MYLIQUITAB® HOMECARE UNIT COMPARISON:

Comparing myliquitab to Traditional Manual Tablet Crushing Methods

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BPharm Sci Project:
Student Placement Report Summary

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Report Conclusions

This summarises the outcomes of the 4 week student project study conducted in partnership with myliquitab, to compare the drug delivery effectiveness of traditional manual tablet crushing in a mortar and pestle to the recently developed myliquitab tablet disintegration system. This study used the same range of tablet types as an earlier Monash study of the myliquitab system performance, and follows recommendations arising.

The mortar and pestle is the most readily available bespoke technique for tablet crushing, and is the most commonly used method so is the most appropriate benchmark for comparison of new tablet disintegration techniques. Following a SWOT analysis of these two approaches, it was hypothesised that the differences in disintegration mechanism and levels of manual handling, means the pestle and mortar technique could provide greater risk of variation of the delivered dose to the patient and for variations in particle size that may affect ability to swallow. Consequently the study tested these issues: the conclusions are summarised as follows.

1. A range of medical professionals indicated that despite dysphasia and tablet crushing being very common, the only known published professional guidance on how to crush tablets is in the publication "'Australian don't rush to crush handbook' (2nd Edition)". This document simply instructs **"Crush the tablet with a mortar and pestle or a tablet crusher"**, with no other guidance on crushing. This process appears highly subjective and an anticipated source of significant variation and potential error in delivery outcomes: these were tested here.
2. In over half the tablets tested in this study, the percentage of drug delivered from the manual tablet crushing process (as per guidance) was substantially inferior to the drug delivered from myliquitab. In three cases of tablet crushing, half or more of the dose was lost.
3. The main factors that were proposed to contribute to this inferior measured drug delivery were:
    a. The size of the dose- lower doses appeared to be associated with % higher drug loss
    b. The drug solubility- less soluble and less wet-able drugs are likely to be more difficult to re-suspend from a dry crushed powder with resulting loss.
    c. The mechanical action of grinding- as an open mortar, material may be lost during crushing as fragmentations, dust or as aerosols.
    d. The adhesive nature of the drug in the tablet formulation.
    e. Material transfer- crushed tablets in a mortar need to be transferred in water suspension and some spillage is common.
4. Variation in crushing method and outcomes was assessed by asking 3 different operators to follow these guidelines to crush a tablet. The results indicated a highly operator-dependent process- resulting in different delivered dose and particle sizes. The myliquitab device does not depend on the operator, thus less of a source of variation in dose delivered.
5. When multiple tablets were crushed together, it was observed to increase the difficulty of preventing powder loss from the mortar.

In summary, this brief study provided both quantitative data and qualitative observations to indicate substantial potential for failings in drug dose delivery from tablet crushing when conducted in a pestle and mortar as per industry guidance. Further, the work here supports the Monash study conclusion that the myliquitab system may overcome many identified limitations of manual tablet crushing.

This brief study indicates a number of areas for further investigation, including validation of proposed mechanisms for the observed drug loss during tablet crushing and greater qualification of resulting risks.