Best Practices: Survivorship Clinic

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Disclosures

• Megan Dillaman, Zak Cerminara, and Tara Giblin have no conflicts to disclose.
• Off label usage of medications will not be discussed in this presentation.
Overall Learning Objectives

• Describe collaboration needed to establish a new survivorship clinic for adult stem cell transplant recipients.
• Examine the role a pharmacist can play in a pharmacist-driven survivorship clinic.
• Identify areas for clinical pharmacist intervention in a provider-run adult stem cell transplant survivorship clinic.
• Evaluate the role of a pharmacist in a telemedicine survivorship clinic.
• Predict the challenges and opportunities related to providing effective pharmaceutical management of common late effects in childhood stem cell transplant survivors.
Best Practices: Establishment of a Pharmacist-Driven Survivorship Clinic

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WVU Medicine J.W. Ruby Memorial Hospital
Morgantown, WV
WVU Medicine J.W. Ruby Memorial Hospital

- 690-bed academic medical center located in Morgantown, West Virginia
- Home to the WVU Cancer Institute Mary Babb Randolph Cancer Center
- Osborn Hematopoietic Malignancy and Transplantation Program
  — Only HCT program in the state with approximately 50-70 transplants performed annually (~40% allogeneic HCTs)
  — Outpatient infusion center within MBRCC allows for daily BMOP visits once discharged
    - Two dedicated clinical pharmacists well-established in HCT clinic
- EMR utilized – EPIC

BMOP = bone marrow outpatient; EMR = electronic medical record; HCT = hematopoietic stem cell transplant; MBRCC = Mary Babb Randolph Cancer Center
Rationale for Survivorship Clinic Establishment

- Complications occurring after alloHCT can result in reduced quality of life and increased late morbidity and mortality.
- Guidelines from ASTCT recommend periodic screening post-transplant with various laboratory parameters and preventive care to help identify and treat these complications earlier.
- FACT Standard B7.12 calls for infrastructure and policies for provision of long-term follow-up to screen for late effects.
- Historically, survivorship for transplant recipients at WVU Medicine has been at the individual attending level.
- Retrospective reviews indicated poor compliance with recommended post-transplant monitoring for late effects.

WVU Medicine Baseline Data – Collected Fall 2018

Urine protein, PFT, DEXA scans, and ECHO completion rates


DEXA = dual energy X-ray absorptiometry; ECHO = echocardiogram; PFT = pulmonary function test
WVU Medicine Baseline Data – Collected Fall 2018

Hgb A1c/fasting glucose, lipid panel, triglycerides, TSH, and T4 completion rates

Day +100
6 Months
12 Months
18 Months
24 Months


Hgb – hemoglobin; T4 = thyroxine; TSH = thyroid stimulating hormone

Initial n = 107
Initial Steps

**Planning**

- **May 2018**
  - Formation of a multidisciplinary work group consisting of oncologists, advanced practice providers, pharmacists, and nurse clinicians

- **June – Oct. 2018**
  - Determination of optimal clinic structure and finalization of survivorship algorithm

- **November 2018**
  - Presentation of a pharmacist-driven model to the hematologic malignancies division to obtain feedback and approval for implementation
Formation of a Multidisciplinary Workgroup

- Project led by 2018-2019 oncology pharmacist resident who has since joined our group as a HCT outpatient pharmacist

- Key personnel initially involved included attending physicians, pharmacists, APPs, and nurse clinicians

- Due to high integration of HCT pharmacists in clinic workflow with all HCT providers, team agreed that process could be streamlined by having a pharmacist lead coordination of care

- No prior reports of a pharmacist-driven alloHCT survivorship clinic to our knowledge

v: APP = advanced practice provider
Building the Foundation

Program Goals

• Increase the frequency, timeliness, and extent of post-HCT survivorship screening and preventive care

• Increase patient quality of life and overall wellness

• Maintain current workload on providers through pharmacy coordination

HCT = hematopoietic stem cell transplantation
Initial Questions

• What will a typical visit look like?
  —Decided to streamline with currently established physician visits to decrease any extra visits to the patient

