Proper disposal of controlled substance medications, a legally gray area since the Controlled Substance Act of 1970 was passed, has received renewed attention in recent years because of an increase in deaths related to opioid pain reliever (OPR) overdoses and increased nonmedical use of OPRs.\textsuperscript{1,2} Prescription drug take-back events have been organized under the purview of the Drug Enforcement Administration (DEA) to properly dispose of controlled substance medications; to decrease prescription medication diversion, abuse, and accidental poisonings; and to decrease environmental hazards resulting from improper medication disposal. The DEA has reported pounds of medications in aggregate donated at take-back events but has not examined the extent to which OPRs are being donated at these events.\textsuperscript{3} We analyzed the characteristics of donors and medications donated at 11 take-back events in rural Appalachia, an area struggling with disproportionately high rates of OPR nonmedical use and abuse.\textsuperscript{4}

Methods. Researchers interviewed all medication donors at each take-back event held in Northeast Tennessee/Southwest Virginia from 2009 to 2011. Donor data included sex; age; race; zip code; means by which donor learned of take-back event; motivation(s) for donating medications; past disposal methods; quantity of medication containers for controlled substances, prescription medications, and over-the-counter medications and supplements; and number of patients represented in medications donated. Individual controlled substance unit doses were quantified at 6 of the 11 take-back events. Institutional review board approval was granted by the parent institution.

Results. Seven hundred fifty-two individuals (57\% female, 96\% white, and 90\% aged ≥ 40 years) representing 53 zip codes in Appalachia donated 16,956 containers (eg, vials, bottles) of medications intended for use by 1210 patients. No donors refused to participate in the study. When given the opportunity to indicate 1 or more reasons for donating medicines at take-back events, donors indicated a desire to clean out their medicine cabinets (68\%), environmental concerns associated with disposing of medicines with other waste (45\%), and accidental poisoning concerns (14\%) as motivating factors. A total of 1,128 containers of controlled substances were donated, which represented 9.3\% of all prescription medications. The Figure shows the composition of doses of controlled substances obtained from 402 donors at 6 take-back events. A total of 11,406 controlled substance dose units were donated. Hydrocodone combinations, oxycodone and oxycodone combinations, and methadone, 3 commonly prescribed OPRs, accounted for 32\%, 11\%, and 5\% of total donated controlled substance doses, respectively. The mean (SD) number of dose units per donor for hydrocodone-, oxycodone-, and methadone-containing medications was 24.4 (23.4), 20.5 (19.9), and 79.4 (46.9) U, respectively. A total of 54\% and 86\% of donors lived within a 10- and 20-mile radius of the nearest donation location, respectively.

Comment. Leaders in our region are concerned regarding the extent of nonmedical use of prescription drugs and are taking a multifaceted approach to address prescription drug abuse, including increased interprofessional provider education that focuses on patient screening and collaborative accountability; expanded utility of the controlled substance monitoring databases; and propagation of public awareness of the consequences of improper disposal of medications.
gation of local take-back events. This approach is in alignment with the Office of National Drug Control Policy’s 2011 Prescription Drug Abuse Prevention Plan. Participation in take-back events is the only direct, environmentally sound method for patients to remove scheduled medications from their home.

In a region where 12.1% of 12- to 17-year-olds and 6.2% of individuals 18 years and older reportedly use OPRs for nonmedical purposes and sales of OPRs per capita are disproportionately high, removal of 1128 containers and more than 11,000 doses of controlled substances may have a considerable impact on the potential for drug diversion in this region. It is noteworthy that a majority of donors traveled 10 miles or less to a donation site, which reveals the limited geographical coverage of take-back events in our rural Appalachian region. These data suggest that geographical proximity needs to be considered as permanent controlled substance disposal methods are legislated and developed. Moreover, the regional impact of take-back events may be enhanced considerably by expanding the number of local and community-based take-back events. Conservatively, we would need to execute 5 to 10 times as many take-back events to encourage optimal regional participation; however, the challenges of take-back event expansion can be considerable because many resources for implementation are required, including collaboration between the DEA, law enforcement agencies, and community volunteers.

The Secure and Responsible Drug Disposal Act of 2010 encourages “a variety of methods of collection and disposal of controlled substances.”2 Drug take-back events serve multiple purposes through proper disposal of medications donated by regional residents; however, the extent to which such programs are addressing the prescription drug epidemic has yet to be determined.

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Published Online: June 25, 2012. doi:10.1001/archinternmed.2012.2374

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Author Contributions: Both authors had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

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Acquisition of data: Gray. Analysis and interpretation of data: Gray and Hagemeier. Drafting of the manuscript: Gray and Hagemeier. Critical revision of the manuscript for important intellectual content: Gray and Hagemeier. Statistical analysis: Hagemeier. Administrative, technical, and material support: Gray. Study supervision: Gray and Hagemeier.

Financial Disclosure: None reported.

Additional Contributions: Kristine A. Bowers, BA, Miranda Hurley, PharmD, and Ralph Lugo, PharmD, generously assisted in conducting the study, collecting data, and preparing the manuscript, respectively.


