Observations of Nursing Practices Related to Drug Preparation and Administration in Care Units : a cross-sectional study

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Introduction

- The drug circuit is a complex process involving multiple actors.
- In order to minimize the risk of adverse events associated with the preparation and administration of drugs, hospitals regularly update policies and procedures to insure best professional practices.

Objectives

- Identify the conformity of drug preparation and administration by nurses in 2019.
- Compare the results to those of previous years.

Methods

- Cross-sectional observational study.
- Repeated in 2007, 2008, 2011, 2014, 2017, 2018 and 2019 according to the same method.
- Study conducted at the CHU Sainte-Justine, a 500-bed teaching hospital.
- Based on a standardized observation grid (59 conformity criteria in 2019 grouped into seven key steps).
- A group of observers observed a convenience sample of nurses on three shifts for the preparation and the administration of drugs practice.
- A conformity rate per criterion has been calculated for each year.
- Only descriptives stats were performed.

Conclusion

- For the majority of the criteria observed, professionals in nursing practices prepared and administered drug doses in care units in conformity with expected practices. However, some criteria have to be improved through the implementation of continuous improvement actions and a communication strategy adapted to the different care units.

Results

Year 2019

- 442 drug administrations were observed from October 7th to November 15th, 2019.
- An average of 26 observations [min 5; max 62] per patient care unit was performed.
- Number of interruptions: 65% of the drug doses observed had no interruption by a third-party, 21% had one interruption, 10% had two interruptions and 4% had more than 2 interruptions.
- 15/59 criteria had a conformity rate great than 80% [min 16%; max 100%].
- A total of 17 improvement actions were identified for conformity criteria below 80%.

Chart 1 : Profile of drug doses observed in each care unit in 2019

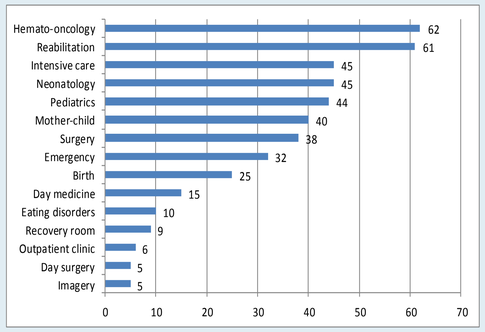

Chart 2 : Profile of professionals in nursing practices observed in 2019

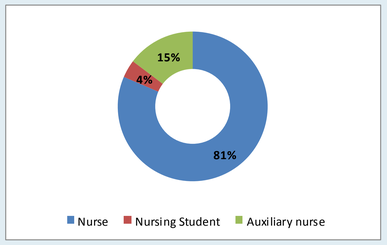

Chart 3 : Profile of drug doses observed by shift-work in 2019

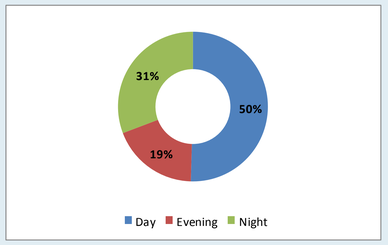

Chart 4 : Profile of drug doses depending on type of preparation in 2019

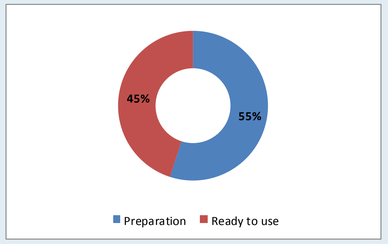

Chart 5 : Profile of drug doses observed depending on route of administration in 2019

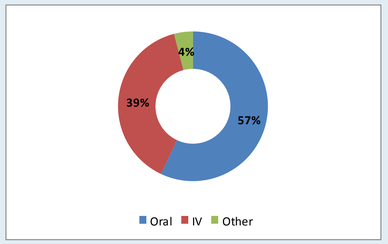

Table 2 : Profile of continuous improvement actions identified in each step of the drug circuit in 2019