• What will the process be for scheduling appointments and screenings?
  —Decided to have the pharmacist coordinate these aspects with a currently established scheduler dedicated to the HCT program and with relevant support staff

• How will we monitor for any excessive charges to the patient?
  —Orders entered via SmartSet order panels prior to the appointments which will alert staff for any instances of non-coverage; also working with financial services director to review periodically

• How can we best incorporate patient education?
  —Institutional brochure developed and additional materials from NMDP selected to educate patients on what to expect

HCT = hematopoietic stem cell transplantation; NMDP = National Marrow Donor Program
Building the Infrastructure

• Pharmacists underwent Certified Tobacco Treatment Specialist training offered through the WVU School of Dentistry to be able to assist with tobacco cessation throughout transplant.

• Six outpatient electronic order sets (SmartSets) built targeting guideline-recommended screenings and preventive care after alloHCT for each survivorship visit.

• Standardized electronic survivorship note template created to allow for consistent and complete survivorship documentation by pharmacists.

• Patient education handout was created to explain survivorship and outline schedule of labs, tests, vaccines, and referrals.

• Pharmacists granted self-scheduling capabilities to see patients as “New/Return Survivorship Visits” within EPIC and place electronic orders for survivorship visits.

alloHCT = hematopoietic stem cell transplantation
Program Go-Live – December 1, 2018!
Established Workflow

- Pharmacists serve as survivorship coordinators
  - Provide patient education and discuss results
  - Conduct validated survey assessments
  - Encourage tobacco cessation, if indicated
  - Order survivorship screenings and necessary tests in advance approximately one visit ahead
  - Ensure implementation of vaccines per established post-HCT schedule
  - Complete referrals in collaboration with oncologists, if indicated
  - Documentation of all survivorship items in EPIC

- Providers
  - Reinforce importance of survivorship to patients
  - Discuss patient-specific survivorship needs with pharmacists for implementation

HCT = hematopoietic stem cell transplantation
Timeframe for Survivorship Visits

- Day 60
- Day 100
- 6 months
- 12 months
- 18 months
- 24 months & annually
Day +60 Survivorship Visit

• Provided for all alloHCT patients in the absence of disease relapse.

• Meet with patient to provide education regarding post-HCT survivorship.
  — Goals of program shared with patient.
  — Patient provided with a brochure outlining the algorithm for post-HCT monitoring.

• Orders placed in anticipation of D+100 survivorship visit.
# D+100 Survivorship Visit

## Assessments
- FACT-BMT survey
- GVHD assessment (by oncologist)
- Tobacco use assessment

## Labs
- Liver function panel
- BUN, serum creatinine, random spot urine protein and random spot urine creatinine
- Hemoglobin A1C and fasting blood glucose
- Ferritin, serum iron, total iron-binding capacity
- Vitamin D 25-OH level

## Supplemental Medications
- OTC calcium citrate or calcium carbonate
- Vitamin D < 30 ng/mL – ergocalciferol 50,000 units weekly for 12 weeks followed by Vitamin D₃ 1,000 International units PO daily
- Vitamin D₃ 800-1,000 International units PO daily

## Tests
- Pulmonary function tests (only if GVHD present)

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FACT-BMT = Functional Assessment of Cancer Therapy-Bone Marrow Transplant; BUN = blood urea nitrogen; GVHD = graft-versus-host disease; OTC = over the counter; PO = by mouth
## 6 Month Survivorship Visit

### Assessments
- Same as D+100 with addition of NCCN Sexual Function Survey

### Labs
- Same as D+100 visit +
- Fasting lipid panel
- Ferritin if received RBC transfusions since previous check or if ferritin was > 1,000 ng/mL on initial check
- TSH and free T4

### Tests
- Pulmonary function tests (all patients)

### Possible Referrals
- Dental assessment with intraoral malignancy evaluation
- Ophthalmologic clinical exam
- Psychological evaluation for patients with recognized deficits

