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Qualitative analysis of Amazon customer reviews of penile clamps for male urinary incontinence

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Abstract

Aims: Penile clamps offer an alternative to manage male urinary incontinence in patients who are unfit for surgery. Patient experience with penile clamps is poorly understood. Our study elucidates patient opinions on commercially available penile clamps and the factors that associate with favorable and unfavorable opinions.

Methods: We collected Amazon reviews of all penile clamps marketed for male urinary incontinence from November 2011 to January 2020 and qualitatively assessed the overall sentiment towards penile clamps, key praises and key complaints. Covariates such as designated Amazon star rating were further explored for association with coding patterns.

Results: Amazon reviews of penile clamps were found to be more *positive* ($n = 425$) in overall sentiment than *negative* ($n = 294$). The most frequent praise was *effective incontinence control* ($n = 334$) and the most frequent complaint was *bad design or material* ($n = 166$). The majority of reviews were for lower priced penile clamps, had higher Amazon star ratings, were written for Wiesner-produced clamps, and were written more recently (i.e., 2015–2020). Penile clamps with higher Amazon star ratings were more often coded *positive* and with a *praise* compared to lower rated penile clamps.

Conclusions: Penile clamps are seen favorably by users as an effective treatment modality for male urinary incontinence. User reviews suggest opportunities for improvement in penile clamp design. The most frequently reviewed clamp seen positively is the Wiesner Incontinence Clamp Penile Clamp whereas the most frequently reviewed clamp seen negatively is the Pacey Cuff Male Incontinence Device.

KEYWORDS
qualitative research, urinary incontinence

1 | INTRODUCTION

Male urinary incontinence affects more than 25% of men over the age of 70 and has severe negative impacts on quality of life.[1] It is estimated that up to 69% of patients

experience urinary incontinence after prostatectomy.[2–5] The standard treatment for urinary incontinence is placement of an artificial urinary sphincter (AUS) or male sling.[6] The need for incontinence surgery, revision, and the financial and physical costs pose barriers to surgery

leading some to employ conservative measures to manage incontinence, such as pads or penile clamps.[7–10]

Designed by German surgeon Wilhem Hildanus in the 1600s as an adjunct to the condom catheter, penile clamps (e.g., Cunningham clamps) were popularized in the 1980s as a conservative means to manage urinary incontinence.[11,12] They are available over-the-counter and through several online platforms including Amazon (Amazon com). Penile clamps are a cost-effective alternative for men who are either unfit, do not want or cannot afford surgery.[13–15] Despite their wide utility, the prevalence, efficacy, safety, and patient experience with penile clamps is understudied.[12]

One source of data regarding safety and efficacy of penile clamps is through Amazon, which has rich data including open text reviews and customer ratings (1–5 stars). *Infodemiology*, the practice of analyzing consumer-sourced qualitative data, is an emerging area of research integrating consumer and public health informatics to empower patients to make more informed care decisions.[16] To that end, Amazon reviews can help elucidate patient understanding, attitudes and behaviors related to penile clamps.[17] An understanding of Amazon review data will yield insights for stakeholders including urologists who often recommend different clamps to their patients,[15] penile clamp producers who seek to optimize their product and patients who are weighing the relative cost-benefit ratios when selecting clamps. In this context, we conducted a qualitative analysis of Amazon customer reviews of all commercially available penile clamps. Our study provides detailed insight into patient-generated opinions on the most common penile clamps available in the market. It further evaluates how those opinions stratify depending on the Amazon rating of the given penile clamp.

2 | MATERIALS AND METHODS

2.1 | Study setting and design

Our study assesses 18 penile clamps for male urinary incontinence through collection of open text data sourced from Amazon. We used a qualitative approach using coding hierarchies to characterize the customer reviews and evaluate patient opinions based on clamp characteristics.

2.2 | Device and reviews selection

Eligible reviews were identified through a search using the Amazon database (https://www.amazon.com/) on January 9th, 2020. The specific search criterion was ("penile clamps" OR "incontinence clamps"). Dates included in this query were from November 2011 to January 2020. This initial search yielded 20 devices with pertinent Amazon reviews. Two devices with Amazon reviews (ASIN: B004U77VNI, B014I1MCO8) were excluded as they only had star ratings with no text review. Of the remaining 18 devices, 12 were size variations of the same 2 clamp designs (Bard Cunningham Incontinence Clamp, Rennich Industries Dribblestop Incontinence Penile Clamp), leaving 8 unique penile clamp designs for analysis (Figure 1). Additional descriptive fields collected included price, average star rating, producing company, and date of review.

