

The Arithmetic of Tapering

There is a consensus among opioid prescribing guidelines that a slow reduction of opioid dosage is the most effective approach when a patient seeks to reduce opioid consumption.

Because only some patients will benefit from opioid dosage reduction, there is also consensus that clinicians must exercise a significant degree of caution when considering dosage reduction. Outcomes among patients who are not suited for dosage reduction or who are inadequately monitored can include increased rates of overdose and suicide.

This brief note examines what is meant in dosage terms by “a 10% per month taper” or a “5% per month taper.”

Consider a patient enrolled in an opioid maintenance program who has stabilized at a dose of 1 mg per day of buprenorphine.

Let us also put aside, for the moment, the practical challenge of accurately manufacturing and dispensing a 0.9 mg daily dose if a clinician were to prescribe it.

The arithmetic is that the patient is currently prescribed 1000 micrograms (1 milligram) per day and is reducing to 900 micrograms (0.9 milligrams) per day.

If the patient is currently prescribed 1000 micrograms per day (1 milligram) and a 5% per month reduction is indicated, then the patient’s next dose would be 950 micrograms per day, or 0.95 milligrams per day.

Producing these dosage amounts at practical scale is the challenge we have sought to address by developing a taper that meets these precision requirements on a consistent basis.

The approach is both technical, involving precise 3D pharmaceutical printing, and mathematical, involving the implementation of taper arithmetic.

For example, a 10% per-step taper produces daily doses of buprenorphine of 1000, 900, 810, 729, and 656 micrograms.

If a clinician were to choose a 5% per-step taper, the total daily doses would be 1000, 950, 903, 857, and 815 micrograms.

If patients prefer divided doses, the manufacturing challenge increases.

Physician Support Services, in partnership with other firms, has approached this problem from a technical manufacturing standpoint.

The result is a platform capable of manufacturing individualized taper sequences across a range of starting doses and tapering rates.