### Miscellaneous
- NMDP 6 Month after Transplant Care Guide reviewed with patient
- Vaccinations administered

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NCCN = National Comprehensive Cancer Network; NMDP = National Marrow Donor Program; RBC = red blood cell; TSH = thyroid stimulating hormone
# 12 Month Survivorship Visit

## Assessments
- Same as 6 month visit

## Labs
- Same as 6 month visit +
- Endocrinologic gonadal assessment
- Ferritin only if received RBC transfusions since previous check or if ferritin was > 1,000 ng/mL initially
- Immune reconstitution panel (at the discretion of attending physician)

## Tests
- DEXA scan for women, allogeneic transplant recipients, or patients at high risk of bone loss
- Echocardiogram with patients with risk factors for cardiac dysfunction
- Mammogram, breast MRI, and clinical breast exam for qualifying patients
- Pulmonary function tests

## Possible Referrals
- Same as 6 month visit +
- Dermatologic routine skin evaluation
- Gynecologic clinical exam for women with PAP test and HPV DNA test
- Onco-cardiology referral if indicated

## Miscellaneous
- NMDP 12+ Month after Transplant Care Guide reviewed with patient
- Vaccinations administered

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DEXA = dual energy X-ray absorptiometry; HPV = Human papillomavirus; NMDP = National Marrow Donor Program; Onco = oncology; PAP = Papanicolaou; RBC = red blood cell
# 18 Month Survivorship Visit

## Assessments
- FACT-BMT survey
- GVHD assessment (by oncologist)
- Tobacco use assessment

## Labs
- BUN, serum creatinine, random spot urine protein and random spot urine creatinine
- Fasting HDL-C, LDL-C, and triglycerides if on immunosuppressant therapy

## Tests
- Pulmonary function tests

## Miscellaneous
- Vaccinations administered

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GVHD = graft-versus-host disease; HDL = high-density lipoprotein; LDL = low-density lipoprotein
## 24 Month Survivorship Visit

### Assessments
- Same as 12 month visit

### Labs
- Same as 12 month visit +
- Fasting lipid panel only if on immunosuppressant therapy
- Hemoglobin A1C and fasting blood glucose
- TSH and free T4

### Tests
- Same considerations as 12 month visit +
- Pulmonary function tests only if GVHD present

### Possible Referrals
- Same as 12 month visit

### Miscellaneous
- Vaccinations administered
WVU Medicine Experience

• Thirty-two alloHCT patients enrolled with a total of 47 visits completed since go-live in December 2018
  — Seven patients excluded due to disease relapse or early mortality
  — New HCT patients are enrolled beginning with D+60 education visit
  — Established HCT patients slowly being rolled in at next relevant time point

• Visits typically last approximately 20 minutes and completed in conjunction with other clinic visits

• High clinic buy-in given streamlined process without increased workflow burden to attending physicians

AlloHCT = allogeneic hematopoietic stem cell transplantation; WVU = West Virginia University
Challenges Faced Post-Implementation

- Variable payer coverage for recommended tests and screenings
  --- Example: only one lipid panel may be covered/year

- Logistical challenges with WVU Medicine PFT lab
  --- Currently overbooked and next available appointment often 1-2 months out
  --- If patient misses a previously scheduled appointment, screening may be delayed

- Lack of dedicated pharmacy consultation space
  --- Due to frequency of visits early post-HCT, has not been a huge issue so far

- Time limitations if HCT pharmacist turnover occurs

HCT = hematopoietic stem cell transplantation; PFT = pulmonary function test; WVU = West Virginia University
Conclusions & Future Directions

• Preliminary review indicates increased frequency, timeliness, and extent of alloHCT survivorship screenings and preventive care at day +100.

• Plan future expansion of survivorship program to include autologous HCT and cellular therapy patients.

