

Background

- The understanding of the workflow for drug compounding (i.e. sterile and non-sterile) is essential for the safe delivery of care.
- The normative framework applicable to drug compounding is increasingly demanding.

Objectives

Describe the literature surrounding technologies assisted workflow (TAWF) for drug compounding.

Methods

Literature review

- Three databases:
 - PubMed,
 - Embase,
 - Google Scholar
- Search terms: drug compounding, drug delivery system, workflow, pharmacy
- English and French articles
- Published from 1-1-2015 to 31-12-2020

Analysis

- 20 variables extracted
- Five outcomes evaluated:
 - error detection
 - compounding workload
 - validation time
 - costs
 - pharmacy staff satisfaction
- No statistic analysis performed

Results

Table 1: Characteristics of the studies

First author, Country, Year	Study design	Population	Formulation	Manufacturer and Product	Technologies in addition to preparation software and pictures/videos*	Preparations analysed (n)	Impact on outcome					Conflict of interest**
							Error detection	Workload	Time	Costs	Perception and satisfaction	
Deng, USA, 2016	Post Single center	Pediatric	Parenteral	Baxter, Dose Edge™	Barcodes	421,730	Not interpretable	NA	NA	NA	NA	No
Reece, USA, 2016	Pre-post Single center	Adult	Parenteral	BD, Cato®	Gravimetry Barcodes	Pre: 51,037 Post: 15,843	↑	↓	↓	NA	NA	Yes
Terkola, Europe, 2016	Descriptive Multicenter	Adult	Parenteral	BD, Cato®	Gravimetry Barcodes	759,060	Not interpretable	NA	NA	NA	NA	No
Benizri, France, 2016	Post Single center	Adult	Parenteral	Eurekam, Drugcam®	-	NA	NA	NA	NA	NA	NA	No
Davis, USA, 2017	Pre-post Single center	Pediatric	Parenteral Oral	In-house	Barcodes	Pre: 680,000 Post: 826,220	↓	↑	NA	↑	NA	No
Bhakta, USA, 2018	Pre-post Single center	Adult Pediatric	Parenteral	Omniceil™, IV station onco™	Gravimetry Robot Barcodes	Pre: 509 Post: 944	NA	↓	NA	↓	NA	No
Roberts, USA, 2018	Pre-post Single center	Adult	Parenteral	BD, Pyxis IV prep™	Gravimetry Barcodes	Pre: 643 Post: 748	NA	↓	↓	NA	Faster and more accurate	Yes
Lin, USA, 2018	Pre-post Single center	Adult	Parenteral	Baxter, Dose Edge™	Barcodes	Pre: 110,963 Post: 101,765	Not interpretable	NA	NA	↓	NA	Yes
Bledsoe, USA, 2018	Descriptive Single center	Pediatric	Oral	In-house	Barcodes	178,344	↑	NA	NA	NA	NA	No
Wright, USA, 2019	Pre-post Single center	Adult	Parenteral	Baxter, Dose Edge™	Barcodes	Pre: 1,530 Post: 85,869	Not interpretable	NA	NA	NA	NA	No
Marzal Alfaro, Spain, 2019	Post Single center	Adult Pediatric	Parenteral	Grifols, Phocus Rx®	Barcodes	Post: 9,872	NA	NA	NA	↓	NA	Yes
Achey, USA, 2019	Pre-post Single center	Pediatric	Parenteral	Grifols, MedKeeper, Pharmacykeeper™	Barcodes	Pre: 680,000 Post: 826,220	Not interpretable	↑	NA	↓	NA	No
Eckel, USA, 2019	Pre-post Multicenter	Adult	Parenteral	Baxter, Dose Edge™	Barcodes	Pre: 244,273 Post: 96,865	↑	↓	↓	↓	NA	Yes
Bucci, USA, 2019	Pre-post Single center	Adult	Parenteral	BD, Pyxis IV prep™	Gravimetry Barcodes	Pre: 116,686 Post: 5,195	↑	↑	↓	NA	Safer and more accurate	Yes
Pang, USA, 2020	Comparative Single center	Adult	Parenteral	Loccioni, Apoteca chemo® and ApoteCAps®	Gravimetry Robot Barcodes	Pre: 42,129 Post: 18,136	Not interpretable	NA	NA	NA	NA	No
Marzal-Alfaro, Spain, 2020	Pre-post Single center	Adult Pediatric	Parenteral	Grifols, Phocus Rx®	Barcodes	Pre: 51,589 Post: 54,430	↓	NA	NA	↓	Safer but slower	Yes

Legend: USA = United States of America; ↑ = increase; ↓ = decrease.

*All 16 studies used technologies with preparation assistance softwares and pictures or videos

**At least one author received fees or the study was funded by the manufacturer of the TAWF

- 16 studies
- 8 different TAWF:
 - 6 commercial,
 - 2 in-house.
- Majority in the United States (n=12).
- All TAWF included preparation assistance software and photos/videos
- Most used barcode readers (n=15) and few used gravimetry (n=6) and robots (n=2).
- Impact on outcomes: errors (n=13), compounding workload (n=7), validation (n=4), costs (n=7) and satisfaction (n=3).

Conclusion

- Several studies suggested that TAWF are associated with an increased detection of compounding errors and a perception of the safety of the drug compounding circuit.
- However, it is difficult to conclude on the impact of TAWF on workload and costs.
 - More work is needed to assess the benefit-cost ratio of these systems.
- Interpretation of the results remains difficult considering sample size, incomplete method description, conflicts of interest and other bias.