2.3 | Coding process

2.3.1 | Root codes

Thematic codes were created based on a random sampling of 20% of total reviews (180 reviews) using principles of grounded theory.[18] Using a previously described methodology,[19] we assessed specific content of sentences and paragraphs in each review to generate a coding framework of root codes including: overall sentiment, praises, and complaints. These root codes serve as larger topical categories under which we created child codes to specify a particular sentiment, praise, or complaint.

2.3.2 | Child codes

The child codes that constituted the overall sentiment root code were *neutral/negative/positive*. The child codes that comprised the praises root code were 1. *Good design or material* 2. *Effective incontinence control* 3. *Ease of use* 4. *Durability* 5. *Customer service* 6. *Comfort* 7. *Price*. The child codes that comprised the complaints root code were 1. *Price* 2. *Failed incontinence control* 3. *Difficult to use* 4. *Customer service* 5. *Bad design or material* 6. *Uncomfortable*. Detailed definitions and textual examples for each code can be found in Figure S1.

2.3.3 | Code sentiment

For each Amazon review, the overall sentiment root coot and its child codes were assigned with each review designated as either *positive*, *negative*, or *neutral*. To be assigned the child code *neutral*, a review had to be

Clamp Type	Code & Descriptor Summaries	Representative Text Excerpts
(A) Wiesner Incontinence Clamp Penile Clamp	Review Total: 631 Overall Sentiment: Positive Top Praise (# mentions): Effective incontinence control (225) Top Complaint (# mentions): Bad design or material (130) Average Rating: 3.56 Price: $33	Praise: "This clamp **worked very well** for my husband. It **clamped off the urine flow perfectly until he had to urinate**, and was easy to unclamp as needed. He said it was very comfortable to wear and frequently he didn't even notice it was on. Easy to clean." Complaint: "No the **clamp does not stay closed**, the **locking gear is easily opened with the slightest movement**."
(B) Bard Cunningham Incontinence Clamp	Review Total: 178 Overall Sentiment: Positive Top Praise (# mentions): Effective incontinence control (80) Top Complaint (# mentions): Uncomfortable (39) Average Rating: 3.77 Price: $38	Praise: "**Works** without problems. Easy to clean. **Use it at the gym when lifting heavier weights.**" Complaint: "Very **uncomfortable**, **can't wear more** than **1 hour**, simple tool too highly priced"
(C) Pacey Cuff Male Incontinence Device	Review Total: 40 Overall Sentiment: Negative Top Praise (# mentions): Effective incontinence control (10) Top Complaint (# mentions): Failed incontinence control (11) Average Rating: 3.08 Price: $95	Praise: "This device **works well to reduce leakage**. It is a good change from wearing condom catheters all the time. It's a little pricey, but if it **holds up** it will be well worth it." Complaint: "**Did not work** at all! No matter how much I tightened it, the **leakage was horrific**. Returned it.."
(D) Rennich Industries Dribblestop Incontinence Penile Clamp	Review Total: 34 Overall Sentiment: Negative Top Praise (# mentions): Effective incontinence control (14) Top Complaint (# mentions): Difficult to use (9) Average Rating: 3.59 Price: $40	Praise: "**Does exactly what is says it will do**, but does require some adjustments and getting used to." Complaint: "The dribblestop is a **complicated** device for a **complicated situation**. Prefer the Wisner (sp) **clamp since it's quite simple** but it has its downside also (loses compression value). Like I said it is a **complicated position to be in that requires adequate compression without a loss of capillary fl**ow. Best to any man that live with this condition. My situation was radiation treatment for bladder ca."
(E) Life Control Squeezer Klip Penile Clamp	Review Total: 8 Overall Sentiment: Positive Top Praise (# mentions): Effective incontinence control (3); Good design or material (3) Top Complaint (# mentions): Bad design or material (1) Average Rating: 4.38 Price: $86	Praise: "My husband has been using the Squeezer Klip since he had prostate surgery. The product is the **best remedy yet that he has found for going out and not worrying about bladder leakage**! It is well worth the purchase price!" Complaint: "**The device doesn't open** but rather **slips off the end**. My husband has had a prostatectomy and the penis shrinks when he is sitting. The problem is that **the device is too long** and his thighs upll the device over the ends. If **the device was 1 1/2" long rather than its 2 1/2" in length and if there were size adjustments** on both ends it would probably work."
(F) Generic Greenwald Baumrucker Incontinence Clamp	Review Total: 3 Overall Sentiment: Positive Top Praise (# mentions): Effective incontinence control (2) Top Complaint (# mentions): Bad design or material (1) Average Rating: 3.33 Price: $98	Praise: "**Does the job well**. I have been using this for years. Thanks Amazon" Complaint: "Save your money it "**stinks**" **among other things**"
(G) Bioderm KindKlamp Penile Clamp	Review Total: 2 Overall Sentiment: Negative Top Praise (# mentions): N/A (0) Top Complaint (# mentions): Bad design or material (1); Uncomfortable (1) Average Rating: 1 Price: $55	Praise: N/A Complaint: "I purchased this clamp thinking that it was the same as all the other clamps on Amazon ... meaning for daily use. When I got it I found that it is **poorly designed** and **not intended for daily use at all. It is to be used with a Liberty bag** (a urine collection device). The clamp will **scratch your penis** and **potential cut into your stomach**. Unfortunately the description on Amazon is totally misleading. I informed the company that they need to fix the description."
(H) POS-T-VAC CirClamp External Male Incontinence Device	Review Total: 1 Overall Sentiment: Negative Top Praise (# mentions): N/A (0) Top Complaint (# mentions): Bad design or material (1) Average Rating: 1 Price: $8	Praise: N/A Complaint: "This product is nothing but a scam to incontinent men. There is no **logical way it can stay in place or** be unpainful to attach. Believe me, I **tried my best to use it**."

