U.S. CENTERS FOR DISEASE CONTROL AND PREVENTION

In-Person Wastewater Access Review Survey at Post-Acute Care Facilities Across Three U.S. Regions

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BACKGROUND

Healthcare facility-level wastewater surveillance at post-acute care facilities is being explored to monitor clinically relevant pathogens and other targets, such as antimicrobial resistance genes. Currently, limited information is available about wastewater access points at such facilities. Two wastewater access surveys were developed and piloted in three U.S. regions to understand the potential for broader implementation of wastewater surveillance at healthcare facilities.

METHODS

Wastewater surveillance subject matter experts in the CDC Division of Healthcare Quality Promotion, Healthcare-Wastewater Antimicrobial Resistance Network (H-WARN), partnered with academic researchers in Illinois (IL) and Utah (UT) to develop and pilot two wastewater access surveys in Georgia (GA), IL, UT, and Texas (TX) between 2021 and 2024.

In 2021, H-WARN developed an 8-question pilot survey to evaluate wastewater sampling points on facility property and the feasibility of routine, longitudinal sampling of wastewater. H-WARN administered the pilot survey during walk-throughs at a convenience sample of 7 GA post-acute care facilities. Starting in 2023, partners in IL and UT collaborated with H-WARN to incorporate additional data elements and to administer a 28-question expanded pilot survey during site visits at 6 additional post-acute care facilities in IL (4), UT (1), and TX (1), also chosen by convenience sampling.

RESULTS

All facilities completed a survey by discussing each question and inspecting potential wastewater access points with the research teams during site visits. The pilot questionnaire was completed by 7 GA post-acute care facilities in 4 counties (Southeast region). The expanded pilot questionnaire was completed by 4 IL facilities in one county (Central region), and 1 facility each in UT and TX (Mountain region).

Routine wastewater sampling was feasible at 9 of 13 (69%) facilities surveyed. At 3 of 4 (75%) facilities where routine sampling was not be feasible, the main reasons for the assessment outcome were safety concerns including a non-standard manhole covering that was difficult to open (Facility C), proximity to vehicular and pedestrian traffic and blocking accessible and emergency vehicle parking (Facility D, Figure 1), and a broken effluent pipe (Facility E) (Table 1). At Facility C there was also a large sludge mat covering the effluent flow that would require a plumbing intervention to remove (Table 1). At 1 of 4 (25%) facilities where routine sampling was not be feasible, there were no wastewater access points external to the building (Facility J) (Table 2).

Overall, the facilities' administrative teams were amenable to future participation in facility-level wastewater surveillance activities.

DISCUSSION

The pilot and expanded pilot survey results revealed that access to wastewater with appropriate flow for sampling could be safely achieved on the property of 69% of facilities surveyed. Expansion of a wastewater access survey to additional U.S. post-acute care facilities should include a sampling strategy that could provide data representative of states or regions to produce useful metrics for developing a national facility-level wastewater surveillance program.

Surveys of on-site facility-level wastewater sampling points were piloted at 13 post-acute care facilities across 3 U.S. regions. Wastewater sampling was feasible at 9 of 13 (69%) facilities.

SCAN ME

Pilot Questionnaire

SCAN ME

Expanded Pilot Questionnaire

Table 1. Summary results of wastewater access pilot survey at seven post-acute care facilities, Georgia, 2021-2022

