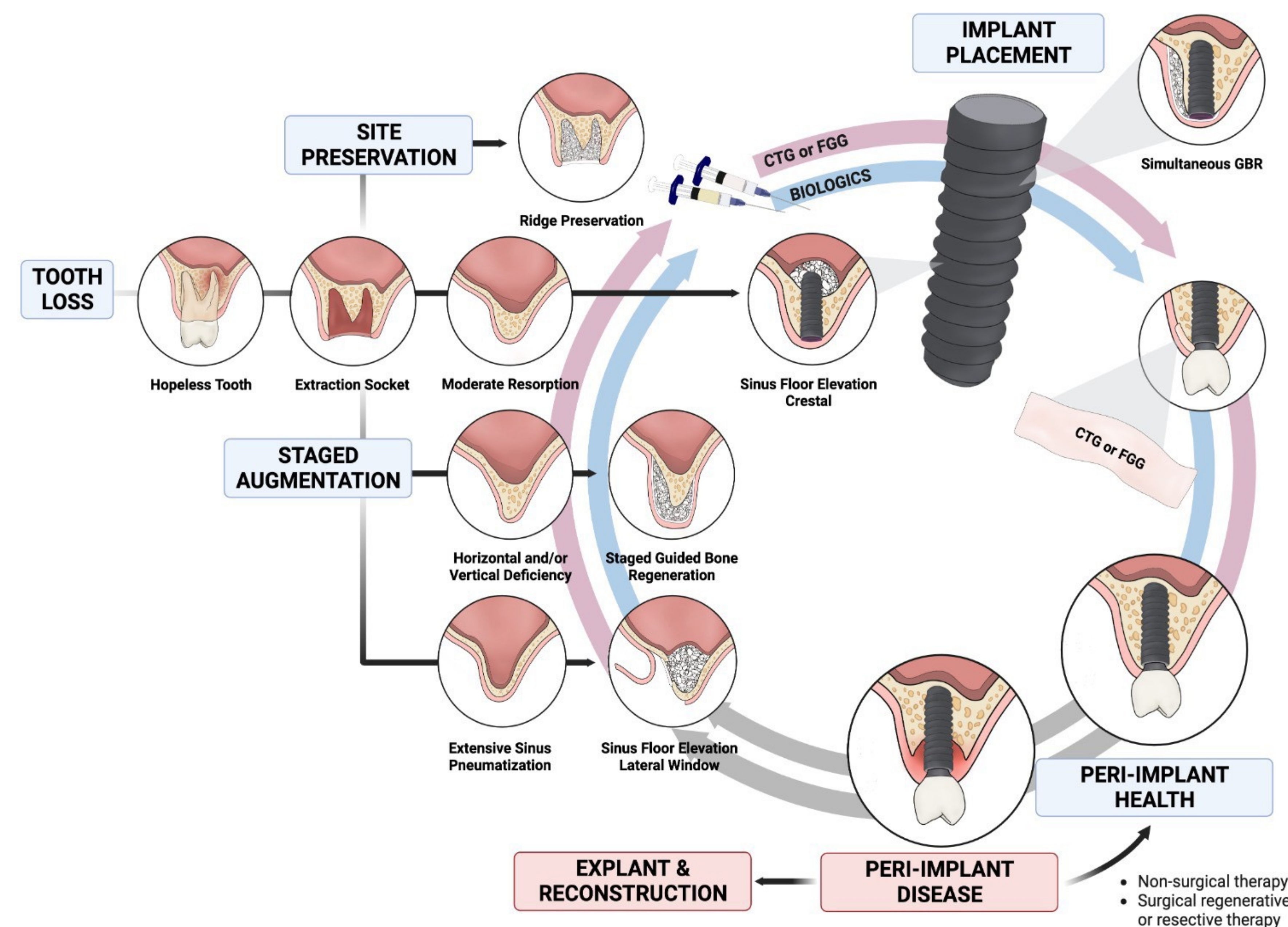
Reconstructive Peri-implant Site Development through an implant life cycle. A longitudinal analysis of 10,247 implants.



Khushboo Kalani, Sandra Stuhr, Abdusalam Alrmali, Dhiraj Mallela, Jessica Latimer, Hom-lay Wang, Muhammad H.A. Saleh

Department of Periodontics and Oral Medicine, University of Michigan School of Dentistry
Department of Oral Medicine, Infection Control and Immunity, Harvard University, Boston MA, USA

Aim: This study aimed to evaluate the frequency of regenerative hard and soft tissue augmentation procedures performed before and after implant placement. We also investigated how patient-specific factors like smoking and diabetes affect the need for implant procedures, analyzed the implant lifecycle and failure times in relation to systemic health, and conducted a cost analysis of pre-and post-implant procedures influenced by these covariates.