FIGURE 1 Qualitative analysis by clamp type including code and descriptive summaries as well as exemplary text excerpts

balanced in tone with both praises and complaints. For every *positive* or *negative* review, the subsequent praises or complaints root and child codes were assigned based on the assessment of primary praise or complaint. If a review was identified as *neutral*, both the top praise and top complaint as well as their pertinent child codes were assigned. If a review indicated multiple praises or complaints in no ordinal sequence, the first praise or complaint listed was used as the child code. If the review did not have adequate text to

support an overall sentiment, praise or complaint, no codes were applied.

2.4 | Inter-rater reliability

To ensure code application fidelity within our research team, we conducted an inter-rater reliability test by having multiple researchers (AL, AE, NR, HT) apply codes to the same posts to assess agreement. Researchers were found to have a strong level of inter-rate agreement (Cohen's kappa coefficient: 0.82).[20]

2.5 | Measures

We used Dedoose (Los Angeles, CA, v8.3.17, 2020), a qualitative analysis program, to store Amazon reviews, apply our coding protocol, and breakout coding frequencies by descriptors of interest. Relationships between descriptors was assessed using Pearson's correlation coefficient. When stratifying codes by field descriptors, we normalized by total review count for each descriptor to account for unequal representation across strata. We presented overall sentiment child code

distribution (i.e., *positive, negative, neutral*) as percentages but maintained praise and complaint code distributions as counts/review given variable application across reviews. We then identify coding patterns at the device level indicating qualitative themes for each of the penile clamps. Finally, we conducted a sensitivity analysis to assess review sentiment over time.

