PharmacoXray
The Radiopacity of Sustained Release Pharmaceuticals

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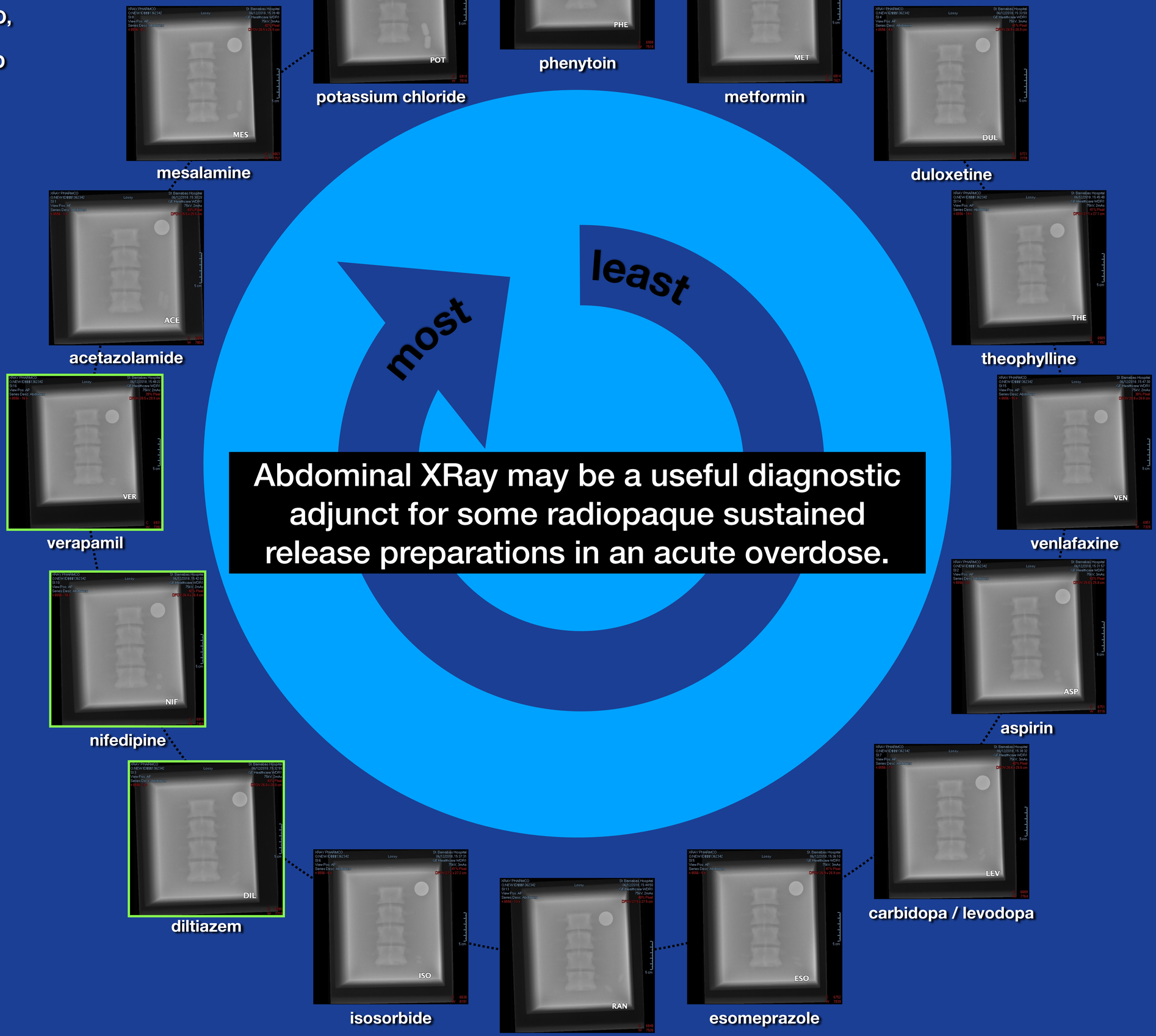
Overdose is a common problem in the Emergency Department. Concerning ingestions involve sustained release (SR) preparations, where toxicity may manifest in a delayed fashion. A screening tool to assist clinical decision making would be helpful. Abdominal x-ray is a rapid, non-invasive tool with minimal risk. Prior studies have shown mixed results. In the 15 years since last studied there have been changes in medication formulation and x-ray technology. We describe the radiolucency of current SR medications to determine whether this warrants a re-evaluation in suspected overdoses.

An inner-city teaching hospital formulary was reviewed for all SR medications. Due to hospital policy, controlled substances were excluded. 16 were identified. A Hologic model DPA/QDR-1 Anthropomorphic Spine Tissue Phantom, used to calibrate bone densitometers and approximated the average human abdomen in a supine position. Two of each medication were placed underneath in a transparent plastic bag, “2” being the smallest “multiple-ingestion” possible. A U.S. quarter was used to provide contrasting radiopacity.



Abdominal XRay may be a useful diagnostic adjunct for some radiopaque sustained release preparations in an acute overdose.

A spectrum of radiopacity was found, ranging from phenytoin (radiolucent) to potassium (radiopaque). 11 of 16 were readily identified, whereas 5 were more difficult. Of the agents that would be most concerning from a toxicity perspective (i.e. the SR calcium channel blockers verapamil, nifedipine, diltiazem), all were identified. There were three agents of concern that were not easily identified (i.e. venlafaxine, duloxetine, metoprolol). We were limited by our hospital formulary, and the restriction on controlled substances. The phantom model does not have the exact radiolucency of human tissue, and did not include bowel or other material that could make visualization more difficult.

We developed a visual guide of the radiopacity of SR medications using abdominal x-ray. This may be an effective adjunct in the evaluation of a patient with overdose of concerning SR medications. More study, with a larger sample, is warranted to quantify radiopacity, and prospectively evaluate clinical utility.

References

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