

# Using Simulation to improve physicians, patients and machines scheduling in a cancer treatment facility

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## ABSTRACT

The administrators of l'Hôpital Cité de la Santé in Laval are confronted with uncertain decisions in designing a new Department of Oncology.

However, the difficulty, at this stage, is to assess the impact of decisions on the functioning of operations.

By simulation, key parameters are analyzed such stochasticity at patients' arrival, coordination of operations and resources allocation.

## GENERAL ISSUES

Increase of waiting time, postponement of appointments and reallocation of resources due to :

- Augmentation of new cancer by 3% in Canada
- Shortage of Staff
- Impact of palliatives patients on the appointments of curatives patients
- Accumulation of patients in the system

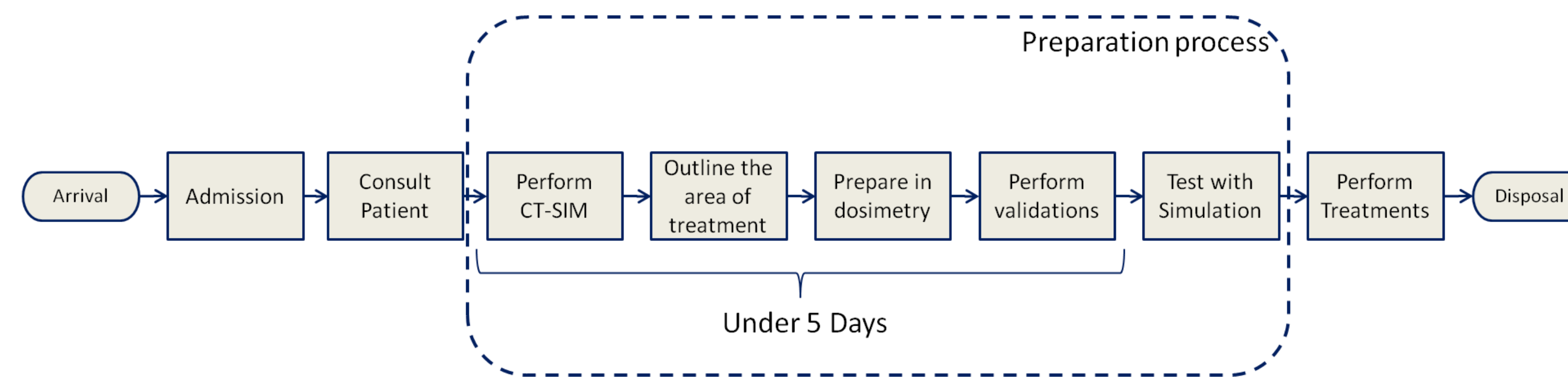
## OBJECTIVES FOR THE NEW ONCOLOGY CENTER

Reduce the time between the CT-SIM and the first day of treatment to 5 days (Actual 20 days)

Expected Benefits:

High quality of treatment, Stabilization of process, Planning of resources, Staff Satisfaction

