

from this study were typically brief with a median word count of 177. This may not be long enough to comprehensively explain certain ED topics such as the risks and benefits of different treatment options. Despite this, three of the four AI chatbots provided web-linked citations for users to read more on the related ED query.

Finally, AI chatbot responses scored low on actionability. It may be reassuring that AI chatbots do not give individualised medical advice, which can potentially harm patients. AI chatbots often provide disclaimers that they are not medical professionals and urge users to seek one. Actionability scores can be improved if chatbots integrated tables, visual aids, and explicit steps to help patients find a provider that could directly address their medical questions.

Future studies are warranted to evaluate the stochasticity of these AI chatbots in response to variations in the wording of inputs. Although asking AI chatbots to rewrite their responses at an easier reading level may lower Flesch–Kincaid readability scores, this study only evaluated initial AI chatbot responses. Future studies can investigate how various follow up queries can impact evaluation scores.

In comparison to ED information on social media platforms, ED information from AI chatbots is generally accurate and contains high-quality information. However, the content is limited by its difficult reading level, lack of visual aids to help explain complex topics, and lack of explicit steps for users to act on.

Disclosure of Interests

Dr Stacy Loeb reported having a family member with equity in Gilead Sciences outside the submitted work. No other disclosures were reported.

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References

- 1 Fode M, Nolsøe AB, Jacobsen FM et al. Quality of information in YouTube videos on erectile dysfunction. *Sex Med* 2020; 8: 408–13
- 2 Dubin JM, Aguiar JA, Lin JS et al. The broad reach and inaccuracy of men's health information on social media: analysis of TikTok and Instagram. *Int J Impot Res* 2022; 19: 1–5
- 3 Singh N. 107+ CHATGPT Statistics & User Numbers in Oct 2023 (new data) [Internet]. 2023. Available at: <https://nerdynav.com/chatgpt-statistics/#:~:text=ChatGPT%20User%20Stats&text=Thus%2C%20ChatGPT%20users%20grew%20by,as%20the%20novelty%20wears%20off>. Accessed October 2023
- 4 National Institute of Diabetes and Digestive and Kidney Diseases [Internet]. Bethesda (MD). Urologic Diseases: Erectile Dysfunction. Available at: <https://www.niddk.nih.gov/health-information/urologic-diseases/erectile-dysfunction>. Accessed July 2023
- 5 Agency for Healthcare Research and Quality [Internet], Rockville (MD). The Patient Education Materials Assessment Tool (PEMAT) and User's Guide. Available at: <https://www.ahrq.gov/health-literacy/patient-education/pemat-p.html>. Accessed July 2023
- 6 Charnock D, Shepperd S, Needham G, Gann R. DISCERN: an instrument for judging the quality of written consumer health information on treatment choices. *J Epidemiol Community Health* 1999; 53: 105–11
- 7 Ley P, Florio T. The use of readability formulas in health care. *Psychol Health Med* 1996; 1: 7–28
- 8 Loeb S, Sengupta S, Butaney M et al. Dissemination of misinformative and biased information about prostate cancer on YouTube. *Eur Urol* 2019; 75: 564–7
- 9 Burnett AL, Nehra A, Breau RH et al. Erectile dysfunction: AUA guideline. *J Urol* 2018; 200: 633–41

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Table S1 Inputs into AI chatbots.

Continent diversion is losing its momentum: a nationwide trend analysis from Germany 2005–2021

Continent (CUDs) and incontinent urinary diversions (IUDs) are widely established methods used to restore urinary flow following extirpative procedures for benign or

malign bladder conditions. **Decision making between use of CUD vs IUD is multifactorial and relies on patient education, preference, and informed consent [1].** In this

context, most international contemporary data indicate a notable decline in CUD use (Table S1). Intriguingly, nationally representative evidence from developed countries is lacking. Furthermore, as robotic surgery continues to gain momentum in the field of cystectomy and urinary diversion (UD), the relatively low prevalence of CUDs in large-scale randomized studies remains a topic of debate [2], although the superiority of CUDs over IUDs in terms of functional patient-reported outcomes is questionable [3,4]. Against this backdrop, our aim was to present evidence from the most populated country in the European Union, and to test the hypothesis that the declining trend in CUD use would be observed on a nationwide level in Germany.

