Update to delivering medications via a pneumatic tube system

Supplementary material is available with the full text of this letter at www.ajhp.org.

Nine years after the publication of guidelines for the use of pneumatic tube systems in medication delivery, a detailed list of medications that should not be delivered via pneumatic tubes was published.[1,2] Updated lists have been subsequently published, with the most recent, from 2015, containing 83 entries.[3,4,5]

In an effort to provide an updated list, published lists were compared.[2-4] In June 2014, two tertiary drug information databases—Micromedex and Drug Facts and Comparisons—were searched for relevant terms, such as *shake*, *swirl*, and *agitate*. Results were reviewed for precautions against the shaking or agitation of medication. Package inserts and FDA new drug approvals from May 2014 through May 2015 were also consulted.

Specific medications with package insert precautions or instructions related to shaking are listed in the eAppendix. Moreover, medications named in previously published lists that lacked precautions in the package insert were excluded, including adalimumab, albumin, cyclosporine oral, dornase alfa, epoprostenol, eptifibatide, exenatide, follitropin beta, glatiramer, mecasermin, parathyroid hormone recombinant, rabies immune globulin human, rho D immune globulin, teriparatide, total parenteral nutrition, and treprostinil. Practitioners should investigate further and decide whether to include these medications due to theoretical concerns about protein denaturation related to shaking, despite the lack of package insert precautions. For example, per communication with Grifols pharmaceutical company, there is no concern for protein denaturation related to pneumatic tube transport of its albumin. Information on whether a medication can be sent via pneumatic tube is based on inference, since no outcomes data stating this have been published. One study found no difference in the weight of insulin aspart after having been delivered once via pneumatic tube, but there was no assessment of protein denaturation.[6] Other exclusions from the list include carbonated products, such as magnesium citrate, since it is possible to send via a pneumatic tube, though precautions should be taken to allow settling before opening the container.[2] Although propofol was cited in past lists, the package insert indicates that the drug should be shaken well before use.[2-4,7] Due to conflicting information between the package insert and theoretical concerns about the appropriateness of tube delivery of this fat emulsion, propofol was excluded from our list.

Moreover, medications supplied as powders for reconstitution were identified because facilities should specify whether only the reconstituted product should not be delivered via pneumatic tube. As the shaking precautions are usually in the "preparation" section of the package insert, it seems reasonable to allow pneumatic tube delivery of the powder before reconstitution unless the drug meets other criteria that would preclude its delivery via pneumatic tube, such as chemotherapy.

Aside from concerns about product integrity, other medication characteristics previously identified as precluding drug delivery via pneumatic tube are noted. For example, chemotherapeutic agents and flammable drugs should not be delivered via pneumatic tube for safety reasons.[1-4] Medications that are expensive or difficult to procure or compound should not be delivered via pneumatic tube unless there is a means to track and prevent drug loss.[2-4] Likewise, controlled substances should not be delivered via pneumatic tube due to a lack of accountability.[1-4]

These guidelines are incomplete and should be updated as medications enter and leave the U.S. market. Fa-

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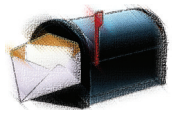

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cilities may have other considerations when developing their policies of what should not be delivered via pneumatic tube, such as controlled substance designation, drug weight, drug expense, and replacement difficulty, as with investigational drugs.

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Community pharmacies and population health

To bridge the transition of care from the hospital to the community, drugstore chains are collaborating with inpatient teams and bringing outpatient prescriptions directly to the hospital to counsel patients about which medications they will continue and discontinue and how the neighborhood store can support them after discharge.[1] The overall goals of Walgreens' program are to reduce readmission rates and increase patient satisfaction while improving patient outcomes. Walgreens was the first chain to join a Medicare shared-savings accountable care organization (ACO) but has now left the ACO market and is refreshing its inpatient bedside delivery and care transitions programs to adopt an alternative payment model (McPherson C, Walgreens Adherence Initiative, personal communication, 2016 Nov). To support these efforts, Walgreens has a physician medical director and employs a subsidiary of nurse practitioners; it operates health-system pharmacies and manages patients during the 30-day postdischarge period using its proprietary software. Similarly, CVS Caremark has ACOs and patient-centered medical homes.[2]

On January 1, 2017, the Centers for Medicare and Medicaid began a trial of the new Medicare Part D enhanced medication therapy management (E-MTM).[3] E-MTM is designed to strengthen links among payers, pharmacies, and prescribers to detect and prevent medication risks across settings while providing population management services to ACOs. With E-MTM, pharmacies may provide new products and services, such as home delivery, prescription synchronization, and compliance packaging.[3] Some community pharmacies, including Wegmans Food Markets and Walgreens, already offer these services. E-MTM will be tested for 5 years in 11 states: Arizona, Florida, Iowa, Louisiana, Minnesota, Montana, Nebraska, North Dakota, South Dakota, Virginia, and Wyoming.[3]

In late 2016, SureScripts announced its new medication history service to support the population health management needs of health systems, ACOs, and analytics vendors who will require this information in order to meet new data and reporting requirements in 2017 under the 2015 Medicare Access and CHIP Reauthorization Act (MACRA).[4] SureScripts is owned by pharmacy associations, CVS Caremark, and Express Scripts and dominates the exchange of electronic information between pharmacies, payers, and doctors. SureScripts data cover more than 240 million patients and in excess of 9.7 billion transactions.[5] This expansion of the electronic health record to include medication histories across community pharmacies allows pharmacies to assess and address potential adverse effects, interactions, and duplicate therapies at routine medication pickups in order to improve overall patient care.

Community pharmacies are also incorporating innovative population management methods into their workflow. For example, in response to pay-for-performance contracts, Wegmans pharmacies use medication therapy management programs (Outcomes, Mirixa, Reston, VA), pharmacy dispensing software (EnterpriseRX, McKesson, San Francisco, CA), and a quality-measure tracking program (EQuIPP, Pharmacy Quality Solutions, Durham, NC) to track patient adherence and outcomes. Mirixa is a healthcare technology and services company that connects patients with pharmacists regarding medication counseling through medication therapy management programs, such