The Institutional Level Impact of Additional Apheresis Days for Multiple Myeloma Patients Undergoing Autologous Stem Cell Transplantation on Costs and Healthcare Resource Utilization

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Introduction

- Autologous stem cell transplantation can be used in the treatment of patients with multiple myeloma, but challenges persist in obtaining a sufficient number of CD34+ cells[1,2]
- Granulocyte colony-stimulating factor (filgrastim) mobilizes stem cells and can be used in conjunction with the CXCR4 inhibitor plerixafor to block retention of stem cells in the bone marrow[1,2]
- Despite the combined use of filgrastim and plerixafor, ~50-70% of patients require more than the 1 day of apheresis to collect a target number of cells[3,4]
- Inefficient mobilization creates burden on patients, increased demand of apheresis chairs, and increased healthcare resource utilization[5]
- Motixafortide, a novel, high affinity CXCR4 inhibitor (CXCR4i) was recently approved by the United States Food and Drug Administration for use in combination with filgrastim to mobilize stem cells for autologous transplantation in patients with multiple myeloma[5]
- Unlike the other regimens in this model, motixafortide requires only one dose to support up to two days of collection[6,7]
- Clinical trials of motixafortide have shown cumulative successful collection rates of 86.3% and 92.5% after one and two days of apheresis, respectively[7]
- Apheresis planning and scheduling may be informed by experience observed in clinical trials or real-world experience. However, administrators also need to understand the cost of deviating from planned schedules

Objective

- This economic model sought to understand the cost and healthcare resource utilization impacts of multiple apheresis attempts via a comparison between placebo and motixafortide and an indirect comparison between plerixafor and motixafortide.

Methods

- An Excel-based model was developed to assess the number of apheresis days associated with mobilization of stem cells with filgrastim (G-CSF) alone, G-CSF + plerixafor, or G-CSF + motixafortide (Figure 1)
- The percentage of patients achieving sufficient stem cell collection (threshold of 6 x 10^6 cells/kg across multiple apheresis) by apheresis day was sourced from GENESIS trial results for filgrastim alone and motixtafortide and the prescribing information for plerixafor (Table 1)[1-8]
- Although the GENESIS trial collected both central and local lab data, this model leveraged local lab data to align with that would be available for patient care decisions
- Drug costs were from Micromedex (Table 2)[9]
- Costs for apheresis days represent a cost per hour average across apheresis procedures, to reflect opportunity loss due to rescheduling events (Table 3)
- Individual procedure costs were from April 2024 Outpatient Prospective Payment System (OPPS) Addendum B[10]

Model Input and Structure

Figure 1: Model Structure

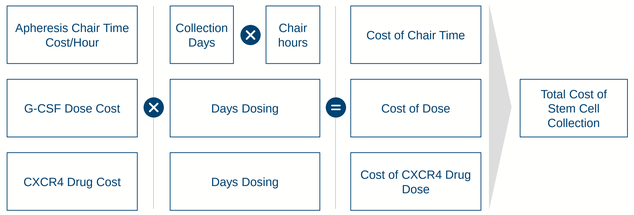

Table 1: Model Efficacy Inputs

Collection Day	Filgrastim		Filgrastim + Plerixafor		Filgrastim + Motixafortide	
	Daily Success	Total Success	Daily Success	Total Success	Daily Success	Total Success
1	9.5%	9.5%	54.2%	54.2%	86.3%	86.3%
2	11.9%	21.4%	23.7%	77.9%	6.2%	92.5%
3	16.7%	38.1%	8.9%	86.8%	3.8%	96.3%
4	4.8%	42.9%	0.0%	86.8%	0.0%	96.3%
5*	57.1%	-	13.2%	-	3.7%	-
Mean Days Collection	3.9		1.9		1.3	

*Represents patients who did not collect to target 6M stem cells/kg in Days 1-4 or withdrew from the study.

Table 2: G-CSF and CXCR4i Costs

A) G-CSF Medications

G-CSF Medication	Cost Per Dose
Filgrastim	$1,002
Tbo-filgrastim	$954
Filgrastim-sndz	$878
Filgrastim-aafi	$700

B) CXCR4i Medications

CXCR4i Medication/Source	Cost Per Dose
Motixafortide	$11,800
Plerixafor – Sanofi-Aventis	$9,968
Plerixafor – Amneal	$3,987
Plerixafor – Fresenius	$1,700
Plerixafor – Teva/Zydus/Dr. Reddy	$1,200
Plerixafor – Novadoz	$1,096
Plerixafor – Eugia/Meitheal Pharma	$500

- Costs per dose for G-CSF and motixafortide represents two units of the drug whereas the plerixafor dose represents one unit

