Excel-based chemotherapy templates, follow-up and ordering process: safe, fast, time-saving, guiding, remove hesitation

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Abstract

In children, all medications and fluids are calculated by body weight or surface area, mostly by mobile phones, written on paper or a pre-filled form, or entered into the hospital information system. The complexity and risks of chemotherapy forces healthcare professionals to follow standard practices. In medical procedures, Microsoft Excel is generally used for data collection and statistical calculation. In this article, we aimed to introduce the use of Excel to facilitate cancer treatment and follow-up procedures, save on time, increase consistency, minimize errors, and eliminate hesitations and contribute to the scientific community.

Introduction

While many drugs are given in standard doses in adults, individual dosing of anticancer drugs according to the body surface is an important part of personalized treatment . In children, all drugs are given according to either body weight or body surface area. When calculating individual drug doses, the result, which are usually referenced to the calculator on mobile phones, are written either on paper or a prefilled form or entered a hospital information system. Doses are computed based on body weight or other factors and are usually adapted to the body surface area or blood cell levels of patients. It is inevitable that chemotherapy is delayed or coincides with the night and public holidays. Furthermore, chemotherapy is a treatment in which more than one drug is given on the same day for a certain period and duration and in a certain order. The complexity and risks of chemotherapy can force healthcare professionals to follow standard practices.

Although standardized chemotherapy protocols are a well-known method of treatment, chemotherapy errors potentially pose a risk of serious harm to patients. Possible errors include underdosing and overdosing, timing and scheduling errors, administering incorrect drugs or pre- and post-hydration, preparing drugs incorrectly, and giving chemotherapy to the wrong patient . These errors are also widespread in the current system of electronic prescribing, although technology has introduced kinds of error different from those found in traditional preprinted or handwritten orders . Most chemotherapy order errors in a computerized physician order entry have been reported to be caused by a programming error in which incorrect chemotherapy orders were included in the standardized protocols.

In medical procedures, Microsoft Excel is generally used for data collection and statistical calculations . In this article, to introduce the use of Excel to facilitate cancer treatment and follow-up procedures, save time, increase consistency, minimize errors, and eliminate hesitations and contribute to the scientific community.

Beginning and progression

Chemotherapy templates were first prepared with pre-printed Microsoft Word. In 2009, existing patterns were transferred to Excel files and calculations based on according to the body surface or body weight were made quickly and reliably by software and over time were rearranged according to new needs. It was moved

to the next stage with patient-specific Excel using international drug abbreviations, maximum dose, cell and sheet protection, placing warning notes where necessary. Also, standard treatment patterns were created by saving the calculated drug doses to cover more than one day, including the application method, duration, order, and the supplement fluids to be given as A4 paper size pdf output.

The accuracy of the doses calculated with the drug doses on the chemotherapy follow-up pages was entered as 27.7 kg body weight, the body surface was calculated by Excel as 1 m^2 based on this weight, and the accuracy of the patient-specific doses was ensured with this method. By keeping patient-specific Excel files on the hospital server and computer network, easily access from multiple points. Templates for acute lymphoblastic leukemia are presented below (Figure 1-3). Similar designs were created for other cancer types used in the clinic.

Discussion

Electronic chemotherapy ordering ensures accurately spelled and legible medications, correct time, proper drug order, infusion rate and duration, dose, appropriate fluids or diluents, and nursing instructions . For all these, it is obvious that a standardized, fast, safe, and sustainable system should be established from the doctor who wrote the drugs to the pharmacist to the nurse who applied it.

It is recommended that drug prescribing, preparation, distribution, and administration be standardized as far as possible. In addition, patient care facilities should develop and use standardized preprinted drug order forms or forms that can be retrieved from a computerized database to request chemotherapy treatments used and treatment-related services. Well-designed, standardized, regimen-specific drug order forms organize treatment information in a clear, consistent, and uniform format, reducing potential errors . The created Excel sheets provide a well-designed standard, specific order treatment form with annotations in pop-up windows when the mouse is passed over, while increasing safety to a much higher level by calculating the drug doses individually for each patient.