We used Diagnosis Related Groups billing data, obtained from Destatis (German Federal Statistical Office), which represent 100% of all billed procedures in Germany between 2005 and 2021. The analysis included covariables such as age, gender, and the annual count of procedures billed in each federal German state. Our focus was on assessing trends in UD use among adult patients. This included both IUDs, such as cutaneous ureterostomy and ileal conduit, and CUDs, including continent cutaneous UD, orthotopic bladder substitution, or uretersigmoidostomy. The identification of these procedures was based on specific operative and procedure-specific (OPS) codes (Table S2).

First, we examined the temporal distribution of CUD use using the Shapiro–Wilk test. Second, differences in CUD use were analysed using the *t*-test or Mann–Whitney *U*-test; data were stratified by (i) gender and (ii) age (non-elderly: 18–69 years vs elderly: ≥ 70 years, within gender subgroups). Third, we employed linear regression for trend analyses and calculation of the average estimated annual percentage change (EAPC) in CUD use. Finally, we assessed differences in the trends of CUD use across different subgroups. Statistical analyses were performed using Stata (StataCorp. 2023. Stata Statistical Software: Release 18. College Station, TX, USA: StataCorp LLC). *P* values reported are two-sided and values < 0.05 were taken to indicate statistical significance.

Between 2005 and 2021, a total of 157 970 UD were performed in Germany, of which 28% and 72% were CUDs and IUDs, respectively. The annual rate increased from 2005 to 2016, before a slight decrease to 2021 (Fig. 1A,B). There was an overall decrease in CUD use from 37% in 2005 to 20% in 2021 (EAPC -3.9% [95% CI -4.1% , -3.8%]; $P < 0.001$). A significantly lower annual proportion of CUD use was observed in women compared to men (Fig. 1B; $P < 0.001$). In women, there was a steady decrease in the proportion of CUD use, dropping from 28% in 2005 to 16% in 2021 (EAPC -3.4% [95% CI -3.8% , -3.0%]; $P < 0.001$).

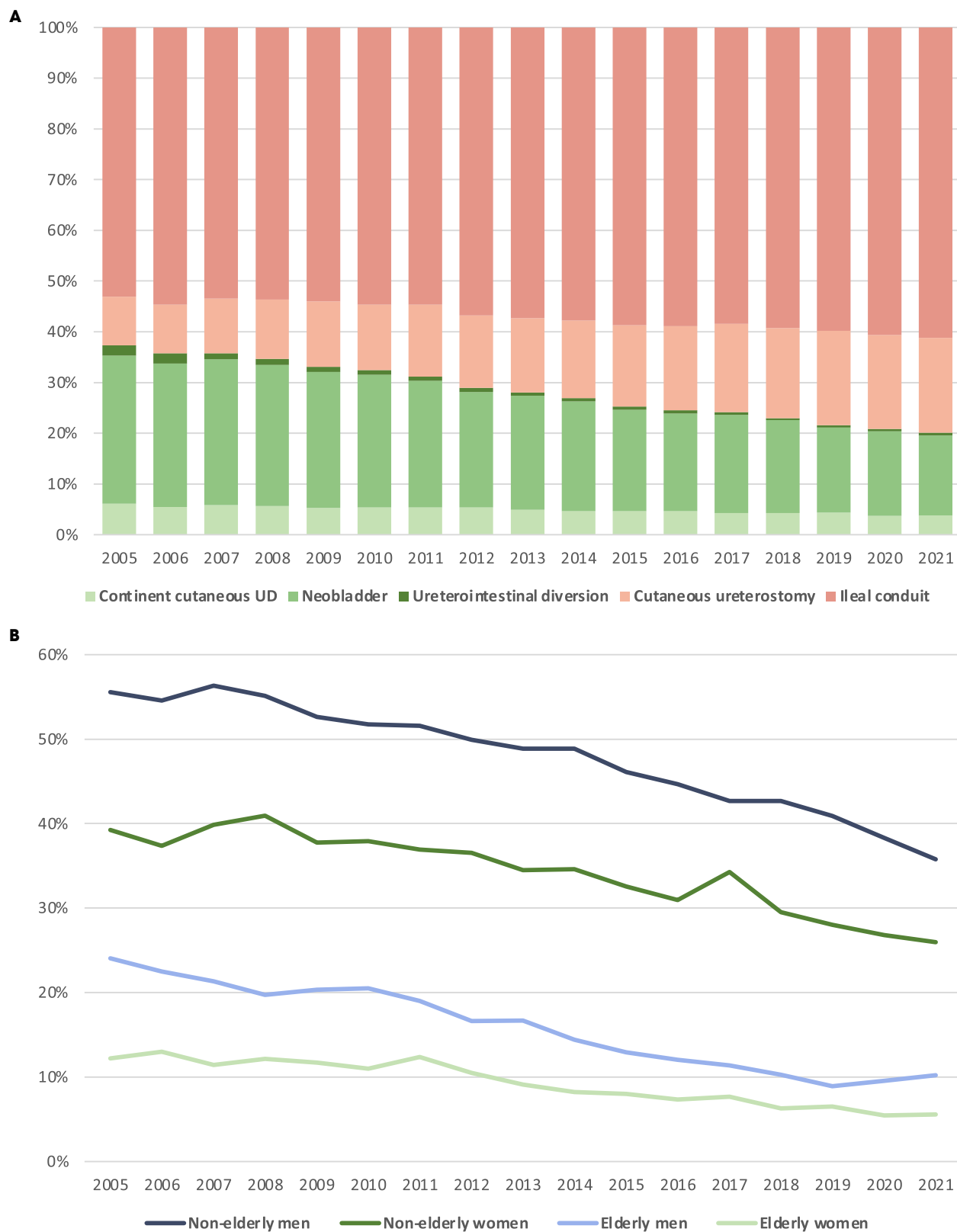
Similarly, CUD use in men decreased from 42% in 2005 to 22% in 2021 (EAPC -4.2% [95% CI -4.3% , -4.0%]; $P < 0.001$). The reduction in the proportion of CUD use was significantly higher in men compared to women ($P < 0.001$; Table S3).