• In-depth analysis to be conducted in the next 1-2 years to assess overall impact more formally.
Important members of the team to include when developing a new HCT survivorship clinic include:

A. HCT physicians  
B. Advanced practice providers  
C. Pharmacists  
D. Nurses  
E. All of the above
Audience Response Question #2

A pharmacist-driven survivorship clinic has the potential to increase the timeliness and frequency of guideline-recommended screenings and preventive care after alloHCT.

A. True
B. False
Recommended References


• Council for Tobacco Treatment Training Programs. 2019. Accreditation for Tobacco Treatment Specialist Training Programs Available at: https://ctttp.org/accredited-programs/.
Best Practices: Pharmacist Involvement in an Established Provider-Run Clinic

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Lead Clinical Pharmacist, BMT/IMTX
Seattle Cancer Care Alliance/Fred Hutch Cancer Research Center
Seattle Cancer Care Alliance (SCCA)/Fred Hutch Cancer Research Center (FHCRC) Overview

- Number of adult transplants: 421
  - Allogeneic: 231 (55%)
    - Unrelated: 146 (63%)
    - Related: 51 (22%)
    - Cord: 28 (12%)
    - Haploidentical: 6 (3%)
  - Autologous: 190 (45%)

Data from fiscal year 2019
Seattle Cancer Care Alliance (SCCA)/Fred Hutch Cancer Research Center (FHCRC) Overview

• 4 outpatient autologous transplant teams (10-18 patients each)
• 6 outpatient allogeneic transplant teams (10-18 patients each)
• 1 transitional transplant clinic (TTC) team (25-30 patients)
• 1 long-term follow-up (LTFU) team (20-30 patients per week)
Team Structure: Active Teams

### Allogeneic Teams

- **Attending Physician**
- **Pharmacist**
- **Dietician**

- **Team 1**
  - APP
  - RN
  - TC

- **Team 2**
  - APP
  - RN
  - TC

- **Team 3**
  - APP
  - RN
  - TC

### Autologous Teams

- **Attending Physician**
- **Pharmacist**
- **Dietician**

- **Team 1**
  - APP
  - RN
  - TC

- **Team 2**
  - APP
  - RN
  - TC

APP: Advanced Practice Provider; RN: Registered Nurse; TC: Team Coordinator (scheduler)
Team Structure: TTC and LTFU Teams

TTC Team

- Attending Physician
- Pharmacist
- APP
- RN
- TC

LTFU Team

- Attending Physician
- Pharmacist
- APP
- APP
- APP
- RN
- RN
- RN
- RN
- TC

Clinic Team

Telemedicine Team

APP: Advanced Practice Provider; RN: Registered Nurse; TC: Team Coordinator (scheduler)
Common LTFU Questions

- Does my patient have GVHD?
- How to manage GVHD
- How to manage ADRs from GVHD therapies
- When and how to taper immune suppression
- Do they need to remain on prophylactic antibiotics?
- How to diagnose/treat uncommon post-HCT infections
- Immunization questions and schedules
- How to work up and treat late effects
- How to treat/manage relapse
Functions of the Pharmacists

- Immunosuppression taper development
- Drug interaction review
- Drug information
- Investigational protocol review
- Insurance coverage
Complexity of Medication Lists

MEDICATIONS:
1. Methotrexate 7.5 mg every Monday. - tapering
2. Prednisone 15 mg every other day.
4. Valtrex 500 mg p.o. twice daily.