METHODS

Patients who received dental implants at the University of Michigan School of Dentistry Periodontics department in the period from January 2012 to January 2023 were included. Information pertaining to each reconstructive procedure performed before or after each implant was placed was collected. Demographic information, systemic conditions (smoking, diabetes mellitus, history of periodontitis and rheumatoid arthritis) and cost.

RESULTS

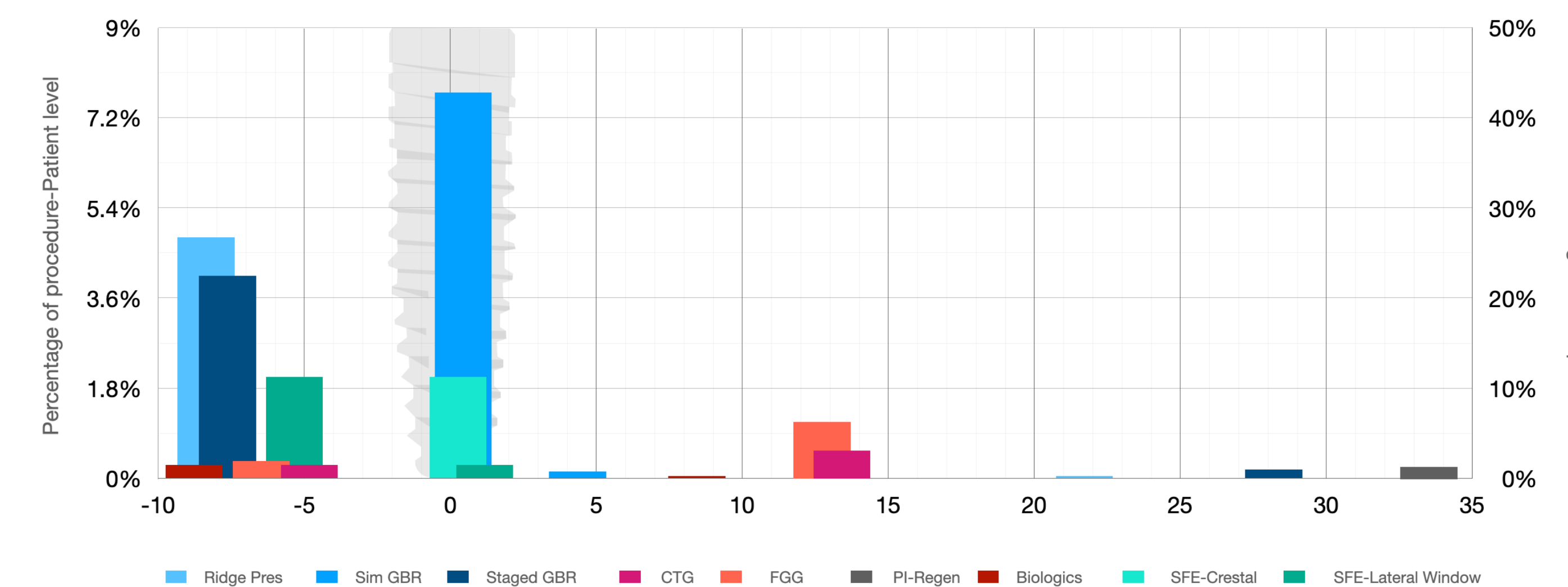


Fig. 1. Prevalence of interventions done at patient level

10,247 implants were included in the final analysis. 1823 implants (17.8%) underwent regenerative procedures before implant placement (pre-IP), and 213 implants (2.1%) underwent regenerative procedures after implant placement (post-IP). Among these, 257 implants (14.1%) had multiple pre-IP regenerative procedures, while only 12 implants (5.6%) had multiple post-IP regenerative procedures.