Aware of the chemotherapy order complexity and sequencing of risk, healthcare professionals, among other aspects of chemotherapy practice, have set standards for chemotherapy ordering . Although there is a decrease in chemotherapy order errors with the computerized physician order entry, dose calculations must be performed externally for these entries, or the computer software must be adapted to these calculations. In the first, mistakes are inevitable and, in the second, an enormous technical team and support are required. There are very few chemotherapy centers in the world where they are found together. On the other hand, preprinted order sets still require doctors to complete the specification of the order and perform all calculations. The checking of these means an additional effort and loss of time by both the writer and the supervisor. These aspects continue to generate both problems (12.6%) and errors (2.2%).

From the planning of the treatment of patients to the continuation of all stages of the treatment with confidence, to adding important notes and adding pictures, to the post-treatment follow-up, without the need for paper files, which saves the troubles experienced due to the falling of the papers, their loss, bringing the file back and forth, if desired, each page can be printed on A4 size paper. We think that it is a candidate to be a contemporary hematology oncology treatment and follow-up program with documentable and instant access to information.

Weaknesses:

Cluttered look for first users, inadvertent deletions or change of records later in areas without cell protection, incorrect or other patient's data entry, overlooked formula errors, deletion of files on the server, and the need to re-enter patient data in order for updates to become active. Also, the requirement of Microsoft Excel on all computers.

In order for the scientific community to reach better ones, we are sending the Excel templates we have free of charge to those who want it.

Conclusion: We can say that Excel-based chemotherapy templates are contemporary, safe, fast, time-saving,

guiding, and candidates for eliminating hesitation in the follow-up and ordering process.

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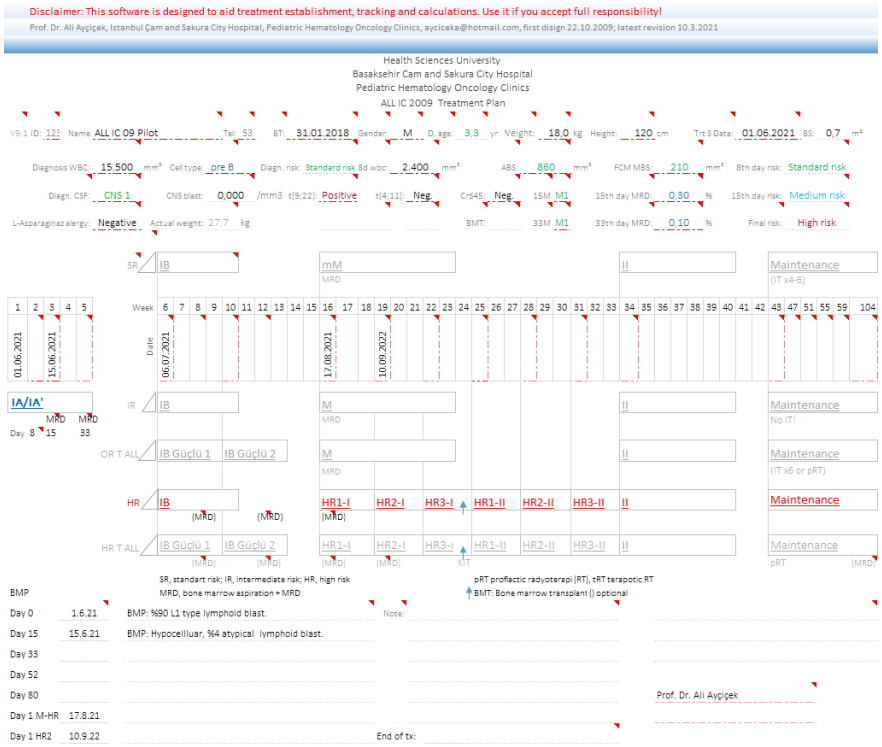
Figure 1. The 'Treatment Plan' page for a patient being treated for acute lymphoblastic leukemia.

