

Painful Pill Crushing

Do workers risk injury while crushing pills? Of course! Indeed, more and more often are musculoskeletal problems arising from this activity. Different factors can explain this situation.

Fortunately, equipment is being upgraded. Two new pill crushers permit reduction of stress. Tests conducted in four institutions show how this equipment is making work easier. Read on to satisfy your curiosity.



Angélique Métra
asstsas



Jocelyn Villeneuve
asstsas

The Risk Factors

Crushing pills can become difficult depending on the equipment used, the height of the work surface and also the toughness and the resistance of the coating of certain tablets. One study, undertaken by OHSAH (Occupational Health and Safety Agency for Healthcare, in British Columbia), shows that the customary force required to crush pills for migraines can attain 36 kg (360 newtons). The 500 mg calcium pills are among the most difficult to crush.

The design of the pill crusher and the type of work surface can lead staff to adopt stressful postures for the shoulders and wrists (**photo 1**). For example, abduction of the prominent arm, higher than the level of the shoulders, and the application of force can cause pain. Moreover, several pill crushers do not offer a strong grip (**photos 2A and B**). The repetitive aspect of the task, up to several hundreds of times every shift, increases even more the risk of musculoskeletal troubles appearing, such as bursitis or tendonitis.

Another problem that has been reported concerns the noise transmitted by the pill crushers. Indeed, the noise can present a nuisance as much as for the clients, particularly in the evening, as for the staff. Besides, certain medications leave

a fine powder in suspension in the air, which must be avoided if at all possible.

Institutional Testing

Four institutions wishing to improve working conditions associated with pill crushers made an appeal to ASSTSAS. We proposed they test two new pieces of equipment. The tests were conducted at the following institutions:



1. Typical posture of an employee operating a pill crusher: the right arm higher than the level of the shoulders (in abduction), application of force on the handle with an uncomfortable grip.

- > Health and Social Services Centre (HSSC) Québec-Sud, General Hospital of Québec ;
- > HSSC Haut-Richelieu/Rouville, located in CLSC of Richelieu/Rouville Centre;
- > HSSC Richelieu-Yamaska, Hôtel-Dieu de Saint-Hyacinthe ;
- > Grace Dart Long-Term Care Centre, in Montréal.

We emphasize that the testing institutions have not made comparisons between the two pill crushers presented in this article. They have compared their usual equipment to one or the other of the new proposed models. In total, 60 people tried the electric model Powdercrush from Manrex and 39 people tried the Ultimate Pill Crusher, a manual model from AB Innovations.

New Tools on the Market !

The easy-to-use Powdercrush (**photos 3 to 6**), sets itself apart because of its electronic function. Pills have to be placed in a sufficiently resistant polyethylene pouch. A maximum of three or four pills can be crushed at the same time, subject to their characteristics (size and resistance). Following this, the top of the pouch is rolled up and the pouch is inserted into the slot of the apparatus. By pressing the start button, the pouch is struck as many times as is necessary. The pouch is then emptied of its contents and discarded. A new pouch is

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2A, B. Two common models of pill crushers.

used for subsequent activations.

The Ultimate Pill Crusher (**photos 7 to 11**), a manual easy-to-use model, requires some prior familiarization. First, insert the medications between two paper or plastic pill containers. Then, set the stacked containers on the anvil and pull the lever down gently until the hammer and the anvil come together (starting point position).

With both hands gripping the handle, exert light pressure. The impact is absorbed by the rotating movement of the anvil under the hammer. The operation needs to be repeated

according to how much crushing is desired, and the toughness of the pills. There is no need to completely raise the lever between crushing repetitions, it is only necessary to reset the handle

The Powdercrush grinds pills more efficiently and more uniformly with little effort.

of the lever to its starting point and to gently turn the containers.

Evaluating the Comments

Powdercrush

Everyone agrees! The Powdercrush grinds pills more efficiently and more uniformly, with little effort. The emphasis is on its ease of utilization and its stability. It allows the crushing of tablets into fine powder, for example, for use in cases of tube feeding.

Certain less appreciated aspects concern noise and dimensions (height: 9.5 cm - 3.8 inches; width: 8.5 cm - 3.4 inches; length: 28 cm - 11 inches; weight: 2.7 kg - 6 lbs). One institution felt that the necessity of recharging the batteries was not acceptable, worrying that the staff would forget to do it. The performance of the Powdercrush is actually greatly reduced when the batteries are low. Manrex recommends recharging them after each session.

In other respects, several people mention the possibility of inhaling powder or getting it on their fingers. Manrex recommends using a specifically resistant type of pouch. The supplier also specifies folding the pouch opening twice and leaving at least 2.5 cm (1 inch) free up to the medications. Respecting these recommendations would permit minimal emission into the air.

Ultimate Pill Crusher

Among the positive aspects pointed out, is that of stability of the device (non-skid ma-

3. Powdercrush, Manrex, electric model.



4. Insert the pill into the pouch.



5. Double-fold the opening.



6. Strike the pouch by pressing the button.

Unsolicited Comments from Testers !