CURRENT MEDICATIONS:
1. Acyclovir 800 mg twice daily.
2. AllerClear 1 tablet daily.
3. Allopurinol 200 mg daily.
4. Atovaquone 1500 mg daily.
5. Benadryl 50 mg p.o. at bedtime for insomnia.
7. Citracal plus vitamin D 1 tablet twice daily.
8. Fluconazole 150 mg weekly.
9. Ibuprofen 200 mg as needed for headache or backache typically uses once to twice per month.
10. Imodium 1 tablet as needed for loose stools. Using about every other day.
11. Levotyroxine 88 mcg daily.
12. Latanoprost eye drops 0.005% 1 drop to each eye daily.
13. Losartan 25 mg daily.
14. Magnesium oxide 1 tablet daily.
15. Metformin 500 mg once daily.
16. Metoprolol 200 mg daily.
17. Penicillin VK 500 mg twice daily.
18. Prednisone 6 mg every other day since 10/11/2019.
19. Protopic cream 0.03% applied once to twice daily to the skin changes on her left lower leg and foot.
20. Refresh eye drops using approximately 6 times per day, increased from her last visit was the sunny weather as well as the heat on in the car drying her eyes out.
21. Tacrolimus 0.5 mg twice daily.
22. Benefiber in her coffee each morning, does not remember daily.
23. KD025 at 300 mg daily on study 8699. Cycle 1 began 08/07/2019.
24. Flonase 1 spray to each nostril as needed for postnasal drip. She does not use this regularly.

<table>
<thead>
<tr>
<th>Medication</th>
<th>Instructions</th>
<th>Other Names, Product Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>LORPINE</td>
<td>2.5 mg by Mouth daily</td>
<td>lorazepam 2 mg tablet</td>
</tr>
<tr>
<td>calcium-vitamin D</td>
<td>1 tab by Mouth twice daily</td>
<td>Caltrate 600 + D</td>
</tr>
<tr>
<td>levemecine</td>
<td>30 mg by Mouth three times daily</td>
<td>levemecine 30 mg oral capsule</td>
</tr>
<tr>
<td>cholecalciferol</td>
<td>1,000 units by Mouth daily</td>
<td>Vitamin D 1000 units oral capsule</td>
</tr>
<tr>
<td>desmopressin</td>
<td>See Instructions: (2 mL PO rinse and spit 6 times a day, holding in mouth for 5 minutes)</td>
<td>desmopressin 0.5 mg/3 mL oral liquid</td>
</tr>
</tbody>
</table>

Facilitate 1.1% topical gel

multivitamin with minerals, no iron

Lovenox 1000 mg capsule

Pantoprazole 40 mg oral delayed release tablet

Potassium chloride

Prednisone 50 mg tablet

Rocumar 10 mg oral tablet

Roxicet 4 mg oral tablet

Sodium 0.5 mg oral tablet

Sodium 2.5 mg oral tablet

FiberScale 100 mg capsule

Lovenox 100 mg capsule

Calcetin 10 mg capsule
Taper Requests

- Almost all immunosuppressants
  - Steroids, tacrolimus, cyclosporine, sirolimus, mycophenolate mofetil
- Standardization
  - Chronic steroid taper vs. acute steroid taper

**Prednisone Steroid Taper**

<table>
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<tr>
<th>DATES</th>
<th>PREDNISONE DOSE</th>
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</thead>
<tbody>
<tr>
<td>1/0/1900 - 1/6/1900</td>
<td>0 mg A.M. daily</td>
</tr>
<tr>
<td>1/7/1900 - 1/13/1900</td>
<td>0 mg A.M. daily</td>
</tr>
<tr>
<td>1/14/1900 - 1/20/1900</td>
<td>0 mg A.M. daily</td>
</tr>
<tr>
<td>1/21/1900 - 1/27/1900</td>
<td>0 mg A.M. daily</td>
</tr>
<tr>
<td>1/28/1900 - 2/3/1900</td>
<td>0 mg A.M. daily</td>
</tr>
<tr>
<td>2/4/1900 - 2/10/1900</td>
<td>0 mg A.M. daily</td>
</tr>
<tr>
<td>2/11/1900</td>
<td>Off Prednisone</td>
</tr>
</tbody>
</table>

If you experience a worsening of your GVHD, stop tapering your prednisone and contact your local physician.

Last dose of Prednisone on: February 10, 1900
Question 1

Which of the following statements regarding best practice for immunosuppression tapers is correct?

