Chemotherapy Dose Rounding

Potential Major Reduction in Cost with Minor Alteration in Dose

Impact of Dose Rounding

- Identified 12 high cost Oncology medications.
- Reviewed use of these agents from July 1, 2014 through June 30, 2015.
- Identified doses that used less than ½ of the "next vial" and could be reduced by 5 or 10% to eliminate use of an additional vial.
- Evaluated potential cost savings in each rounding scenario.

Cost of Newer Anti-Cancer Agents

Drug	Smallest Vial Size	Cost
Ado-trastuzumab	100 mg	$2,310.19
Bendamustine	25 mg	$318.53
Bevacizumab	100 mg	$506.45
Carfilzomib	60 mg	$1,282.58
Cetuximab	100 mg	$375.65
Doxorubicin, Liposomal	20 mg	$483.69
Ipilimumab	50 mg	$4,709.36
Nivolumab	40 mg	$737.20
Paclitaxel, protein bound	100 mg	$675.43
Pembrolizumab	100 mg	$3,318.21
Pemetrexed	100 mg	$575.67
Rituximab	100 mg	$289.27

5% Dose Rounding

Drug	Number of Potentially Rounded Doses	Projected Savings
Ado-trastuzumab	2	$4,620.38
Bendamustine	6	$1,911.18
Bevacizumab	57	$28,867.65
Cetuximab	2	$751.30
Ipilimumab	7	$32,965.52
Nivolumab	1	$737.20
Paclitaxel, protein bound	3	$2,026.29
Pemetrexed	8	$4,605.36
Rituximab	48	$13,884.96

5% Dose Rounding
Total Projected Savings

$90,369.84

10% Dose Rounding

Drug	Number of Potentially Rounded Doses	Projected Savings
Bendamustine	4	$1,274.12
Bevacizumab	29	$14,687.05
Cetuximab	4	$1,502.60
Doxorubicin, Liposomal	12	$5,804.28
Ipilimumab	4	$18,837.44
Nivolumab	5	$3,686.00
Paclitaxel, protein bound	6	$4,052.58
Pembrolizumab	5	$16,591.05
Rituximab	23	$6,653.21

Cost Impact of >5-10% Dose Rounding

$77,118.02

Potential Total Cost Impact

$167,487.86

Low Cost/High Volume Medications

Drug	Vial Size	Potential Savings per Rounded Dose
Docetaxel	20 mg	$24.22
Gemcitabine	200 mg	$5.26
Irinotecan	40 mg	$5.61
Leucovorin*	350 mg	$11.79
Oxaliplatin	50 mg	$22.55

*Leucovorin is available in smaller vials, but due to cost and availability, we do not carry them.

What about multiple dose vials?

- Due to our ability to use a multiple dose vial for multiple patients, not much waste is generated.
- Multiple dose vial drugs will not be rounded. These include: Carboplatin, cisplatin, cyclophosphamide, doxorubicin, etoposide, mesna, trastuzumab and vinblastine.

What do we do with this?

- It is clear that we could potentially save a lot of money with very little change in dose.
- Many, if not most, fully electronic ordering systems have built in rounding protocols that flag the Provider when an order is entered.
- Most of these medications are used in second or third line therapies where cure is not possible.
- We are already rounding doses for other high cost items like IVIG, factor products, infliximab, and belimumab.

What we did:

- Informally targeted high cost items in non-curative protocols whose doses were a few milligrams above the previous required vial.
- Spoke to Providers about each order to request dose rounding for that dose or series of doses.
- Documented the change as a handwritten verbal, electronic or telephone order on the printed and signed COS order on the day of treatment.
- Included some very obvious doses of low cost items such as gemcitabine and docetaxel.

Reception:

- Providers were receptive to all ≤ 5% rounding requests made of them.
- Some providers told us “You can always do that. Don’t even bother to call”. (We did always call.)
- When 10% rounding requests for ipilimumab were made, all were accepted.
- All Oncology Providers agreed that Pharmacists would be welcome to make changes ≤ 5% in order to reduce costs and waste.

What next?

- Proposal brought before Pharmacy and Therapeutics Committee to allow Pharmacists to dose round Oncology medications. Approved January 27, 2016.
- Form to document rounding of dose developed and was approved by Forms Committee on March 10, 2016.
- Barcoded forms will be available by the end of March.
- Data collection and monthly submission to Pharmacy Director will be done.

Key Points of Dose Rounding Policy

- Provider can "opt out" for any patient receiving therapy with curative intent, or for whom they believe dose rounding is inappropriate, by writing "Do not dose round" in the comments section of the COS order.
- Pharmacist will evaluate all orders to determine which ones are appropriately dose rounded.
  - Curative therapies should not be rounded without provider consent.
  - High cost items are the priority, but cumulative savings from rounding lower cost doses are beneficial.

