



## A SYSTEMATIC LITERATURE REVIEW ON CLINICAL, ERGONOMIC, AND ECONOMIC ADVANTAGES OF MULTI-CHAMBER BAGS AS COMPARED TO (HOSPITAL) PHARMACY COMPOUNDED BAGS AND MULTI-BOTTLE SYSTEMS.

### THE PROBLEM/OPPORTUNITY

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Industrial multi-chamber bags (MCB) play a critical role in the client's product portfolio. The definition of its value proposition, together with all the necessary evidence to support and to demonstrate its value proposition was being developed and publications were a critical component of the strategy to demonstrate the value for money of the MCB.

### CLIENT'S NEEDS

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The value of the MCB compared to other PN delivery systems had to be documented with all the available evidence. A systematic literature review was conducted to demonstrate the value for money of the MCB and was the basis for a publication to support client's strategic objective of switching markets from compounding/piggy back and single bottle systems to standardized, industrial MCB to encounter the full potential of MCB.

### OUR APPROACH

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The systematic review was based on comprehensive and reproducible literature searches with clearly defined and described selections and reporting protocols. Four databases were searched for articles published between January 1990 and November 2014: MEDLINE (via PubMed), EMBASE, the Cochrane Library, and EconLit. The Cochrane Library search included a search of the Cochrane Database of Systematic Reviews, the Database of Abstracts of Reviews of Effects (DARE), and the Cochrane Central Register of Controlled Trials (CENTRAL). Conference abstracts, reports, theses, and pamphlets were also searched and the references of all included studies were reviewed manually to identify additional studies.

The PICOS framework (Population, Intervention, Comparison, Outcomes and Setting) was used to conduct the analysis.<sup>18</sup> PICOS-related elements that consist of population, interventions, comparators, outcomes and study design were used to generate all search algorithms used in this systematic review. Search terms encompassed three categories: therapeutic area of parenteral nutrition, parenteral nutrition delivery systems, and outcomes.



Two reviewers independently screened the titles and abstracts generated from the search strategies to identify potentially relevant articles. Full texts of publications were analyzed if titles and abstracts did not provide enough information for inclusion or exclusion. For a study to be deemed relevant, it included adults and/or children of at least 2 years of age, and PN was given within an inpatient setting. PN delivery systems consisted of commercial standardized MCB (two- or three-chamber bags), a MBS or COB. The search considered a range of study designs including systematic reviews, randomized controlled trials (RCT), experimental studies, observational studies, case-control studies, case series, and economic evaluations. Economic assessments included full and partial evaluations such as cost-utility, cost-effectiveness, cost-consequence, cost-minimization, and cost-benefit analyses. Studies that did not meet the selection criteria at this stage were excluded and the reasons for exclusion were documented. Disagreements regarding the inclusion and exclusion of studies were resolved through discussion between the two reviewers until consensus was reached. Information from accepted studies was extracted into a data extraction form.

The two reviewers also independently assessed the methodological quality of each study. Their approach focused on assessing the internal validity of the individual studies, which is defined as the extent to which study design, conduction, and reporting prevent or reduce bias in the results. The methodological quality of all studies was assessed with four checklists proposed and presented in The Cochrane Handbook. The range of checklists used reflected the range of studies that met the search criteria; the GRADE checklist was used for clinical trials, the Newcastle-Ottawa scale (NOS) checklist was used for studies using cohort and case-control designs, the checklist by Evers et al. was used to appraise cost studies, and a checklist by Phillips et al. was used for all economic models. Any disagreements in methodological quality between reviewers were resolved by consensus.

## RESULTS

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From 1307 unique citations 74 relevant publications were identified. 18 met the inclusion criteria and were included in this systematic review. A total of 15 studies reported cost of parenteral nutrition as a primary outcome, nine described infectious complications, three clinical outcomes in terms of nutritional efficacy, three the length of stay, and one mortality rates. Three studies compared multi-chamber bags (MCB) with hospital compound bags (COB) and industrial multi-bottle systems (MBS), 12 MCB with COB, and three MCB with MBS. Findings suggest a significantly higher blood stream infection and catheter-related bloodstream infection rate associated with COB. This may be associated with a longer length of stay for patients receiving COB and higher hospitalisation costs. Potential cost advantages for MCB compared with COB and MBS were seen when production costs were included. Conclusions: This systematic review identified potential benefits for MCB regarding patient safety and economic advantages, although some methodological factors may limit evidence quality. More prospective studies



are required, including effectiveness measures related to patient safety, clinical outcomes, standard cost methodology, and time-and-motion techniques to estimate activity duration.

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