3 | RESULTS

3.1 | Code frequency

Overall, we assessed 897 reviews. Reviews tended to be more *positive* ($n = 425$) then *negative* ($n = 294$). Under the praises root code, the most common child code applied to the reviews was *effective incontinence control* ($n = 334$) and the least commonly applied was the child code *price* ($n = 4$). For the complaints root code, the most commonly applied corresponding child code was *bad design or material* ($n = 166$) and the least commonly applied child code was *price* ($n = 12$). The second-most common complaint in penile clamp Amazon reviews was the device being *uncomfortable* ($n = 124$; Figure 2).
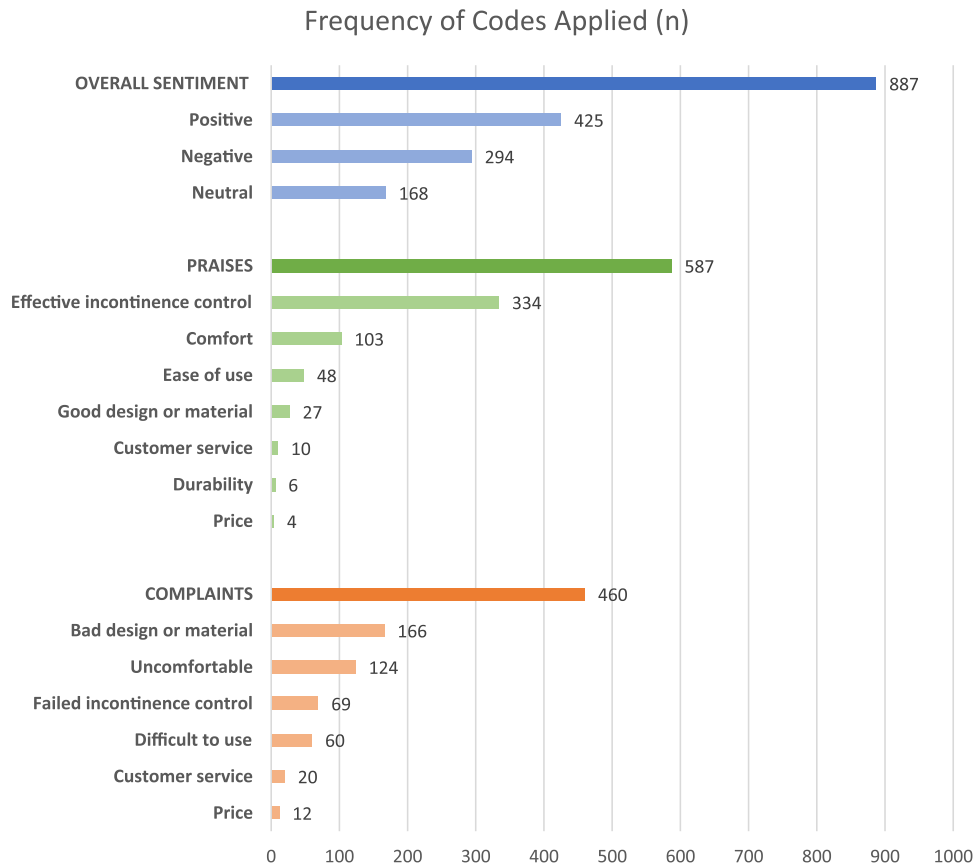
Frequency of Codes Applied (n)

Code	n
OVERALL SENTIMENT	887
Positive	425
Negative	294
Neutral	168
PRAISES	587
Effective incontinence control	334
Comfort	103
Ease of use	48
Good design or material	27
Customer service	10
Durability	6
Price	4
COMPLAINTS	460
Bad design or material	166
Uncomfortable	124
Failed incontinence control	69
Difficult to use	60
Customer service	20
Price	12

FIGURE 2 Frequency of code application across all reviews

3.2 | Distribution of reviews by descriptor

A total of 70% of penile clamp reviews in our analysis were for lower priced clamps in the $21–$34 bracket. The next most frequent price bracket was $34–$46 which comprised 23% of all included reviews. The mean price of a penile clamp was $36 (*SD* 14; Figure S2A). A majority of the penile clamps had a star rating of 4 or 5 (63%); 18% had a rating of 1. Mean review rating was 3 (*SD* 1.52; Figure S2B). Pearson's correlation coefficient for Amazon star rating versus price yielded a nonsignificant result ($R = -.05$; $p = .16$). Wiesner was the most represented company in terms of included reviews (70%) followed by Bard (20%; Figure S2C). The number of reviews increased overtime with 92 reviews from November 2011 to February 2015 and 805 reviews from March 2015 to January 2020 (Figure S2D). Our sensitivity analysis further revealed that Amazon reviews for penile clamps over time have remained consistently more *positive* than *negative* with particular focus on *effective incontinence control* (Figure S3).