Table 3: Procedure/Chair Time Costs

Procedure *	HCPCS	Avg Chair Hours	OPPS Fee for Service	Cost per Hour
Leukapheresis	36511	4	$1,462	$365
Red Blood Cell Exchange	36512	3	$1,462	$487
Plateletpheresis	36513	2	$414	$207
Plasmapheresis	36514	2	$1,462	$731
Therapeutic apheresis **	36516	3	$4,409	$1,470
Extracorporeal Photopheresis	36522	4	$4,409	$1,102
Stem cell collection	38206	6	$1,462	$244
	Average cost per hour			$658

*From the Outpatient Prospective Payment System
**With extracorporeal immunoadsorption, selective adsorption, or selective filtration and plasma reinfusion

- The average cost per hour of chair time for apheresis was calculated as an average of procedures requiring the chair to account for potential opportunity loss

Results

Table 4: Financial considerations for using G-CSF, G-CSF + plerixafor, or G-CSF + motixafortide

Planned cost (Scheduled Apheresis Time in Chair)		G-CSF	G-CSF + plerixafor	G-CSF + motixafortide
	Planned Apheresis Days	4	2	1
	Total planned cost	$22,816	$14,164	$20,138
Apheresis @ 6 hours/day	$3,948	$15,792	$7,896	$3,948
GCSF per dose	$878	$7,024	$5,268	$4,390
Plerixafor per dose	$500		$1,000	
Motixafortide per dose	$11,800			$11,800
Planned cost (Actual Time in Chair)	**Actual Apheresis Days**	**5**	**3**	**2**
	Cost of one add'l day	**$4,826**	**$5,326**	**$4,826**
	$3,948	$3,948	$3,948	$3,948
GCSF	$878	$878	$878	$878
Plerixafor per dose	$500		$500	
Motixafortide per dose	Not needed for most patients			

- Actual collection costs can deviate from the planned costs that are based on mean collection days (Table 1)
- Planned costs with or without the additional day is highest when using G-CSF alone largely due to the opportunity cost of devoting 4+ days to apheresis
- Planned costs without the additional day is lowest when using G-CSF + plerixafor, but the opportunity costs of devoting 2+ days to apheresis mitigate the cost difference between plerixafor and motixafortide

Table 5: Cost required to achieve maximum efficacy for stem cell mobilization in 100 patients with G-CSF + plerixafor versus G-CSF + motixafortide

G-CSF + plerixafor		Accumulated Costs with Each Additional Day		
Apheresis Day	Patients Receiving Final Collection	Medication/patient	Chair Time/patient	Total
1	54	Minimum investment		
2	24	$1,378	$1,462	$68,156
3	9	$2,756	$2,924	$51,117
4	0	$4,134	$4,386	-
Successful Collections	87		Total Additional Cost	$119,274
G-CSF + motixafortide		**Incremental Costs**		
Apheresis Day	Patients Receiving Final Collection	Medication/patient	Chair Time/patient	Total
1	86	Minimum investment		
2	6	$878	$1,462	$14,039
3	4	$12,678	$2,924	$62,407
4	0	$13,556	$4,386	-
Successful Collections	96		Total Additional Cost	$76,446

- A minimum investment of one day of apheresis and associated costs is assumed for every patient
- In the cohort using G-CSF + plerixafor, 33 patients would require additional apheresis days beyond Day 1 at an additional cost of $119,274
- In the cohort using G-CSF + motixafortide, 10 patients would require additional apheresis days beyond Day 1 at an additional cost of $76,446

Limitations

- No head-to-head Phase III comparison data exist for plerixafor and motixafortide; only indirect comparisons could be made.
- Costs were modeled on publicly available sources which may not reflect individual institution rates
- OPPS reimbursement rates were used as proxies for procedure costs, and the costs of apheresis services without a reimbursement rate (e.g., CAR-T cell collection) could not be captured
- A simple average of the per hour cost of each apheresis service that may be rendered in a chair was calculated by taking the OPPS reimbursement rate per service and dividing it by the time to complete the apheresis

Conclusions

- Aside from clinical value, relying on drug cost alone when determining therapy choice may inadvertently result in unintended opportunity cost.
- Clinical efficacy data can inform logistical needs, but data points that consider impact to other services must be evaluated to develop a clearer picture of financial impact
- Variations from planned/scheduled chair time for apheresis for stem cell collection are associated with both costs and departures from planned resource allocation that may negatively impact practice level financial planning
- This study demonstrates that despite a higher drug cost than G-CSF or G-CSF + P, G-CSF + M may confer similar or better financial impact than drug cost alone may imply
- Effective modeling of practice scenarios can help identify options to minimize such variability. Customizing this model for each institutions set of circumstances and conditions can provide practical insight into planning and scheduling practices

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Disclosures

- JRS is an equity-holding employee of Trinity Life Sciences, which was contracted for this study by BioLineRx USA, Inc. JL is an equity-holding employee of BioLineRx USA, Inc.
- Results described in this poster may differ from results described in the abstract as inputs were updated to reflect the latest available information.

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