# INFECTIONS IN TRANSPLANT PATIENTS

Dr Clementine Fraser – Respiratory and Transplant physician





### Infections in transplant patients

Leading cause of problems especially in first year.

Clinical manifestations can be few or atypical in immunocompromised hosts

Eg. 40% of infection cause no fever

Many of the pathogens are uncommon in immunocompetent individuals

Important to try to get exact diagnosis so correct decisions can be made about treatment

Drug interactions a significant aspect of decisions about treatment (immunosuppression etc.)

Element renal decline.

# Different Types of Infection

Bacterial Infections

Viruses

Fungus

#### Timeline of Common Post-Transplant Infections

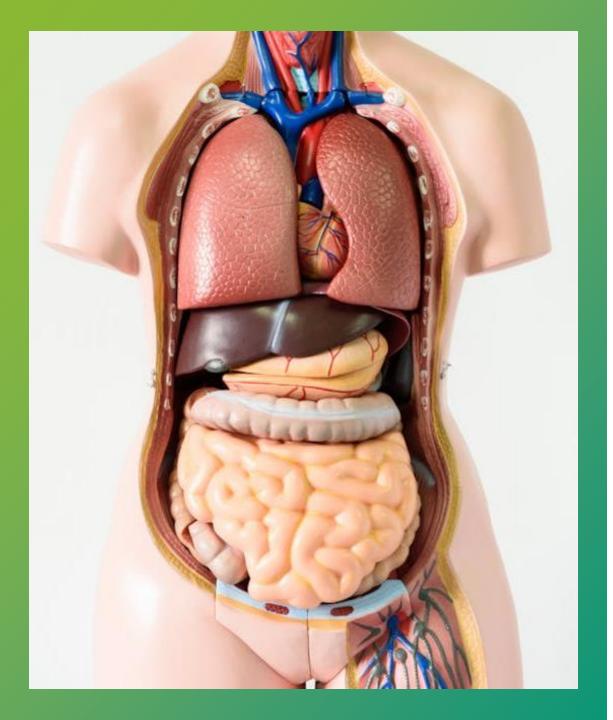
	< 4 Weeks	I-12 Months	> 12 Months
	Nosocomial, technical, donor/ recipient	Activation of latent infections, relapsed, residual, opportunistic infections	Community acquired
		Adenovirus	
		BK polyomavirus	
		Comr	munity-acquired respiratory viruses
		Cytomegalovirus	
		Epstein-Barr virus	
		Hepatitis B	
2		Hepatitis C	
3		Herpes simplex virus	
		Human herpesvirus 6, 7	
			Human Papillomavirus
			JC polyomavirus and PML
			PTLD
		Varicella zoster virus	•
Do	onor derived viruses		
		Aspergillus	Aspergillus
	Candida species (non-albicans)		
,	Candida species (non-aib	icans	Cryptococcus neoformans
200	Calidida species (non-au		Cryptococcus neoformans
39	Candida species (non-aid	Endemic fungi	
39	Candida species (ion-au	Endemic fungi Mucor, Scedosporium	
30	Canada species (non-au	Endemic fungi	
ŀ		Endemic fungi Mucor, Scedosporium	
ŀ	nastomotic leaks	Endemic fungi Mucor, Scedosporium	
ŀ		Endemic fungi Mucor, Scedosporium	
Ar	nastomotic leaks	Endemic fungi Mucor, Scedosporium	
Ar	nastomotic leaks Glostridium difficile	Endemic fungi Mucor, Scedosporium	Mucor, Scedosporium
Ar	nastomotic leaks Glostridium difficile	Endemic fungi Mucor, Scedosporium Pneumocystis Jirovecil	Mucor, Scedosporium
Ar	nastomotic leaks Glostridium difficile	Endemic fungi Mucor, Scedosporium Pneumocystis Jirovecil Listeria monocyt Nocardia species	Mucor, Scedosporium
Ar	nastomotic leaks Glostridium difficile	Endemic fungi Mucor, Scedosporium Pneumocystis Jirovecil Listeria monocyt Nocardia species	
Ar Lin	nastomotic leaks Clostridium difficile ne infection	Endemic fungi Mucor, Scedosporium Pneumocystis Jirovecil Listeria monocyt Nocardia species	Mucor, Scedosporium
Ar Lin	nastomotic leaks  Clostridium difficile ne infection  Gound infection	Endemic fungi Mucor, Scedosporium Pneumocystis Jirovecil Listeria monocyt Nocardia species	Mucor, Scedosporium
Ar Lin	nastomotic leaks Clostridium difficile ne infection found infection osocomial pneumonia	Endemic fungi  Mucor, Scedosporium  Pneumocystis jirovecii  Listeria monocyt  Nocardia species  Myco	Mucor, Scedosporium  cogenes  is bacterium tuberculosis, non-TB mycobact
Arr Lir	nastomotic leaks Clostridium difficile ne infection found infection osocomial pneumonia	Endemic fungi  Mucor, Scedosporium  Pneumocystis jirovecii  Listeria monocyt  Nocardia species  Myco	Mucor, Scedosporium  cogenes  bacterium tuberculosis, non-TB mycobact
Lin	nastomotic leaks Clostridium difficile ne infection found infection osocomial pneumonia	Endemic fungi  Mucor, Scedosporium  Pneumocystis jirovecii  Listeria monocyt  Nocardia species  Myco	Mucor, Scedosporium  cogenes  bacterium tuberculosis, non-TB mycobact