A. All immunosuppressant tapers follow a standard schedule, therefore one template per drug is all that is needed.
B. Steroids are the only immunosuppressant that requires a taper; creation of a steroid template is all that is needed.
C. Taper templates can help expedite the formation of a taper schedule, but are not infallible.
D. After filling out a taper template, it can be considered accurate without a second check.
Drug Interaction/Information Questions

• Interactions:
  — Most commonly with chronic GVHD medications
    • Ibrutinib
    • Ruxolitinib
  — Secondary prophylaxis agents
    • Azole antifungals

• Information
  — Most commonly regarding herbal supplements
Investigational Study Patients

- Maintenance and chronic GVHD medications
- Medication review prior to enrollment
  — Ensure no prohibited medications are used
- Counsel patients on IMiD therapy
- Reviewing orders
  — Confirm written orders for chemotherapy/immunotherapy are appropriate

IMiD: Immunomodulatory Drug
Insurance Coverage Support

• Rare occurrence
• Most commonly cGVHD medications
  — Ruxolitinib
  — Ibrutinib
• Communicate between providers and billing technicians
Question 2

Within a stem cell transplant survivorship clinic, what areas can pharmacists provide help?

A. Immunosuppressant tapers
B. Drug information questions
C. Drug reviews and supplement questions
D. All of the above
Future Roles of the Pharmacist

• In-person patient visits
  — Drug and supplement review

• Prescriptive authority for tapers
  — Write for smaller tablet sizes

• Monitor late metabolic effects of transplant
  — Diabetes
  — Hypertension
  — Dyslipidemia
Recommended Readings


Best Practices?
Challenges and Opportunities in a Pediatric Survivorship Clinic

Tara B. Giblin, RN, MS, MPH, CPNP
Nurse Practitioner/Pediatric Survivorship Program Coordinator
Maria Fareri Children’s Hospital at Westchester Medical Center, Valhalla, NY
Epidemiology of Childhood Transplant Survivors

• Approximately 23,000 hematopoietic stem cell transplants (HCTs) performed in United States in 2017 (numbers are going up every year!)
• Pediatrics (age 0-20) accounts for ~15% of all HSCTs
• Most common disease categories:
  — Acute lymphoblastic leukemia
  — Acute myeloid leukemia
  — Solid tumors
  — Neurological disorders
  — Immune system disorders
  — Inherited abnormalities of erythrocyte differentiation or function (e.g., sickle cell disease)
• Survival rates for patients who live ≥2 years post-HCT are approaching 80%

Cumulative All-Cause Mortality by Treatment Period: A study by Holmqvist et al.

- N = 1388
- Transplanted 1974-2010 at one of two US institutions
- Lived ≥2 Years post-HCT
- Median age at HCT = 14.6 years
- Exposures:
  - Total Body Irradiation 64.3%
  - Cyclophosphamide 80.5%
  - Busulfan 25.6%
- Overall survival rate at 20 years post-HCT = 79.3%

Causes of death up to 25 years post-transplant

- N=244 patients from prior cohort

- Causes:
  - Infection
  - Chronic graft-versus-host-disease
  - Subsequent malignant neoplasm (SMN)
  - Cardiac disease
  - Pulmonary disease
  - Primary disease*
  - External causes
  - Other causes

What does this mean for transplant survivors?

- More likely to experience premature death versus general population even 25 years post-transplant!

- Risk factors:
  - Transplant at age 5-9
  - Female
  - Unrelated donor
  - Primary disease with high risk of relapse
  - Transplanted within 5 years

- Is there any good news?
  →Yes, these numbers are getting better in the recent transplant cohort!

What do we mean by “Late Effects?”

- Late effects are long-term side effects that occur ≥2 years after treatment ends
- Some people consider a late effect as occurring ≥1 year after transplant
- Late effects can result from:
  - Primary disease
  - Pre-transplant treatment exposures:
    - Chemotherapy
    - Radiation
    - Surgery
    - Transfusions
  - Conditioning regimen
  - Post-transplant GVHD

aHCT: autologous hematopoietic cell transplantation
The crux of survivorship: know the history and all else follows
Possible Late Effects from HSCT

Neuropsychological effects
- Depression, anxiety
- Post-traumatic stress disorder
- Neurocognitive deficits