A constant decrease in the proportion of CUD use was also observed across age groups, with a notably greater decline observed among elderly patients compared to non-elderly adults of both genders (all $P \leq 0.001$). In particular, the proportion of CUD use among non-elderly and elderly women decreased from 39% and 12% in 2005 to 26% and 6% in 2021 (EAPC -2.6% [95% CI -3.1% , -2.1%] and EAPC -5.5% [95% CI -6.3% , -4.7%]; all $P < 0.001$), respectively. The proportion of non-elderly and elderly adult men with CUDs declined from 56% and 24% in 2005 to 36% and 10% in 2021 (EAPC -2.59% [95% CI -2.9% , -2.3%] and EAPC -6.21% [95% CI -6.9% , -5.5%]; all $P < 0.001$), respectively.

Our findings confirm a significant decrease in CUD use in Germany over the last few decades, consistent with reports from other countries (Table S1). We observed a more pronounced decline among male and elderly patients, although the reasons for this trend remain speculative and require further research to uncover potential drivers. Other authors have already suggested possible reasons for a decreasing trend in CUD use, such as the surgical volume of the centre, imperfect functional outcome of CUDs, or the technical challenges with steep learning curves for the robotic adoption of (intracorporeal) CUD [5]. Other factors, such as patient preference, quality-of-life considerations, an aging population with more health issues, surgeon preferences and economic considerations, could contribute to this decline. Interestingly, conclusive evidence regarding the superiority of one UD type over the other is lacking. Limited data exist comparing long-term quality-of-life outcomes among different UD types, with studies showing either no significant differences or conflicting results [3,4]. Hence, it is crucial to have unbiased discussions with patients and their caregivers, considering the risks, benefits and motivations associated with each UD type [1]. Historically, CUDs have been linked to higher postoperative morbidity. However, the lack of standardized morbidity reporting makes interpretation difficult, and data using high reporting standards suggest a comparable morbidity spectrum and intensity when comparing CUDs and IUDs [6,7]. Healthcare practitioners may recommend IUDs to older patients, who may have higher morbidity rates, potentially explaining the observed downward trend.

The significantly higher decrease in CUD use in male patients may reflect an existing gender gap in UD care. Despite the feasibility of neobladder and continent cutaneous pouches in female patients, CUDs have persistently been underutilized among female patients [8]. This suggests that the proportion of CUDs was already low in 2005, leaving limited room for further decrease.