Kev

**Bold type** indicates infections potentially preventable by prophylaxis. May be delayed until prophylaxis is discontinued.

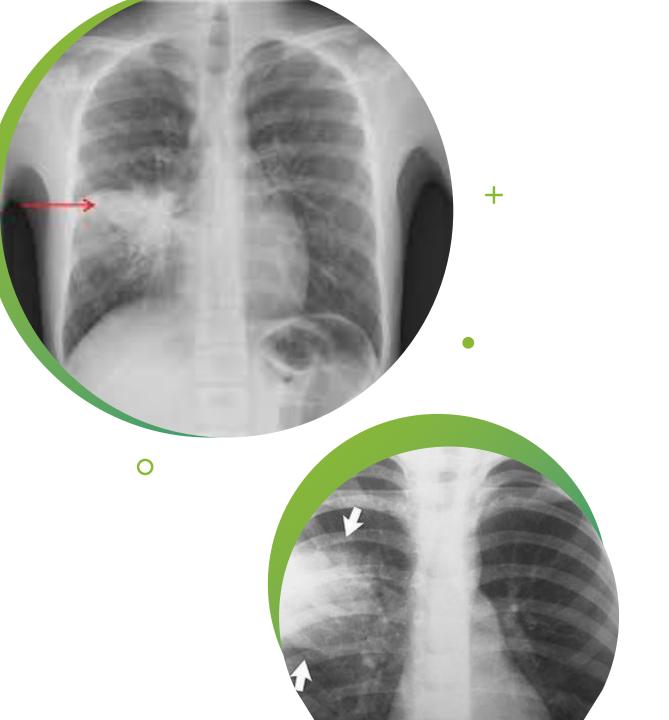
Thickness of line indicates relative

- Donor (fluid/ BAL)
- Ventilator positive pressure/ tubes etc.
- Immunosuppressive therapy more immunosuppressed for 3 months. Higher aims
- Procedures / lines (leaks/fluid collections/poor wound healing) - Urinary/Vascular/Dialysis catheters, surgical drains,
- Wounds breaks in skin/mucosae
- Lung slightly more than heart
- Lungs not sterile
- Open to elements
- RATG (aggressive immunosuppressant early on)



### Common Sites

- Chest
- Urine (UTI)
- Skin (cellulitis)
- Bowel
- Sternum
- Line (eg. dialysis)



### Chest Infections / Pneumonia

- Interchangeable
- Pneumonia changes on CXR
- Sputum
- Fever
- Send off sample
- Bloods/CXR
- Spirometry (lung)

### Targeting treatment







**SPUTUM CULTURES** 

WHAT GROWN BEFORE

WHAT RADIOLOGY AND BLOODS LOOK LIKE



### Covid (Virus)

- Cough cold fever
- Lateral flow
- Swab
- Early might be eligible for medications that reduce severity

Molnupiravir

Sotrovimab

Paxlovid (nirmatrelvir / ritonavir combination), **should not be** used in transplant recipients due to the significant interaction with calcineurin inhibitor (Tac) and mTOR (siro).

Remdesivir

IL-6 inhibitors (Tocilizumab and Sarilumab, Sotrovimab)

Keep lateral flows at home

# Urinary Tract Infections

Symptoms can include pain with urination, frequent urination, and fever

Catheters

Immunosupression

Sample

Target treatment – Antibiotics

Keep hydrated More at risk of becoming systemic

### Diarrhoea

Normal flora disrupted. Immunosupression. Microbiome Norovirus C difficille CMV

0

Table 1. Common causes of post-transplant diarrhea

Infectious	Noninfectious
Bacterial	IS medications
Clostridium difficile	Mycophenolate
Campylobacter spp.	Tacrolimus
Salmonella spp.	Cyclosporine
Bacterial overgrowth	Sirolimus
Aeromonus spp.	
Escherichia coli	
Viruses	Non-IS medications
CMV	Antibacterial
Norovirus	Antiarrhythmic
Sapovavirus	Antidiabetic
Rotavirus	Laxatives
Adenovirus	Proton pump inhibitors
	Protease inhibitors
Parasitic	Other
Giardia	GVHD
Cryptosporidium	PTLD
Isosopora Cyclospora	IBD
Microsporidium	Colon cancer

- Send sample
- Stay hydrated protect kidneys
- May need treatment depending on cause



# Sternum Osteomyelitis (bacteria)

Crunching/
Weeping clicking
Instability

Swab

+

(

### CMV

 CMV is a common virus that is usually harmless in the immunocompetent population.