Pulmonary diseases
- Bronchiolitis obliterans syndrome
- Cryptogenic organizing pneumonia
- Pulmonary hypertension

Kidney diseases
- Thrombotic microangiopathy
- Nephrotic syndrome
- Idiopathic chronic kidney disease
- Persistent acute kidney injury
- BK virus nephropathy

Iron overload

Bone diseases
- Osteopenia
- Osteoporosis
- Avascular necrosis

Endocrine diseases
- Thyroid dysfunction
- Gonadal dysfunction
- Diabetes
- Dyslipidemia
- Metabolic syndrome
- Adrenal insufficiency

Solid cancer
- Oral cavity
- Skin
- Breast
- Thyroid
- Other sites

Cardiovascular diseases
- Cardiomyopathy
- Congestive heart failure
- Valvar dysfunction
- Arrhythmia
- Pericarditis
- Coronary artery disease

Liver diseases
- Hepatitis B, Hepatitis C, liver cirrhosis
- Nodular regenerative/focal nodular hyperplasia

Gonadal dysfunction/infertility

Infectious diseases
- Pneumocystis jiroveci
- Encapsulated bacteria
- Fungi
- Varicella-zoster virus
- Cytomegalovirus
- Respiratory syncytial virus
- Influenza virus
- Parainfluenza virus

Others:
- Sensory
- Skin
- Dental
- GVHD

Can we manage all of these in a single clinic?
Pediatric Survivorship Program at Maria Fareri Children’s Hospital

End of Therapy Survivorship Care Plans (SCPs)
- Patients tracked in real time during rounds/tumorboard
- SCP delivered to post-transplant patients during routine follow-up visit with their primary oncology/HCT team
- Coordination of follow-up via Wellness & Survivorship team, primary treatment team, and pediatrician

Late Effects Clinic
- Interdisciplinary annual clinic visit
- Staffed by physician, nurse practitioner, neuropsychologist, psychologist, and social worker
- SCP delivery
- History/Physical exam
- Neurocognitive screen
- Specialty collaboration and referrals (e.g., cardiology, pulmonology)
- Work with primary care providers
- Feedback to primary team

Research
- Institutional Review Board-approved Registry
- Demographic info
- Outcome variables
  - Labs (e.g., complete blood count, complete metabolic panel, Lipids, Hormones, Thyroid, Cardiac biomarkers)
  - Cardiac studies
  - Lung function
  - Bone density
  - Audiograms
- Quality of Life indicators

NO PHARMACIST!!
Lack of Pharmacy In Clinic: The Challenge

- Some acute issues are managed within clinic (e.g., fungal rash)
- All chronic health issues are managed by specialists
  - Knowledge gap among specialists regarding management of HCT survivors
  - Patients likely to have multiple specialists (e.g., pulmonology, endocrinology, cardiology) who do not always communicate with each other
  - Pharmaceutical management by physicians unlikely to be monitored by a Pharmacist
  - WHO is the medical home? Survivorship Clinician? HCT team? Pediatrician?
  - Lack of oversight by a Medical Home may lead to errors including drug interactions
- How you get everyone in the same room?
  - In a tertiary care center, this is very difficult
  - Patient with multiple providers needs multiple appointments—compliance is a big issue!
  - Do you really need to? Maybe not.
Having Pharmacy In Clinic: The Opportunity

• Many problems that arise in survivorship do not necessarily require specialty management
• Others may be co-managed after an initial specialist recommendation with less frequent specialty follow-up
• Common late effects we encounter in our clinic:
  — cGVHD
  — T and B cell dysfunction and IVIG replacement
  — Endocrine late effects like osteopenia/Vitamin D deficiency, hypothyroidism
  — Cardiac late effects like hypertension
  — Neurological side effects like seizures
  — Pulmonary late effects like obstructive or restrictive pulmonary disease/asthma
  — Psychological disorders like depression or anxiety
  — Cognitive issues like ADHD