Figure 2. 'High risk 1' block treatment template.

Figure 3. 'High risk 1' block drug order page as a PDF file.



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V9.1 ALL IC 09 Pilot 3,3 yr 18,0 kg 0,73 m²
pre B Diagnosis: Standard risk Day8. Standard risk Day15. Medium risk Final: High risk

ALL IC BFM 09 HR1-I Block

Concolidation Therapy: all HR

code	Drug	Dose	metric	Method of application	Patient Dose		Day 1 (17.08.2021)	2 (24.21)	3	4	5	6	7	...	21 (14 days later HR2')
DEX	Dexamethasone	20,0	mg/m2/day	Per-oral, in 3 dose, PPI + milk / dairy products. 3,7 4mgtb / day	14,6	mg	DEX	DEX	DEX	DEX	DEX				
VCR	Vincristine	1,5	mg/m2/day	10 mL NaCl 0.9 % slowly i.v. then 10 mL %0.9 NaCl.	1,1	mg	VCR					VCR			
MTX	Methotrexate	5.000	mg/m2/day	50 mL NaCl 0.9% 1/10 0,5 h; 9/10 23.5 h in hidr. sol i.V. inf.	3.657	mg	MTX								
DNS	%5D %0.45 NaCl	3.000	mL/m2/day	Her 1.000 mL içine 60 mL NaCHO3+30 mL KCl 24 sa i.V. inf.	2.194	mL	DNS	DNS		DNS	DNS	DNS			
LCV	Calsium Folinate	15	mg/m2/dose	i.v. at 42 h, 48 h, 54 h.	11	mg		LCV	LCV						
CPM	Cyclophosphamide	200,0	mg/m2/dose	50 mL NaCl 0.9% p.i (1 h). 1. dose on day 2 (21:00) (protect light)	146	mg		CPM	CPM	CPM	CPM				
MES	Mesna	200,0	mg/m2/dose	in CPM fluid.	146	mg		MES	MES	MES	MES				
ARC	Cytarabine	2.000	mg/m2/dose	250 mL G 5% p.i (3 h) 2 doses 12 h apat (9:00 + 20:00)	1.463	mg						ARC			
ASP	L-Asparaginase	25.000	IU/m2/day	250 mL NaCl 0.9% p.i (2 h) or i.m.	18.287	IU							ASP*		
FLG	Filgrastim	5	µg/kg/ day	until ANC > 5.000/mm3.	90	µg								FLG	FLG
TMP	Trimetoprim-Sulphametaxazole	5	mg/kg/day	in 2 doses, 3 day a wk, every wk.	90	mg						TMP	TMP	TMP	
OND	Ondansetron	0,15	mg/kg/dose	1/2-1 h before first dose KT, i.v. if necessary 3 doses.	2,7	mg	OND	OND	OND	OND	OND				
PAN	Pantoprazol	0,4	mg/kg/day	10 mL NaCl 0.9% 2 min i.v. or per-oral, empty stomach.	7	mg	PAN	PAN	PAN	PAN	PAN				
IT	Dexamethasone 4 mg; Metotrexate 12 mg; Cytarabine 30 mg; NaCl 0.9% total 12 mL						IT								
	Bone marrow asp. IA→IB→HR1→HR2→HR3→(BMT)→ HR1→HR2→HR3→II→Maint.						BM								

To get started with HR1:
I. Good general condition
II. No sever infection
III. Creatinine normal limits
IV. ALT/AST ≤ 5 xN (<200 IU/L)
V. Bilirubin ≤ 3 xN (<3 mg/dL)
VI. aPTT ≤ 1.6 xN
VII. AT3 ≥ x0.75 by age.
VIII. Neu ≥ 0.2; plt ≥ 50
IX. Neu and plt should tend to increase.
X. Pulse ile O2 saturation ≥ %94

* It should be 12 hours between VCR and ASP (ASP after 12 hours).
Peg-ASP 2.500 U/m2, 1 hf IV single dose,
Erwinia ASP 10.000 U/m2 IM every other day 3 dose.