Facility	A	B	C	D	E	F	G
(Q1) Resident census N	164	107	99	61	109	118	87
(Q2) Number of residents contributing fecal material to wastewater n(%)	66 (40%)	16 (15%)	ND	20 (33%)	21 (19%)	Approx 85%	Approx 60-70%
(Q3) Manhole appropriate for sampling?	Yes	Yes[1]	Yes[1,2]	Yes	Yes[1]	Yes	Yes
(Q4) Wastewater flow adequate for sampling?	Yes	Yes	No[3]	Yes	Yes	Yes	Yes
(Q5) Cleanout accessible for sampling?	Yes	No[4]	No[4]	Yes	No[4]	No[5]	ND
(Q6) Facility amenable to project?	Yes	Yes	Yes	ND[6]	Yes	Yes	Yes
(Q7) Open communication avenues at facility?	Yes	Yes	Yes	ND[6]	Yes	Yes	Yes
(Q8) Safe sampling site?	Yes	Yes	No[7]	No[8]	No[9]	Yes	Yes
Overall, is sampling wastewater feasible at this facility?	Yes	Yes	No	No	No	Yes	Yes

Abbreviations: ND = not determined; **1.** No nearby electrical outlet for autosampler; **2.** Large heavy square manhole covering was difficult to open with standard manhole opening tools; **3.** Low wastewater flow in manhole. A sludge mat several inches thick was covering the flow and would require a plumbing intervention to remove debris; **4.** No cleanout available or unable to locate cleanout; **5.** Cleanout located in the middle of the dining room; **6.** Not assessed because sampling site was unsafe and therefore sampling could not be performed at this facility; **7.** Out of the way of pedestrian and vehicular traffic but the non-standard square manhole covering could pose a safety risk; **8.** Both manholes on the property were in unsafe locations. One was near the entrance of the facility and the other was close to a street with vehicular traffic; **9.** Effluent pipe was broken about two feet below the manhole opening which created a safety concern for wastewater splashing out of manhole.

Table 2. An excerpt from the results of the expanded wastewater access pilot survey at six post-acute care facilities in Illinois, Utah, and Texas, 2023 – 2024

Facility	H	I	J	K	L	M
State	IL	IL	IL	IL	UT	TX
(Q13) Is there at least one external physical access point to the WW?	Yes[1]	Yes[2]	No	Yes[1]	Yes[1]	Yes[3]
(Q14) Where is the external WW access point located?	On land-scaped grounds	On land-scaped grounds	n/a[4]	Public sidewalk	By dump-sters at loading dock, away from traffic	CO at end of East wing; MH in roadway of parking lot in back of facility
(Q15) Approximately how far from the building is the WW access point?	20-50 ft	<20 ft	n/a[4]	<20 ft	20 ft	6 ft, 40 ft
(Q16) Manhole cover a. Energy source/outlet?	No	Yes	n/a[4]	No	No	No
b. Description of manhole	MH cover diameter 22.75 in, depth 13 ft	MH cover diameter 22.75 in, depth 20 ft	n/a[4]	MH cover diameter 22.75 in, depth 4 ft	MH diameter 24 in, depth 11 ft	MH diameter 24 in, depth 11 ft
(Q17) Sufficient space for setting up equipment? a. Autosampler	Yes	Yes	n/a[4]	Yes	Yes[5]	Yes[5,6]
b. Passive	Yes	Yes	n/a[4]	Yes	Yes[5]	Yes[5,6]
(Q18) Any feasibility concerns?	No	No	Yes[4]	Yes[7]	Yes[8]	Yes[9]
Overall, is sampling wastewater feasible at this facility?	Yes	Yes	No	Yes	Yes	Yes

Abbreviations: WW = wastewater, CO = cleanout, MH = manhole, n/a = not applicable; **1.** Access point is a manhole; **2.** Access point is a manhole lift station; **3.** One manhole and one cleanout; **4.** No external physical access point at this facility; **5.** There is room for sampling equipment if it is placed in the manhole; **6.** There is room for sampling equipment next to the building near the cleanout; **7.** Location is in the middle of a public sidewalk; **8.** Sampling equipment could obstruct garbage pickup location; **9.** Manhole is in parking lot therefore would need a vehicular traffic diversion. Area could flood with heavy rain.

Figure 1. A wastewater access point at a post-acute care facility. Sampling routinely at this access point would not be feasible because of its proximity to vehicular and pedestrian traffic, accessible parking, and emergency vehicle areas.

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