

Name:

Block:

Date:

Activity: organ allocation case study

After **informed consent** has been obtained for organ donation and healthcare professionals have verified that the organs are functioning properly (through **individual organ testing**), the available organs are **allocated** to potential organ recipients who are on the organ transplant waitlist. The organs will not be recovered for donation unless a potential recipient is identified.

What factors do healthcare professionals consider when determining which patients will receive the donated organs? How do they determine who the best “match” is?

1. Blood type of potential recipient (are they a “match” in comparison to the blood type of the organ donor?)
2. Organ size: will the donated organ fit into the recipient? Is it an appropriate size for their body?
3. Medical urgency: how badly does this person need to organ?
4. Length of time on the waitlist: out of all the “matches”, who has been waiting the longest?

The physical location of the potential recipients also comes into play. For the most part, organs donated in BC will stay in BC. If there are no matches in BC, the organ will go to a recipient in the closest Canadian province (in terms of physical distance/travel time). If there are no Canadian matches, the organ will go to a recipient in the United States (whoever is the closest in terms of physical distance/travel time).

Discussion question:

- If there are no “matches” in BC, and an organ is going to go out-of-province, why would it make sense to send the organ to the recipient who is **closest** to BC in terms of physical distance/travel time?

Note: in certain scenarios, medical urgency can override these location-based factors. Someone may be classified as a “high status recipient”, which means that they are likely to pass away if they do not receive an organ transplant within the next 24-48 hours. If a Canadian patient who is classified as a “high status recipient” is a match for a particular organ, they will receive that organ before other “matches” in BC, *even if they are from another province* (due to the medical urgency of the situation).

The same applies for people who are “highly sensitized.” This means that they are likely to reject *most* donated organs due to high antibody levels in their blood. If a Canadian patient who is “highly sensitized” is a match for a particular organ, they will receive that organ even if they are from a different province (because finding a match is very unlikely for them, and this might be the only time that they are a “match” for a donated organ).

Case study activity

In this activity, you will use the following information to determine which potential recipient would be the best “match” for a particular donated organ.

Blood Type

The information below is taken from the Canadian Blood Services web page “What’s my blood type?”

Use the chart below to determine whether a donor’s organ could go to a particular recipient. The red symbol indicates a “match” between those blood types.

Understanding your blood type

Everyone has a type. You belong to one of four:

O, A, B or AB.

An additional factor—the ‘Rh factor’—determines whether your type is **positive** or **negative** (though this is used only for blood matching, not organ matching).

Knowing your blood type is important because it determines to whom you can donate blood, and from whom you can receive blood.

		DONOR BLOOD TYPES							
		O-	O+	B-	B+	A-	A+	AB-	AB+
RECIPIENT BLOOD TYPES	AB+	ⓧ	ⓧ	ⓧ	ⓧ	ⓧ	ⓧ	ⓧ	ⓧ
	AB-	ⓧ		ⓧ		ⓧ		ⓧ	
	A+	ⓧ	ⓧ			ⓧ	ⓧ		
	A-	ⓧ				ⓧ			
	B+	ⓧ	ⓧ	ⓧ	ⓧ				
	B-	ⓧ		ⓧ					
	O+	ⓧ	ⓧ						
	O-	ⓧ							

Organ Size

We will use **chest circumference** (in centimeters) as our way of determining if the lungs are the right size to fit into the new recipient. A recipient who is a “match” should have a chest circumference that is close in value to the donor’s: within 10 cm [plus or minus 10 cm]).

Height and weight are used to determine if a donor heart or liver will fit into a recipient. For liver, the size match may be affected by many recipient factors, such as the size of their liver due to their disease process, or if they have already had a previous liver transplant. If the recipient has a large amount of **ascites** (fluid build up in their abdomen), or if they have **polycystic liver disease**, which causes an enlarged liver, then they are able to receive a liver from a larger donor. However, if they have had a previous liver transplant, then due to **adhesions, or scar tissue** of the tissues, they will need a smaller liver because there will be less room in their abdomen for the donor liver.