Steps of the drug circuit observed	Since	Continuous improvement actions
Enteral preparation	2018	1. Consider the purchase/use of a tablet splitter or mortar per patient.
	2019	2. Make a visual and/or microbiological inspection to promote cleaning of tablet splitters and mortars.
Parenteral preparation	2017	3. Define the best practice regarding the use of the fluid dispensing connector.
	2017	4. Promote the use of fluid dispensing connector.
	2019	5. Continue to promote the fluid dispensing connector with the support of a nursing technique.
Labelling of the preparation	2018	6. Consider a predefined label format better suited for cups when taking tablets.
	2018	7. Aim for 100% identification for the date / time of tubing installation.
	2019	8. Evaluate the feasibility of implanting printers for labels in care units.
Independant double check	2017	9. Update the policy and procedure regarding double checking of drugs.
	2018	10. Produce a video about the best practices of double checking.
Administration at the patient's bedside	2018	11. Achieve a complete use of smart pumps in library mode.
	2019	12. Promote intravenous drug administration policies and procedures.
	2019	13. Harmonize practices regarding the use of free flow valves.
Reminders	2018	14. Educate staff about cleaning and hygiene of the medication cart and/or workbench.
	2018	15. Make a targeted communication plan to reduce interruptions of nurses during preparation or administration of drugs.
	2019	16. Make microbiological measurements on medication carts to promote hygiene of the workbench.
	2019	17. Develop a non-interruption during drug preparation awareness campaign.