3.3 | Code density by Amazon star rating

Higher (4/5-star) rated penile clamps had a larger percentage of *positive* reviews than lower (1/2-star) rated penile clamps (50%–88% vs. 0% *positive*; Figure 3A). Stepwise increases in praise code density are noted as Amazon rating increases from 1 to 5 (0→0.1→0.4→0.9→1.0 praise codes/review) with the most significant praise for higher-rated devices being *effective incontinence control* (Figure 3B). Stepwise decreases in complaint code density are also noted as Amazon rating

increases from 1 to 5 (1.0→1.0→0.9→0.5→0.1 complaint codes/review) with the main complaint for lower-rated devices being *bad design or material* (Figure 3C).

3.4 | Clamp satisfaction by model

The Wiesner Incontinence Clamp Penile Clamp, Bard Cunningham Incontinence Clamp, the Life Control Squeezer Klip Penile Clamp and the Generic Greenwald Baumrucker Incontinence Clamp, had higher percentages of *positive* reviews relative to *negative* or *neutral* reviews (Figures 1A,B and 1E,F). By frequency, they were most often praised for *effective incontinence control* with reviews commenting on their ability to "use it at the gym when lifting heavier weights" and "clamped off the urine flow perfectly until he had to urinate." In contrast, the Pacey Cuff Male Incontinence Device, the Rennich Industries Dribblestop Incontinence Penile Clamp, the Bioderm KindKlamp Penile Clamp and the POS-T-VAC CirClamp External Male Incontinence Device had a higher percentage of *negative* reviews relative to *positive* or *neutral* reviews (Figures 1C,D and 1G,H). By frequency, they were most often criticized for *bad design or material* with comments emphasizing "there is no logical way it can stay in place" and "that it is poorly designed and not intended for daily use at all."

4 | DISCUSSION

In this study, we found that overall, Amazon reviews assert a *positive* sentiment towards penile clamps used for male urinary incontinence with the most frequent praise
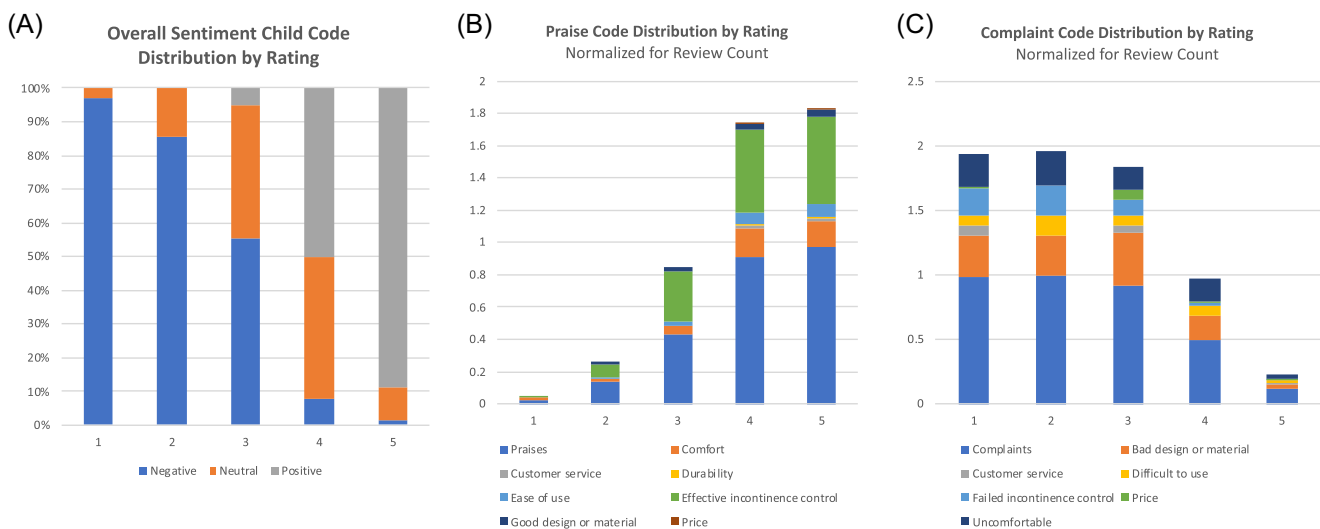

FIGURE 3 Code count stratified by Amazon star rating

being *effective incontinence control* and the most frequent complaint being *bad design or material* and *uncomfortable*. Reviews were most commonly left for clamps in the lower price bracket ($21–$34), with higher rating, and produced by Wiesner. When stratified by Amazon star rating, higher rated clamps tended to have more *positive* reviews. Collectively, our findings suggest qualitative satisfaction with efficacy for more expensive clamps and identifies need for improvement in design and configuration for cheaper clamps.

