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Improving Midstream Urine Collection for Urine Culture through the Use of a Novel Device, FlipCatch

Christopher Neely
Thomas Jefferson University

Dante Varotsis
Thomas Jefferson University

Helen Xu
Thomas Jefferson University

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Title: Improving midstream urine collection for urine culture through the use of a novel device, *FlipCatch*.

Authors: Christopher Neely, Dante Varotsis, Helen Xu

Background: A midstream, clean-catch urine sample is the gold standard for diagnosing urinary tract infections and determining treatment. The current method of collection is not standardized, frustrating both patients and providers. The current method results in a high rate of contaminated samples (30-40%), which often need to be repeated in order to obtain a diagnosis and antibiotic susceptibility data. A design project was conducted in order to create a more effective urine collection device with the goals of decreasing contamination and improving patient and provider experience.

Methods: We conducted interviews of patients, allied health professionals, physicians, and clinical microbiologists involved in the urine collection process in order to gain insight into current systemic flaws in urine collection (n=18). A set of design criteria were established based on interview feedback. Following conceptualization and rough prototyping, feasible designs were 3D printed in PLA (polylactic acid) filament and tested for functionality using water. Users were asked to urinate in the final design and rate its comfort and ease of use.

Results: *FlipCatch* is a gravity-fed urine collection device featuring an ergonomic funnel, which helps guide the stream onto a cellulose sponge mounted to a rotating arm. Once the sample is collected, staff can utilize the Vacutainer® receptacle for sample processing. User testing of the device was limited due to the small number of prototypes able to be 3D printed, but the feedback was positive.

Conclusions: *FlipCatch* could solve many of the current problems with urine collection, yet significant improvements still need be implemented in order for the device to be feasible.

Mechanical optimization and more detailed financial analyses with updated manufacturing costs will be needed. In the future, a pilot study at Jefferson could be used to measure contamination rate and user satisfaction in *FlipCatch* compared to current practice.