ADHD attention deficit hyperactivity disorder; cGVHD chronic graft-versus-host disease
Case Study 1: JD

- Female diagnosed with Hodgkin Lymphoma Stage IIIB at age 9 in January 2013
  - Initial treatment on Children’s Oncology Group Protocol AHOD0831:
    - Doxorubicin
    - Bleomycin
    - Vincristine
    - Etoposide
    - Prednisone
    - Cyclophosphamide
    - Risk-adapted radiation therapy to the chest
    - Completed therapy May 2013

- Disease relapse February 2014 (9 months after therapy completion)
  - Bridging therapy with brentuximab, ifosfamide, etoposide and carboplatin

- aHCT June 2014
  - Conditioning with etoposide, carmustine, cyclophosphamide, methylprednisolone

- Bridging therapy with rituximab

- AlloHCT in September 2014
  - Conditioning with fludarabine, busulfan

aHCT: autologous hematopoietic cell transplantation
alloHCT: allogeneic hematopoietic cell transplantation
Case Study Continued

• Patient presents today to Survivorship Clinic at Age 15
• Post-Transplant Issues
  — Gastrointestinal:
    • cGVHD of the liver, now resolved
    • Was treated with azathioprine and extracorporeal photopheresis
  — Endocrine:
    • Hypothyroidism, managed by endocrine with levothyroxine 100 micrograms daily
    • Osteopenia (decreased bone mineral density) managed with high dose Vitamin D 50,000 IU twice a week
  — Pulmonology
    • Restrictive pulmonary disease managed with inhaled corticosteroids PRN
  — Cognitive
    • Complains about ability to concentrate, maintain attention
    • Difficulty making friends, feels “angry” a lot

PRN: as needed
## Case Study Continued: Is there a role for pharmacy?

<table>
<thead>
<tr>
<th>Current Clinic Model</th>
<th>Clinic with a Pharmacist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient is seen annually in survivorship and current medications are reviewed</td>
<td>The Pharmacist would be able to identify potential medication interactions and prevent harm</td>
</tr>
<tr>
<td></td>
<td>Pharmacist would know if patient is properly dosed for diagnosis and/or if doses need to be adjusted for growth</td>
</tr>
<tr>
<td>Patient currently sees multiple providers for medication management and has several specialty appointments every year/misses many days of school.</td>
<td>Patient could have all medications managed at the survivorship clinic and miss fewer school days</td>
</tr>
<tr>
<td>Patient does not know corticosteroid name or dose, and survivorship team does not have access to pulmonology medical record</td>
<td>The Pharmacist could assume management of pulmonary medications and ensure patient understands what and why they are taking</td>
</tr>
<tr>
<td>Patient possibly needs psychotropic medications that cannot be prescribed in clinic</td>
<td>Pharmacist could work with patient and clinic psychologist/neuropsychologist to identify and prescribe appropriate therapy</td>
</tr>
</tbody>
</table>
Pearls

- Pediatric HCT survivors experience myriad late effects
- Late effects result in significant morbidity and mortality
- Many late effects do not require a medical specialist for management, or can be co-managed by a Pharmacist after initial specialty consult
- Fewer specialty appointments means fewer days missed from school or work
- Having a Pharmacist in clinic may prevent issues of non-compliance/lack of follow-up with prescribed medications and specialty referrals
Audience Response Question 1

Which of the following are benefits of having a Pharmacist in a pediatric HCT survivorship clinic (select all that apply):

A. Patients miss fewer days of school/work when they don’t have to attend multiple specialty appointments

B. Having a Pharmacist overseeing all medications a patient is taking may prevent medical errors and drug interactions

C. Parents of survivors can have their prescriptions written during the visit too

D. A and B only
Recommended References

- Cupit MC, Duncan C, Savani BN, & Hashmi SK. Childhood to adult transition and long-term follow-up after blood and marrow transplantation. Bone Marrow Transplant. 2016, 51(2):176-81


- Inamoto & Lee, Late effects of blood and marrow transplantation. Haematologica. 2017, 102(4), 614-625