Size is generally not a factor for kidneys, unless the donor or recipient is a small child. If the donor is a small child, both of their kidneys may be transplanted into one adult to compensate for the size discrepancy.

Medical Urgency

In the scenarios below, medical urgency is rated on a scale of 1 to 10 (1 being “not very urgent” and 10 being “very urgent”). Refer to the details about “high status” or “highly sensitized” recipients if needed.

Time on the Waitlist

For the most part, the donated organ will go to the “match” who has been on the waitlist the *longest* if all other factors are approximately equal.

Remember to consider physical distance/travel time if the organ is going out-of-province. Note that all transplants in BC take place in one of three hospitals in Vancouver. When an organ becomes available, potential recipients quickly travel to Vancouver for the transplant surgery to take place.

Scenario #1: A kidney is available from an individual at the University Hospital of Northern British Columbia in Prince George. Their blood type is O+.

Here is a list of potential recipients:

Name (initials)	Blood Type	Chest circumference (cm)	Medical urgency (scale of 1-10)	Time on the waitlist	Location of recipient
SC	B-	112 cm	5	18 months	Sidney, BC
JW	A+	84 cm	2	6 months	Kitimat, BC
OR	O+	86 cm	4	7 months	Montreal, QC
sRR	B+	142 cm	9	12 months	Prince Rupert, BC
SJ	O-	77 cm	9	4 months	Vancouver, BC
AN	AB+	99 cm	10 (“high status”)	1 month	Winnipeg, MB
LR	A-	129 cm	4	8 months	Vancouver, BC
ST	AB+	95 cm	8	12 months	Duncan, BC
TO	O-	69 cm	10 (“high status”)	4 months	Toronto, ON
PN	O+	105 cm	3	21 months	Burnaby, BC

Who are all the “matches” for this organ? Hint: determine “matches” based on blood type. Out of these “matches”, which potential recipient should this kidney go to? Explain your thought process:

Scenario #2: A pair of lungs are available from an individual at Royal Jubilee Hospital in Victoria. Their blood type is AB+. Their chest circumference is 89 cm.

Here is a list of potential recipients:

Name (initials)	Blood Type	Chest circumference (cm)	Medical urgency (scale of 1-10)	Time on the waitlist	Location of recipient
YB	O-	104 cm	5	8 months	Tofino, BC
ML	AB+	70 cm	6	15 months	Castlegar, BC
SE	O+	99 cm	4	7 months	Vancouver, BC
KG	AB+	88 cm	8	11 months	Edmonton, AB
QE	B+	91 cm	2	14 months	Kelowna, BC
LL	AB+	88 cm	8	11 months	Winnipeg, MB
LR	A-	110 cm	4	6 months	Vernon, BC
PD	B+	80 cm	7	20 months	Kamloops, BC
DY	B-	134 cm	2	24 months	Abbotsford, BC
MM	AB+	68 cm	9	4 months	Ladysmith, BC

Who are all the “matches” for this organ? Hint: determine “matches” based on blood type and chest circumference first. Out of these “matches”, which potential recipient should these lungs go to? Explain your thought process:

Scenario #3 (create your own): Create a hypothetical donor from BC, assigning them a blood type and a chest circumference value. Fill out the table below with potential recipients. Assign each potential recipient a value for blood type, chest circumference, medical urgency, time on the waitlist, and physical location so that there is **one** clear “perfect match” who the organ should be allocated to. Exchange scenarios with a classmate and see if you can correctly determine the perfect “match”.

Donor information:

List of potential recipients:

Name (initials)	Blood Type	Chest circumference (cm)	Medical urgency (scale of 1-10)	Time on the waitlist	Location of recipient

Who are all the “matches” for this organ? Hint: determine “matches” based on blood type and chest circumference first. Out of these “matches”, which potential recipient should this organ go to? Explain your thought process:
