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Investigating Dental Biomedical Waste Management at Semmelweis University

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Objectives Dental biomedical waste (BMW) generation and disposal contribute significantly to the environmental burden of healthcare systems. The aim of this study was to assess and compare the composition of daily generated BMW and waste segregation awareness among clinical specialists' (STR) and clinical educational treatment rooms (ETR) at the dental clinic of Semmelweis University Faculty of Dentistry.

Methods Three waste audits were conducted in 2023 with two-week intervals between each audit to quantify and analyze the complete daily production of BMW generated during dental care. Collected clinical waste has been analyzed and separated into 49 categories and each fraction was weighed using kitchen scales. Measurement data of the three audits were summarized and averaged. Independent samples t-test (significance level: $p < 0.05$) was used to compare the measured waste quantities among STRs and ETRs.

Results The average daily amount of generated BMW in the dental centre weighed 59596 g in total and 93 g per patient, whereas the total weight of the waste collection bags was 14310 g. The heaviest waste fractions were medical gloves, paper towels and disposable patient bibs (22197g, 12107g and 5673g, respectively). Discarded single-use personal protective elements (PPE) and single-use plastics (SUP) used in patient care were responsible for 57% (34154 g) of the total BMW weight, and the ratio of mismanaged municipal solid waste was 3% (1997 g). Significantly more BMW is produced per patient in ETRs compared to STRs ($p = 0.007$). ETRs use 7 pairs, while STRs use 3-4 pairs of medical gloves per patient on average ($p = 0.010$), whereas more sterilization pouches were discarded as clinical waste in STRs compared to ETRs ($p = 0.03$).

Conclusions Excessive use of SUP and PPE in dentistry, together with overproduction, inappropriate collection and/or mismanagement of dental BMW has negative economic and planetary health consequences. Switching to reusable, sterilizable utensils, implementing sustainable procurement and circular economy strategies, and educating staff members and dental students about proper waste disposal may help mitigate these effects.