Powdercrush

"There is less strain. It is faster and more efficient!" "No effort required, no more pain, in the shoulder nor the wrist." "Easier to use, does not require any arm or shoulder effort. Also this apparatus gives us a tablet that has been well crushed into fine powder. The only fault: it is noisy. Sometimes Senokot remains difficult to crush when it is placed together with other, larger pills. It takes several attempts. When there are several pill forms, more than three or four, the pouch can get pierced!" "Really crushes into a powder. Excellent for cases of tube feeding."

"Pills are well crushed. Requires no physical effort. Little loss of powder within the pouch."

"Faster and much less effort. No wasted medications."

Ultimate Pill Crusher

"Lighter, less noise." "No shock during use, prevents accidents due to repetitive movements."

"Efficient, easy manipulation, and rather good stability." "Less effort, safer." "Less noise, requires less effort, more comfortable." "Does not grind into a fine powder."

Additional comments about certain medications that remain more difficult to crush: Calcium 500 mg, Senokot, Norvasc, Byprexa, Liorisal.

terial under the base). If necessary, it can be attached to the medication cart or to a counter. With the Ultimate Pill Crusher, workers feel that their upper limbs stay in a natural and comfortable position, eliminating the elevation of the arms. The solid comfortable handle allows a two-handed grip. The effort is less than that required with common pill crushers. The impact absorption movement (arising from under the anvil) eliminates repetitive striking and reduces the noise level.

Nevertheless, several tries are necessary in order to crush the pills: 3 to 12 times depending on the toughness and the number of tablets. It is advisable therefore to avoid crushing too many pills at the same time in order to obtain the best result and to ensure that the powder does not get out of the container.

It is possible to add a flat disk on the anvil (to be fastened with metal glue.) The supplier has fabricated this piece following

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the recommendations of ASSTSAS. The institutional tests demonstrated that the paper pill containers were indeed tearing by the friction of the granules on the jagged base of the anvil. This piece must be ordered separately on purchase of the pill crusher.

And so, the arrival of easy crushing?

Crushing more safely, myth or reality? In any case, even if perfection has not yet been attained, there is no doubt that the progress made is significant and probably marks a notable turning point in the world of pill crushers. It's up to you to see them and try them out! In other respects, research is ongoing and we are keeping our eyes open for you! ●

REFERENCES

ENGST, C., R. HALL, A. YASSI, D. ROBINSON, B. KEANE. *Development Process for an Ergonomic Pill Crusher*; Association of Canadian Ergonomists, Conference 2002, Banff, AB.

ASSTSAS. « Pas facile d'écraser des pilules ! », *Objectif prévention*, vol. 25, n° 1, 2002, p. 32.



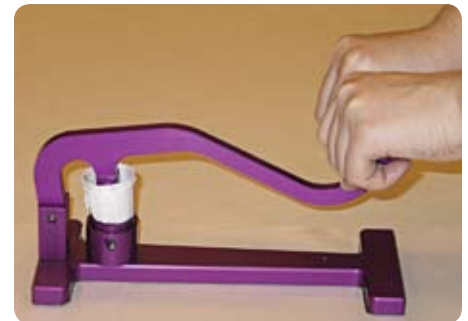
8. Insert the pill in the first container.



9. Place the second container in the first.



10. Place the stacked containers on the anvil.



11. With two hands, lower the lever and press the pills.

Powdercrush, Manrex (Electric)	Ultimate Pill Crusher, AB Innovations (Manual)
Strong Points	
<ul style="list-style-type: none"> > Effortless > No postural constraints > Crushes tablets into fine powder > Simple to use > Stable 	<ul style="list-style-type: none"> > Less effort > Less postural constraints to upper limbs and shoulders > Better crushing of tablets without hammering > Stable
Weak Points	
<ul style="list-style-type: none"> > Noisier > Heavier > Larger > Requires battery recharging 	<ul style="list-style-type: none"> > Requires more than one attempt to crush pills (3 or more) > Directions to follow > Manual guidance of containers
More Suitable for	
<ul style="list-style-type: none"> > Pills in pouch > Tube feeding of patients > Grinding of pills over a continuous period (e.g., in pharmacy) 	<ul style="list-style-type: none"> > Pills not in pouch > Usage of paper or plastic pill containers > Coarser grinding of tablets

Distributors

Manrex

300 Cree Crescent,
Winnipeg (Manitoba) R3J 3W9
Tel.: 1 800 665-7652
www.manrex.com
Québec Representative: Doris Boudreault
Tel.: 418 687-2506

AB Innovations Inc.

33 050, Whidden Avenue
Mission (British Columbia) V2V 2T2
Tel.: 604 820-4855
abinnovations@shaw.ca
Contact: Dennis Kruger
(pill crusher: 366DDD ;
Add-on piece for base: AMJV)