Our findings that the most common praise of penile clamps is *effective incontinence control* and the most common complaints are *bad design or material* and *uncomfortable* is consistent with previous studies. Macaulay et al.[21] noted that penile clamps, when evaluated against a sheath drainage system and body-worn urinal, were the most secure and least likely to leak but were consistently described as "uncomfortable or painful" by study participants.[21] Discomfort due to bad design or material can cause significant complications including penile incarceration.[22] Increasing efforts have been made to better quantitate this tradeoff between urinary incontinence control and significant discomfort and pain. Using three-dimensional modeling of penile soft tissues, Levy et al.[23] identified envelopment, adaptability, and durability as parameters to help guide clamp design.[23] Incorporating these design elements may help direct the future development of penile clamps so that they continue to prevent urinary loss and are not as painful to the user.

The associations we found between higher rating with increased praises centered on device efficacy and less complaints regarding design or material is consistent with previous studies for different devices. Our findings align closely with another qualitative study of Amazon reviews in hearing devices, which demonstrated that higher Amazon rating was significantly associated with more positive reviews. These positive reviews focused on the cost, affordability, and recommendations that the customers would make on behalf of the product to friends and family.[24] Higher-rated hearing devices also had fewer negative reviews mentioning issues related to sound quality/fit. These mirror our results where highly rated penile clamps were often praised with strong recommendation and less criticized on the overall design and quality. Amazon star rating likely serves as a nontextual proxy for overall customer sentiment towards a product.

Our study has limitations. The present findings are influenced by selection bias as our collection of textual reviews is based on the individuals who decided to leave an Amazon review for a given clamp. As with any online forum, this means that the data being entered into the Amazon review section is not controlled. This may impact the external validity of our findings, especially for clamps that had fewer reviews. Some reviews may also be spurious (i.e., companies leaving bad reviews for their competitors, companies employing third-party agents to self-promote their own product). Amazon also has protections in place to help limit the number of spurious reviews such as denoting a verified buyer. Our study still captures sentiments of more opinionated patients who may be more meaningful catalysts for change in penile clamp innovation for manufacturers and recommendation for providers. Another limitation is the inherent shortcoming of coding hierarchies in terms of comprehensiveness and sufficient granularity. Application of grounded theory reduced the effects of this limitation. Finally, as with any qualitative analysis, the coding protocol does include a degree of subjectivity. High inter-rater reliability (Cohen's kappa coefficient: 0.82), consistent research team training and alignment on a standardized codebook (Figure S1) helped mitigate systematic error related to this limitation.

These limitations notwithstanding, our findings hold actionable implications for practicing clinicians, penile clamp producers and patients suffering from urinary incontinence. For urologists, management of postsurgical incontinence is a complex endeavor balancing a patient's existing comorbidities, ability to pay, and capacity for surgical remediation through an AUS or sling.[9,10] Our study adds to the existing literature that penile clamps are a cost-effective, nonsurgical alternative that can help diversify a clinician's set of management options. For the penile clamp production industry, our study highlights particular clamp types that are seen more favorably than others on virtue of functionality and design. An important point for further research is discriminating what specific design elements of a given clamp compel reviewers to designate it as bad or good to help guide future development. For men with incontinence, our study suggests not only which clamp types have the most favorable subjective outcomes but also the reliability of Amazon star rating as correlates to facilitate decision making on part of the patient.

5 | CONCLUSIONS

On average, Amazon reviews of penile clamps were more *positive* where the most frequently cited praise was *effective incontinence control* and the most frequently cited complaint was *bad design or material*. In addition, higher rated clamps associated with more *positive* reviews. These results provide new insight into patient-specific attitudes, critiques and praises of a common urologic device with implications for management and innovation in the male urinary incontinence space.

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