HDT for 2 hours after intrathecal (IT), without pillow,
The patient should lie on a 6% inclined bed, head down tilt (HDT).

Analyses:
0. Whole blood count and peripheral smear
1. Biocchem (Na, K, Cl, crea, ure, G, U/S-ozmolarity, alb, ALT AST, bilirubin,UA, Ca, P, Mg, urine analysis and TCO2)
2. Urine pH (if urine pH< 7 20 mL NaCHO3 20 mL aqua pro inj. P.i over 30 min. Ref: ALL IC 2009 Appendix p 38).

0,1 (BM) It is done on day IB 52 to no-remission (p. 45,74) 0,1

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V9.1 ALL IC BFM 09 HR1-I Block **Drug Order** **High risk**

ALL IC 09 Pilot MTX start date: 01.04.2021 h: 13:00 15:00 18,0 kg 0,73 m2
Age: 3,3 yr

Time	Hour					
	01.04.2021					*General condition and vital signs follow-up x 4; oral care x 3 (bicarbonate + mycostatin)*
		Dexamethasone	***3 x***	*4,9*	*mg*	*Per-oral, in 3 dose, PPI + milk / dairy product.*
		Pantoprazol	**2 x**	4	mg	10 mL NaCl 0.9% 2 min i.v. or per-oral, empty stomach.
-4	09:00	%5D %0.45 NaCl		366	mL	NaCHO3 29 mL + KCl 7 mL 107 mL/h, 4 h pre-MTX hidration.
-1	12:00	Ondansetron		2,7	mg	1/2-1 h before first dose KT, i.v. if necessary 3 doses.
-1	12:00	Vincristine		1,1	mg	NaCl 10 mL slow i.v. then 10 mL %0.9 NaCl. 1
-1	12:00	Distilated water		36	mL	NaCHO3 36 mL 72 mL/h, 1 h p.i (if urine pH <6.5).
0	13:00	Methotrexate		366	mg	NaCl 50 mL 116 mL/h 1/2 h 1/10 loading dose p.i (30 min). 1
+0,5	13:30	Methotrexate		3.292	mg	in hydration fluid.
+0,5	13:30	%5D %0.45 NaCl		2.194	mL	NaCHO3 132 mL + KCl 66 mL 108 mL/h 23,5 h hydration fluid p.i. 2,3,4
+2	15:00	Sitarabin (Arc)		30	mg	Intrathec Arc + Mtx + Dex + NaCl 0.9% total 12 mL prepared in a single injector.
+2	15:00	Methotrexate (Mtx)		12	mg	Intrathecal
+2	15:00	Dexamethazone (De		4	mg	Intrathecal
	02.04.2021					*General condition and vital signs follow-up x 4; oral care x 3 (bicarbonate + mycostatin)*
		Dexamethasone	***3 x***	*4,9*	*mg*	*Per-oral, in 3 dose, PPI + milk / dairy product.*
		Pantoprazol	**2 x**	4	mg	10 mL NaCl 0.9% 2 min i.v. or per-oral, empty stomach.
+24	15:00	%5D %0.45 NaCl		2.194	mL	NaCHO3 132 mL + KCl 66 mL 104 mL/h 24 p.i. 5
+30	22:00	Ondansetron		2,7	mg	1/2-1 h before first dose KT, i.v. if necessary 3 doses.
+30	22:00	Cyclophospham	**2 x**	146	mg	%0.9 NaCl 50 mL 83 mL/h, p.i (1 h), protect from light.
+30	22:00	Mesna		146	mg	in CPM fluid.
						Warning to the pharmacist: Prepare the cyclophosphamide at 10:00 of the next day!