Prescriber Opt Out

- A prescriber may at any point indicate the patient is not eligible for dose rounding by writing “No dose rounding” on the orders.
- Be sure to check the “Special Instructions” for this statement before commencing with dose rounding.

Process – day before appointment

- Receive orders from Provider.
- Review order as usual.
- Perform all usual dose calculations.
- If the dose is such that a reduction of < 5% will prevent the opening of the new vial for an eligible drug, enter the order for the lower dose in the Pharmacy system.
- Document the new dose on the Dose Rounding Form, sign and date the form, and make 2 copies.

Process – day of appointment

- Verify the patient's current weight with the Nurse.
- Mix the modified dose.
- Include the original Dose Rounding Form in the bag with the compounded dose.
- The administering RNs will sign off the dose change, transcribe the modified dose on the MAR and file the form in the patient's chart.
- Place 1 copy in the patient's Pharmacy file, and the other in the data collection folder.

Example 1:

- Bevacizumab 15 mg/kg for a 55 kg woman with recurrent or metastatic ovarian cancer yields a dose of 825 mg. Bevacizumab is available in 400mg and 100mg vials.

- This dose may be rounded per policy to 800mg, documented on the dose rounding sheet by the pharmacist, mixed, and sent to the patient's Nurse without a Provider order as the rounding is a 3.125% reduction.

- This therapy, which is given every 21 days until progression or intolerance, yields a savings of $506.45 per dose given.

Example 1, continued:

- This same woman returns for her next cycle 3 weeks later, and has gained 2 kg. She now weighs 57 kg and her bevacizumab 15mg/kg dose is 855mg.

- We would not round this dose because it is not less than ½ of a vial, although the dose reduction would be less than 10%.

- Mix and administer the prescribed dose.

Example 2:

- A 64 year old woman with metastatic ovarian cancer is prescribed docetaxel 35 mg/m^2 and carboplatin AUC = 2, on days 1, 8, and 15 of a 21 day cycle. She weighs 69.6 kg, is 162 cm tall, has a BSA = 1.77, and has a Cr = 1.1.
- We carry docetaxel in 20mg and 80mg vials.
- Her dose of Docetaxel is 62 mg, and of carboplatin is 164 mg. What would you do?

Example 2, continued:

- Her docetaxel dose may be dose rounded to 60mg, yielding a savings of $24.22 per dose rounded.
- If she get this for several months, as she will be treated until progression or intolerance, the savings becomes substantial.
- Carboplatin will be administered as ordered as it is a multiple dose vial.

Example 3:

- R-EPOCH is ordered for a 43 year old patient with new Diffuse Large B-Cell Lymphoma who weighs 75 kg, is 5'10", and has a BSA = 1.93. What should you do?
- Ordered regimen includes:

  Rituximab 375mg/m² = 724mg

  Etoposide 50mg/m² = 97mg

  Doxorubicin 10mg/m² = 19mg

  Vincristine 0.4mg/m² = 0.8mg

  Cyclophosphamide 750mg/m² = 1,448mg

  Prednisone 60mg/m² = 116mg BID

Curative Intent Therapy

- This regimen is not going to be rounded automatically for several reasons, but as it is curative therapy, it is not eligible for Pharmacist Dose Rounding.
- You may approach the Oncologist to ask if they would like to round the rituximab dose, but if they do, it would have to be written as a verbal order or written by the Prescriber.
- Three of the other 4 agents are all multiple dose vials, and not included in dose rounding.
- Vincristine vial sizes and dosing patterns do not lend themselves to dose rounding.

Process for 10% Dose Rounding

- If a very high cost drug is viewed to be appropriate for dose rounding by the Pharmacist, a verbal, electronic or telephone order may be taken from the Provider to do so.
- This order will be put into writing on the Dose Modification form, and signed and dated by the Pharmacist and Provider, before going to Nursing.
- All other steps are the same as for doses rounded $\leq 5\%$

Example 4:

- A 47 year old man is being treated with ipilimumab 3mg/kg for unresectable, metastatic melanoma. His 72kg weight calls for a dose of 216mg ipilimumab every 3 weeks for 4 doses.

- Ipilimumab is available in 200mg and 50mg vials. What should be done?

Example 4, continued:

- This is a patient with incurable disease, however, rounding down to 200mg is an 8% reduction.
- The Provider should be contacted, and if in agreement, the dose may be modified, and the Provider must sign the Dose Modification Form.
- Potential savings = $4907.36/dose x4 doses = $19,629.44.

What about Fluorouracil?

- Due to the fact that our CADD pumps have necessitated modifications to the prescribed dose in order to conform with the pumps' programming limitations, fluorouracil will not be included in this dose rounding practice.

Evaluation of savings

- The Dose Rounding forms will be used to collect data regarding the cost savings generated by dose rounding.

- This data will be turned in to the Director of Pharmacy each month.

Future Direction

- With the advent of a new EMR system, it is our hope that the dose rounding process can be built into the ordering process.

Questions?