Table 1: Conformity rate per criterion of the observation grid since 2007

	Conformity rate 2007 n/N (%)	Conformity rate 2008 n/N (%)	Conformity rate 2011 n/N (%)	Conformity rate 2014 n/N (%)	Conformity rate 2017 n/N (%)	Conformity rate 2018 n/N (%)	Conformity rate 2019 n/N (%)	p-value 2019 c. 2018
Number of observations	142	140	98	74	494	252	442	NA
1. The initial verification steps applicable to any dose								
The nurse consults the MAR to prepare the dose to be administered (or checks the original prescription and then registers it to the MAR with all the required fields if first administration) in the eMAR	135/136 (99)	129/132 (98)	87/92 (95)	70/72 (97)	418/435 (96)	242/250 (97)	409/437 (94)	0.0765
The nurse checks if the previous doses have been administered and at the correct times (for the current 24 hours)	-	-	-	-	412/441 (93)	175/192 (91)	329/377 (91)	0.2095
The nurse takes the right drug	142/142 (100)	137/137 (100)	97/97 (100)	74/74 (100)	491/491 (100)	248/248 (100)	441/441 (100)	>0.9999
The nurse checks the validity of the expiry date of the drug	96 (75)	118/130 (92)	73/96 (76)	61/74 (82)	419/470 (89)	231/243 (95)	401/438 (92)	0.1207
The nurse checks the integrity of the drug	-	-	-	68/74 (92)	453/482 (94)	238/245 (97)	434/437 (99)	**0.0404**
The nurse wears protective personal equipment if necessary	-	-	-	2/3 (67)	54/55 (98)	6/6 (100)	1/1 (100)	>0.9999
2. The initial steps of a preparation required by a nurse								
The nurse cleans the workbench before preparation	-	-	-	-	-	24/142 (17)	62/382 (16)	0.8946
The nurse requests another nurse for double checking when required	80/85 (94)	129/130 (99)	91/96 (99)	16/17 (94)	108/150 (72)	88/93 (95)	98/102 (96)	0.7389
The nurse prepares the medicine after a hand washing	-	-	-	-	259/352 (74)	174/234 (74)	336/415 (81)	0.0581
The nurse documents the narcotic remnant in the office or on the count sheet if applicable	-	-	-	7/13 (54)	23/27 (85)	17/19 (89)	17/19 (89)	>0.9999
The nurse documents the preparation in the eMAR (time, signature)	-	-	-	-	117/125 (94)	84/87 (97)	241/257 (94)	0.5311
2.1. Preparation of an enteral drug								
The nurse shakes the suspension	45/47 (96)	47/49 (96)	27/28 (96)	7/9 (78)	52/57 (91)	31/38 (82)	56/65 (86)	0.5798
The nurse draws the right volume	-	-	-	18/19 (95)	70/72 (97)	43/43 (100)	70/70 (100)	>0.9999
The nurse performs the dilution according to the guideline of the MAR	-	-	-	-	-	12/12 (100)	30/30 (100)	>0.9999
The nurse cleans the tablet splitter or mortar before using it	-	-	-	4/5 (80)	8/19 (42)	7/17 (41)	13/27 (48)	0.76
The nurse cleans the tablet splitter or mortar after using it	-	-	-	1/2 (50)	6/19 (32)	11/17 (65)	12/27 (44)	0.2279
2.2 The preparation of a parenteral drug								
The nurse dilutes the drug with the right diluent	82/109 (75)	65/75 (86)	44/45 (98)	16/17 (94)	83/84 (99)	40/40 (100)	45/45 (100)	>0.9999
The nurse takes the right amount of diluent to reconstitute it	-	-	-	-	83/83 (100)	42/42 (100)	45/45 (100)	>0.9999
The nurse shakes the drug after reconstitution	-	-	-	-	85/88 (97)	38/39 (97)	40/42 (95)	>0.9999
The nurse prepares the correct diluent with the right volume according to the MAR	73/76 (96)	74/74 (100)	45/45 (100)	21/23 (91)	110/110 (100)	59/59 (100)	77/77 (100)	>0.9999
The nurse uses the fluid dispensing connector during this preparation	-	-	-	-	10/89 (11)	20/40 (50)	20/68 (29)	**0.0401**
The nurse mixes and shakes the solution after dilution	-	-	-	-	86/96 (90)	45/49 (92)	72/74 (97)	0.2148
2.3 For subcutaneous and intramuscular drugs								
The nurse takes the right volume	-	-	-	-	-	11/11 (100)	14/14 (100)	>0.9999
3. Documentation and labeling of the preparation when prepared by the nurse								
The label of the syringe / bag / cup contains 2 unique identifiers	20/62 (32)	52/69 (75)	23/45 (51)	21/48 (44)	104/259 (40)	103/176 (59)	159/281 (57)	0.6985
The label contains the name of the drug	43/73 (59)	64/72 (89)	34/45 (76)	30/48 (63)	187/263 (71)	133/176 (76)	190/280 (68)	0.0904
The label contains the drug dose or concentration of continuous drip	29/71 (41)	59/71 (83)	26/45 (58)	25/48 (52)	157/258 (61)	119/170 (70)	169/274 (62)	0.0824
The label contains the route of administration	21/78 (27)	40/69 (58)	15/45 (33)	20/48 (42)	113/251 (45)	79/166 (48)	117/276 (42)	0.323
The label contains the date and time of the installation if continuous drip of the drug	8/19 (41)	18/29 (62)	2/10 (20)	3/12 (25)	57/120 (48)	17/41 (41)	24/30 (80)	**0.0015**
The label does not contain abbreviations	-	-	-	-	-	-	141/157 (90)	NA
4. Preparation of a ready-to-use drug								
The nurse checks that the label provided by the pharmacy is conform to the correct entry on the MAR	51/51 (100)	58/60 (97)	47/50 (94)	27/28 (96)	220/222 (99)	83/89 (94)	194/203 (96)	0.4012