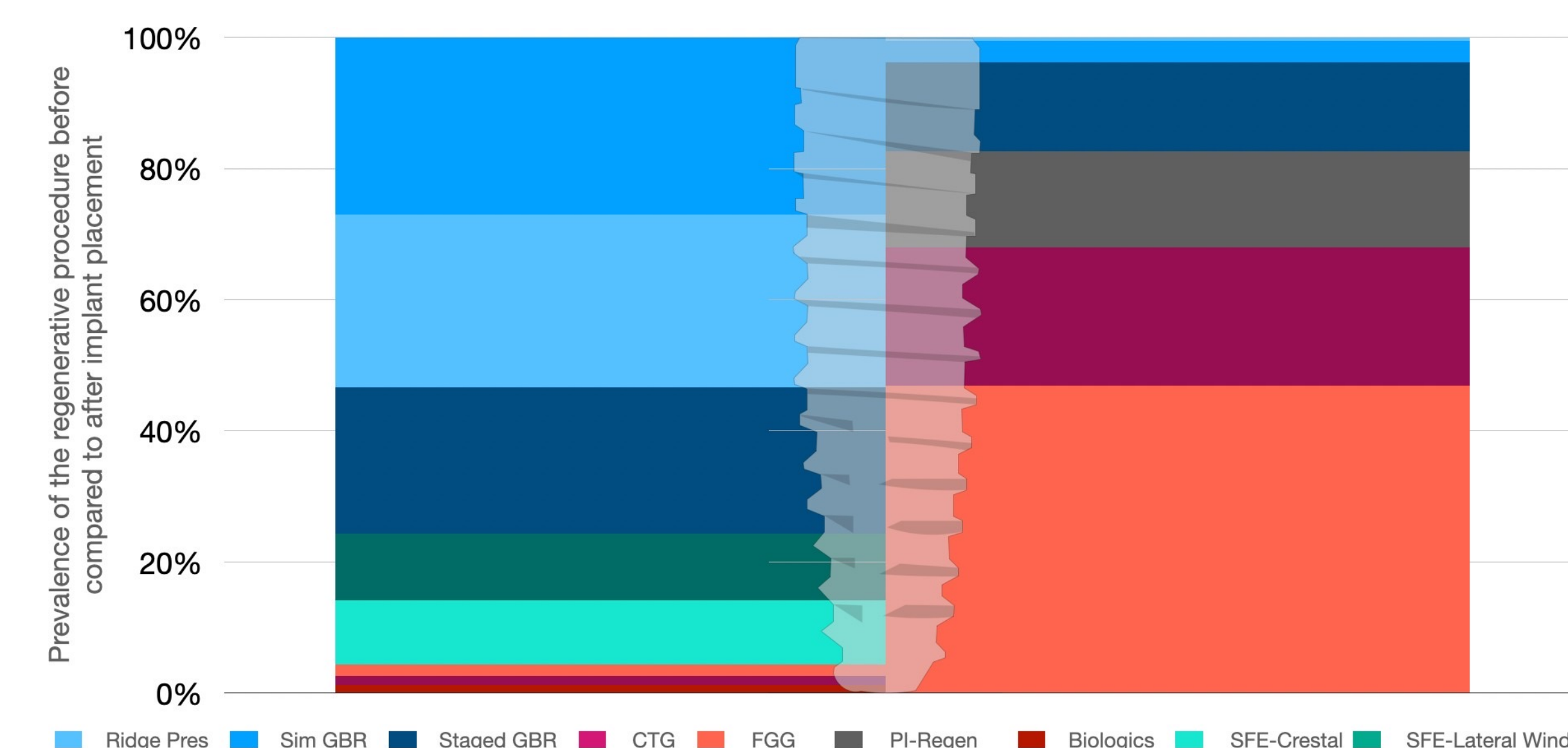


Fig. 2. Prevalence of interventions done pre-IP compared to post-IP

Most reconstructive interventions done pre-IP were hard tissue augmentation, while most post-IP procedures were soft-tissue grafting. Probability of CTG procedure was higher in the maxillary anterior region ($p=0.006$), while FGG was done more in the mandibular anterior ($p<0.001$). Patients who were diabetics required repeated procedures ($OR=5.47$; $p=0.016$) compared to other systemic diseases which didn't reach clinical significance.