#### VALGANCICLOVIR

- Neutropenia, nephrotoxicity
- FOSCARNET
  - Nephrotoxicity
- MARIBAVIR

 Risk Factors - Who is most at risk?

### CMV



Intensive Immunosuppression:

**Longer Ischemic Time:** 

**Type and Duration of Prophylaxis:** 

Premature Discontinuation of Antivirals:



### Varicella

- Contact has chicken pox/shingles
  - If direct contact or if unsure, advise full varicella tx
  - Same day prescription of aciclovir 400mg 5x daily for 7-10 days
  - If develop rash they must contact transplant centre; disseminated Zoster can be serious may need IV aciclovir/ steroids
  - Eligible for Shingrix vaccine



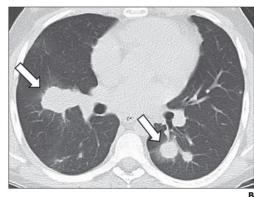


Fig. 11—Posttransplantation lymphoproliferative disorder (PTLD) in 26-year-old man 4 months after bilateral lung transplantation.

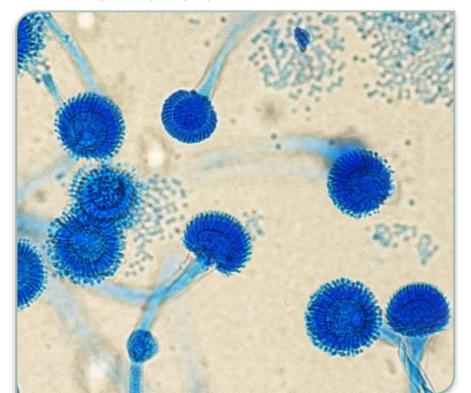
A. Multiple lung nodules were detected incidentally on surveillance chest radiograph.

B. CT scan shows multiple nodules with surrounding halo of ground glass (arrows). Percutaneous CT-guided biopsy confirmed diagnosis of PTLD.

## EBV associated PTLD

- Post-transplantation lymphoproliferative disorder (PTLD) is a widely recognized complication of transplantation.
- Uncontrolled growth of B lymphocytes –
- Fever, weight loss, night sweats, fatigue, and Lymphadenopathy
- The incidence of PTLD rare
- Primary Epstein-Barr virus (EBV) infection is a major risk factor as well as immunosuppression.
- Patients who were EBV- before lung transplant are more likely to develop PTLD
- Ix CT CAP if suspect EBV DNA copies

- Lung or disseminated (eg. in blood) In lungs initially likes to sit on the joins and the sutures
- Colonisation
  - Tx candidates Pre transplant (eg. CF or bronchiectasis patients for lungs
    - Aspergillus spp most common (A. fumigatus 59%, A.flavus 35%)
- Invasive fungal infection post-Tx
  - Rates 3-14%
  - Why on prophylaxis



### Fungi and transplant



Risk factors:
Colonisation before/early after Tx
Acute/chronic rejection
CMV infection
Single lung tx
Airway stents
Diabetes

PcP -Pneumocystis jirovecii

Pneumocystis jirovecii is a ubiquitous and opportunistic fungus that is localized in the alveoli.

Dyspnoea and/or non-productive cough, drop in LF

Lifelong prophylaxis is required for tx patients.

Agents – most co-trimoxazole.



### Mitigating risk



0



VACCINATION – PNEUMOCOCCAL, COVID, INFLUENZA , SHINGLES, RSV



SENSIBLE IN CROWDED PLACES



**ACTIVE** 



EARLY INTERVENTION/ CONTACT



TAKING PROPHYLAXIS WHERE APPROPRIATE/ SUITABLE

### Prophylaxis

Aciclovir, Valganciclovir or Ganciclovir 3 months or 6 in D+/R- CMV, CMV viremia monitored for regularly.

Co-trimoxazole - PCP prophylaxis for life PCP

Azithromycin (also reduces rejection but is a good antibiotic too).

Antifungals – 100 days Nystatin

Vaccinations – influenza, pnemococcal, covid 19