ECO-FRIENDLY DIALYSIS WITH THE SYSTEMIC DESIGN METHODOLOGY: AN ECO-FRIENDLY DIALYSIS MAY START FOR "THE GRAVE"

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Objectives:

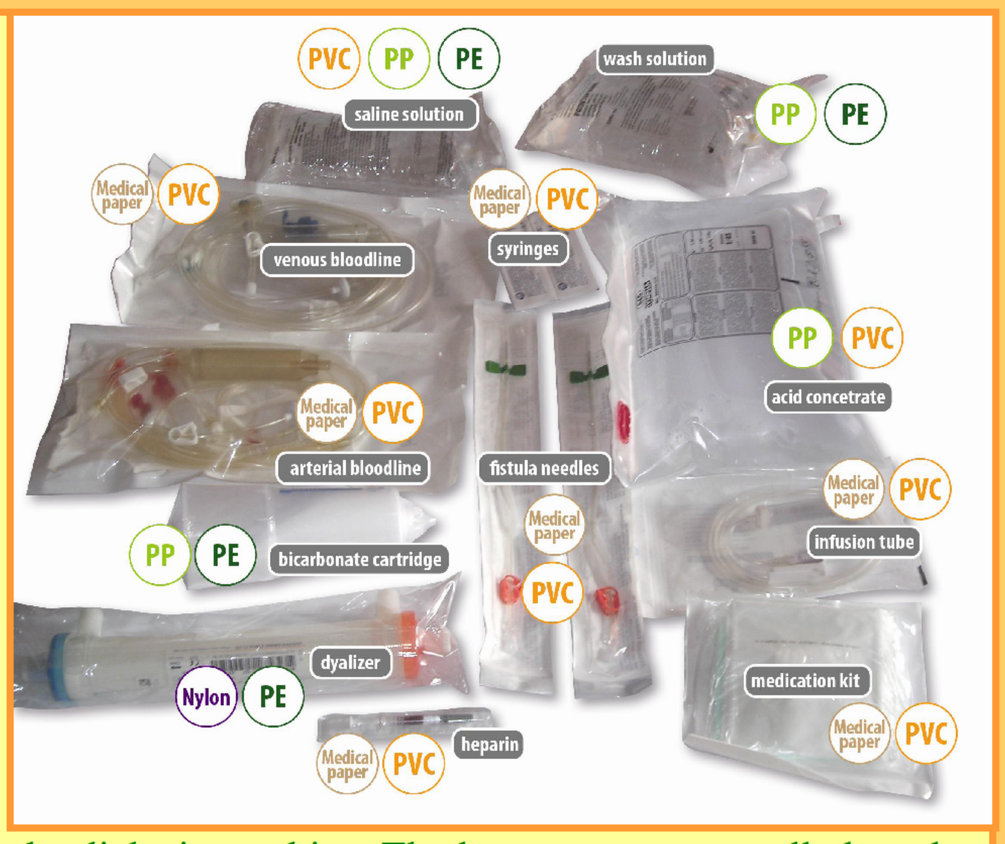
Chronic Hemodialysis produces about **600,000 tons of plastic wastes per year (1). The Systemic Design** is an innovative method to analyse the environmental impact and the improvement strategies needed for a "planet friendly" production hardware and supplies, in all fields of human life, with an approach that progressively moved from **the study of the lifespan of the objects, from "cradle-to-grave", to the continuous start of new cycles "from cradle to cradle" (2). In medicine,** attention to the environmental impact is still limited, most of the analyses so far performed regard the last part of the cycle, **the "grave of waste products" (3-4).**
Aim of the present study was an analysis of the charcteristics of the disposables employed in chronic hemodialysis, as a tool for identifying strategies to reduce the environmental impact and the discharge costs.

Methods:

The pathway of the dialysis disposables was followed since their arrival to the hospital. Each step of dialysis was followed and photographed; each item was analyzed as for the type of material, the weight, the volume and the optimization of wastes. **(5)**

Results:

Quantitative analysis.
Each hemodialysis session produced **1.5-2 kg of "contaminated" plastic wastes** (i.e. in contact with the patient's blood) that, according to the Italian law, need to be separately discharged, and between **2 and 3 Kg of "non contaminated", mainly plastic wastes (as PP, PE, PVC**). As the cost of "contaminated" waste disposal in Italy is **1.8-2 € per Kg**, the discharge cost averages 10% of dialysis supplies.
Qualitative analysis
The following potential strategies were identified, staring from the "grave of the waste products"
1. External packaging: large amount of boxes (non-recycled cardboard), wrapped in plastic**. Suggestion: non-disposable coverage, reusable, for delivery.** Cardboard boxes should be reused and reusable; the reuse of the same cardboard boxes for dialysis supplies should be considered.
2. Each box contains at least 2 A4 pages of "instructions". Suggestions: use of recycled, non acid paper and ink; reference site for instructions.
3. Packaging. There are two main philosophies of packaging: each element individually and "pre-assembled" packaging, in which a plastic "guide" helps mounting the dialysis machine. The latter are conceptually based upon the principle that time is more costly than wastes. **Suggestion: consider compact packaging of single elements. (6-7)**
4.Dialysis companies supply **pre-assembled "kits" for start and end of the dialysis sessions,** which could be at least partly **substituted with recycled/recyclable or reusable materials.**
5. For disposables contaminated by blood, consider optimal geometry of waste bins: even where wastes are disposed by weight, the volume is crucial in determining transportation fees from hospitals to incinerators (8)**.**
6. Reuse of dialysis filters for a limited time should be weighted against risks of infection, of loss of efficiency and of contamination by disinfectants (9-11).



Conclusions:

The costs, both economical and environmental of dialysis wastes are huge.
The Systemic Design method (12) may be a useful tool for defining single steps of "production" of a dialysis session, suggesting potential strategies. The approach "cradle to cradle" may be a starting point for a critical analysis, opening to further, more innovative steps, such as the "output>input" approach, learning from nature how to create and renovate "systems".

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DOI: 10.3252/pso.eu.50era.2013