Fig. 1 (A) Annual proportions of continent urinary diversions (green) and incontinent urinary diversions (red) in Germany from 2005 to 2021 for patients aged ≥ 18 years. **(B)** Trends in continent urinary diversion use, stratified by gender and age group. UD, urinary diversion.



Our study has some limitations, including primarily relying on administrative billing data, which do not fully capture patient characteristics and the decision-making process. Factors such as surgical indication, approach, previous treatments, comorbidities, and performance status, which could influence the choice of UD type, were not considered due to data restrictions. Additionally, the association between the decrease in CUD use and the adoption of robotic UD remains hypothetical [9] and requires future research. In summary, we cannot draw conclusions about the effects of recent notable transitions in bladder cancer treatment, such as the widespread adoption of neoadjuvant chemotherapy or minimally invasive robotic surgery.

Despite the limitations, our study underscores significant shifts and diminishing utilization of CUDs over the past 17 years in Germany. Whether this trend will continue in the future remains uncertain, and its potential repercussions may be concerning. In a worst-case scenario, this decline could limit the diversity of treatment options available to patients.






In conclusion, our study reveals a distinct and consistent downward trend in CUD use in Germany. While the underlying reasons are still unclear, future research is needed to determine whether these trends could affect the quality of patient care.

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References

- Witjes JA, Bruins HM, Carrión A et al. European Association of Urology guidelines on muscle-invasive and metastatic bladder cancer: summary of

the 2023 guidelines. *Eur Urol* 2023. In press. <https://doi.org/10.1016/j.eururo.2023.08.016>

- Stenzl AR. Effect of robot-assisted radical cystectomy with Intracorporeal urinary diversion vs open radical cystectomy on 90-day morbidity and mortality among patients with bladder cancer: a randomized clinical trial. *Eur Urol* 2023; 83: 90–1
- Shi H, Yu H, Bellmunt J et al. Comparison of health-related quality of life (HRQoL) between ileal conduit diversion and orthotopic neobladder based on validated questionnaires: a systematic review and meta-analysis. *Qual Life Res* 2018; 27: 2759–75
- Cerruto MA, D'Elia C, Siracusano S et al. Systematic review and meta-analysis of non RCT's on health related quality of life after radical cystectomy using validated questionnaires: better results with orthotopic neobladder versus ileal conduit. *Eur J Surg Oncol* 2016; 42: 343–60
- Hautmann RE. Declining use of orthotopic reconstruction worldwide-what went wrong? *J Urol* 2018; 199: 900–3
- Vetterlein MW, Dahlem R, Engel O et al. Perioperative morbidity after ureterocutaneostomy, conduit, and continent urinary diversion following radical cystectomy: a comparative assessment using the Comprehensive Complication Index® and the updated EAU guidelines of standardized reporting. *Eur Urol Open Sci* 2020; 19(Suppl. 2): e2251–2
- Katsimperis S, Tzelves L, Tandogdu Z et al. Complications after radical cystectomy: a systematic review and meta-analysis of randomized controlled trials with a meta-regression analysis. *Eur Urol Focus* 2023. In press. <https://doi.org/10.1016/j.euf.2023.05.002>
- von Deimling M, Laukhtina E, Pradere B et al. Radical cystectomy and urinary diversion in women: techniques, outcomes, and challenges-a narrative review. *Transl Androl Urol* 2022; 11: 1598–610
- Mitra AP, Cai J, Miranda G et al. Management trends and outcomes of patients undergoing radical cystectomy for urothelial carcinoma of the bladder: evolution of the University of Southern California experience over 3,347 cases. *J Urol* 2022; 207: 302–13

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Abbreviations: CUD, continent urinary diversion; EAPC, estimated annual percentage change; IUD, incontinent urinary diversion; UD, urinary diversion.

Supporting Information

Additional Supporting Information may be found in the online version of this article:

Table S1 Literature overview of global contemporary trends in CUD use.

Table S2 List of operative and procedure-specific (OPS) codes utilized for procedure identification.

Table S3 Total procedural count of urinary diversions (frequencies and proportions) in adult female and male patients in Germany from 2005 to 2021 (proportions refer to all listed procedures per year).