Redo pre-IP treatment rate by Covariates

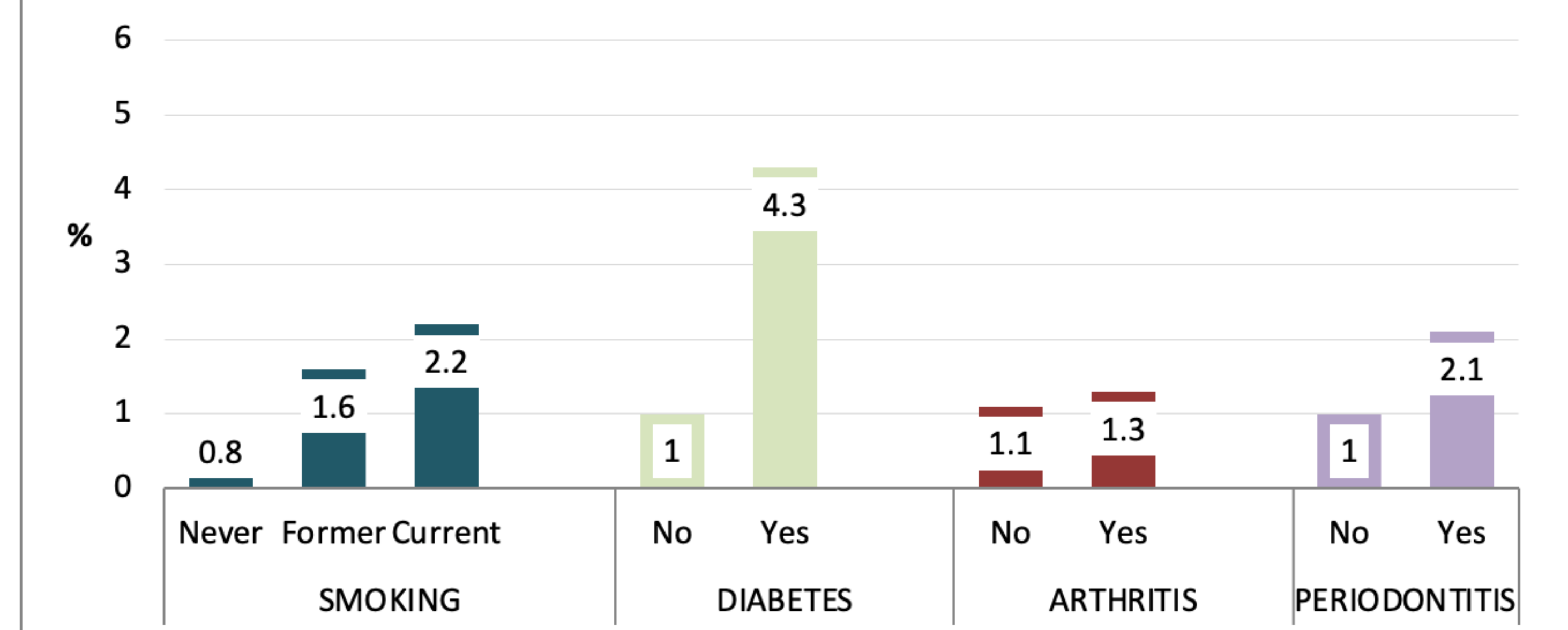


Fig. 3. The prevalence of redo procedures per patient systemic confounding factor.

Our study found that pre-IP procedures make up 11.7% of implant costs, while post-IP procedures make up 1.2%. Combined, pre- and post-IP procedures account for 12.9% of total implant costs. Most redos were the Staged GBR & Diabetic patients.

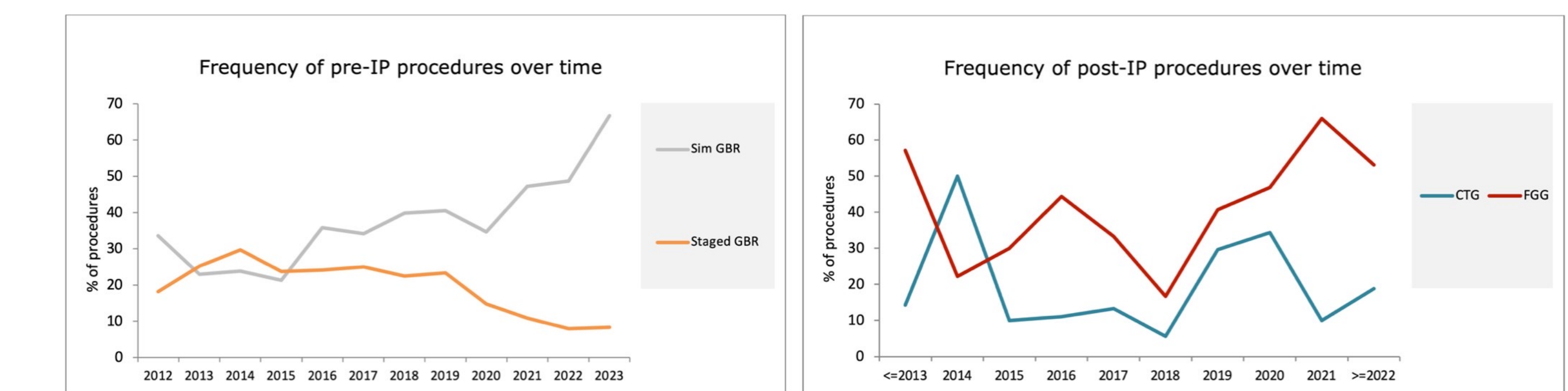


Fig. 4. Trends of hard and soft tissue procedures over 10 years

Trends in reconstructive procedures demonstrated an increase in simultaneous ridge augmentation procedures at the expense of staged procedures. For tissue grafting procedures, FGG procedures seemed to follow a similar trend.

CONCLUSION

A significant number of implants require regenerative procedures during their life cycle, with hard tissue procedures being more prevalent pre-IP and soft tissue procedures post-IP. Diabetic patients were more susceptible to implant failure and the need for repeated procedures, adding to the cost offset. Pre-implant procedures constituted a larger share of costs than post implant procedures. Moreover, the trend towards simultaneous GBR and soft tissue procedures has increased over the past decade.