The nurse checks if it is the right dose	56/57 (98)	71/71 (100)	53/53 (100)	28/28 (100)	233/233 (100)	99/102 (97)	213/213 (100)	**0.0333**
The nurse does not reconstitute an intravenous drug syringe prepared by the pharmacy (unless the recipe on the MAR requires a dilution or if the syringe served is a 1 mL syringe)	-	-	-	-	103/109 (95)	34/34 (100)	76/77 (99)	>0.9999
The nurse makes sure that the label contains 2 unique identifiers (last name, first name and birth date OR last name, first name and patient file number)	9/22 (41)	19/25 (76)	2/6 (33)	10/24 (42)	127/152 (84)	75/93 (81)	167/187 (89)	0.0628
The nurse checks that the unit dose pack is not torn before being at the bedside, unless half-dose	10/17 (59)	18/24 (75)	16/27 (59)	6/6 (100)	69/76 (91)	24/34 (71)	70/72 (97)	**0.0002**
5. At the bedside, if there is a basic solute or solutes								
The library mode is used and there is consistency between the inscription on the IV bag and display of the name of the solute on the pump	-	-	-	-	-	79/95 (83)	151/174 (87)	0.4698
The date / time of installation is indicated on the tubing	-	-	-	-	-	65/93 (70)	101/171 (59)	0.0852
There is a free anti-flow valve added to the IV tubing circuit	-	-	-	-	-	-	108/156 (69)	NA
6. Independent double check								
Verification of concordance between MAR orders and original orders is performed (drug, route, dosage)	-	-	-	-	112/133 (84)	91/93 (98)	87/101 (86)	**0.0033**
Container-content verification according to the MAR is performed	-	-	-	-	117/129 (91)	86/89 (97)	96/99 (97)	>0.9999
Verification of the volume to be administered according to the MAR and the dilution to be done, if needed is performed	-	-	-	-	111/119 (93)	74/81 (91)	79/83 (95)	0.3665
Verification of the labeling of the drug prepared by the nurse according to the MAR	-	-	-	-	90/115 (78)	55/77 (71)	52/74 (70)	>0.9999
Verification of the route of administration	-	-	-	-	126/133 (95)	82/88 (93)	83/101 (82)	**0.0284**
Verification a clinical condition, if required	-	-	-	-	51/63 (81)	26/30 (87)	17/21 (81)	0.7023
Verification of pump or syringe pump programming according to the prescription and MAR for PCA/ NCA, epidurals, continuous double-check drips, concentrated electrolyte bolus, double check drug bolus administered from an existing drip and double identification of the patient who is about to receive the drug	-	-	-	-	15/45 (33)	19/27 (70)	16/21 (76)	0.7502
Documentation of the double check activity	-	-	-	-	-	71/72 (99)	93/99 (94)	0.2408
7. Administration at patient bedside								
The nurse washes her hands before administering the drug	-	-	-	-	294/457 (64)	156/230 (68)	337/421 (80)	**0.0008**
The transportation of drugs is safe from the preparation room to the patient room	119/127 (94)	125/134 (93)	73/84 (87)	59/62 (95)	438/450 (97)	218/236 (92)	416/430 (97)	**0.014**
The nurse introduces herself to the patient and explains the care to be provided	71/77 (92)	68/74 (92)	55/60 (92)	38/64 (59)	297/361 (82)	181/197 (92)	319/355 (90)	0.5432
The nurse checks the concordance of the identifiers on the patient's wristband	66/101 (65)	112/132 (85)	50/91 (55)	45/74 (61)	355/463 (77)	188/243 (77)	380/432 (88)	**0.0004**
The nurse checks the presence / absence of the allergy wristband	49/91 (54)	70/101 (69)	36/77 (46)	34/70 (49)	288/390 (74)	110/238 (46)	267/394 (68)	**<0.0001**
The nurse checks the drug tubing circuit from the bag or syringe drip to the patient	-	-	-	-	-	-	138/161 (86)	NA
The nurse administers the drug at the right time as prescribed in the MAR	-	-	-	-	460/466 (99)	228/236 (97)	384/394 (97)	0.6228
The data entered in the pump are the same as the MAR for intermittent drips (enter parameters: volume and time)	-	-	-	-	130/157 (83)	66/68 (97)	104/122 (85)	**0.0123**
The data entered in the pump are the same as the MAR for continuous drips (enter weight and throughput-dose)	-	-	-	-	18/27 (67)	10/14 (71)	9/10 (90)	0.3577
The pump or syringe pump is used in library mode	-	-	-	-	129/176 (73)	61/89 (69)	97/135 (72)	0.6539
Nurse administers live intravenous drug according to the MAR	-	-	-	-	35/35 (100)	26/28 (93)	76/79 (96)	0.6043
The nurse checks if the patient has received the drug	68/69 (99)	76/77 (99)	47/50 (94)	56/59 (95)	365/368 (99)	188/189 (99)	362/372 (97)	0.1092
The nurse documents the dose directly after administration on the MAR without retranscription on another paper and signs the MAR	121/125 (97)	104/105 (99)	86/87 (99)	69/71 (97)	409/454 (90)	218/227 (96)	359/404 (89)	**0.0017**
The nurse checks patient allergy status	96/103 (93)	119/126 (94)	82/84 (98)	64/74 (86)	236/315 (75)	183/240 (76)	369/436 (85)	**0.0092**

MAR : Medication Administration Record ; eMAR : Electronic Medication Administration Record ; PCA : Patient-controlled analgesia ; NCA: Nurse-controlled analgesia

Legend :
- ◆ > 80%
- ◆ >50% ; <80%
- ◆ < 50%

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