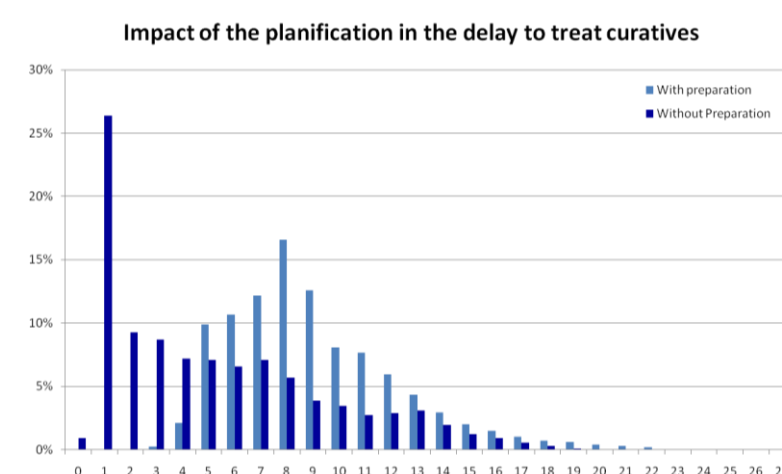
## PROCESS



## SIMULATION'S ROLE

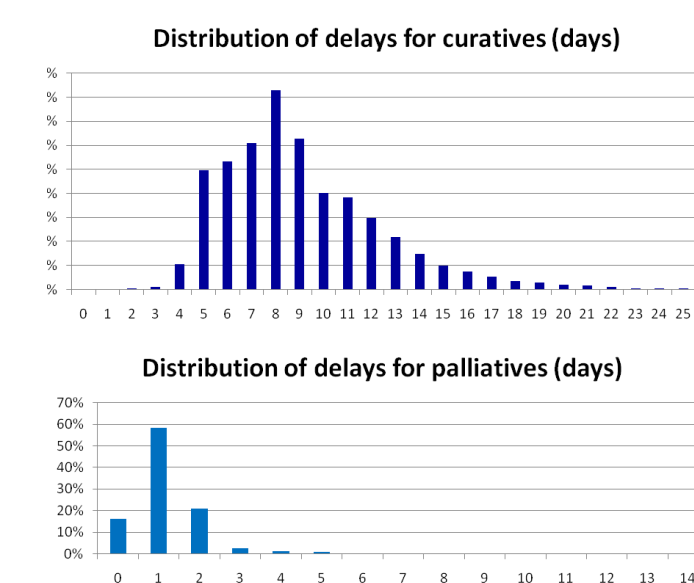
Elimination of bottlenecks

Validation of organizational resources



Slot reservation for palliative

Find the right amount of slots to reserve

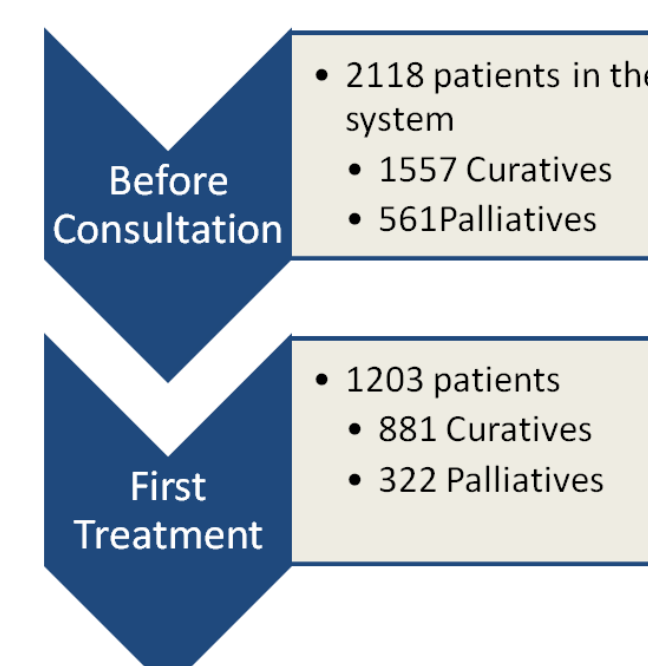


Standardization of Physician's tasks

Create a weekly Schedule

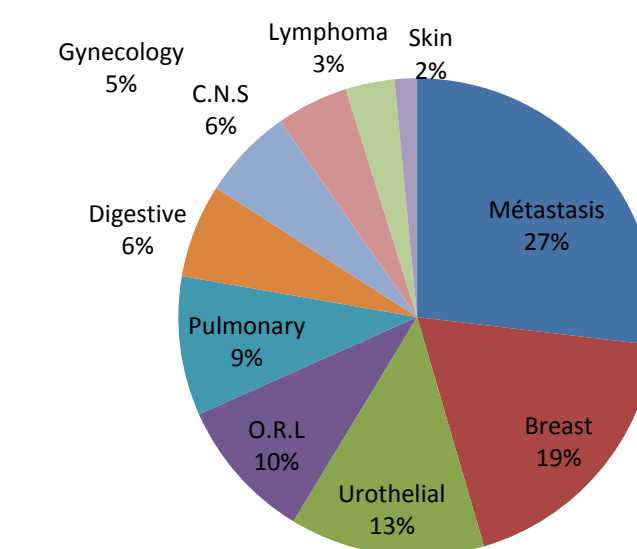
	Monday		Tuesday		Wednesday		Thursday		Friday	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Phy A	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue
Phy B	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue
Phy C	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue
Phy D	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue
Phy E	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue
Phy F	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue
Phy G	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue

### Patient flow



## DATA COLLECTED

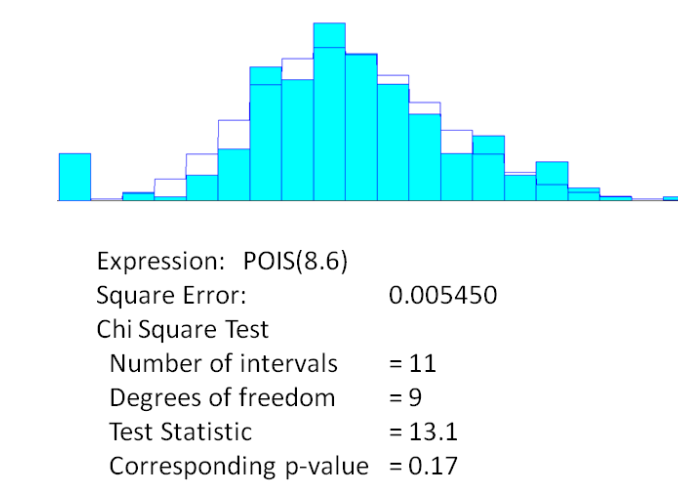
### Cancer Distribution



### Resources

- Equipments
- 4 linear accelerators (machines)
  - 2 CT-SIM Scanners
- Human Resources
- 7 physicians
  - 28 technologists
  - 4 dosimetrists
  - 9 physicists

### Representation of Patient Arrival



## RESULTS AND FURTHER WORK

### Validation of the maximum delay

Type Cancer	Delay	Respect	Less than 5 days
Digestive	14	92%	49%
Skin	28	100%	35%
Urothelial	28	100%	49%
Central Nervous System	14	96%	54%
Pulmonary	14	94%	49%
Lymphoma	14	92%	51%
ORL	14	93%	52%
Breast	28	100%	47%
Gynecology	14	95%	59%
Metastasis	3	98%	

### Next Steps

- Revise capacity of the linear accelerators
- Implement an heuristic model to improve the physician's schedule

## AKNOWLEDGMENT

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