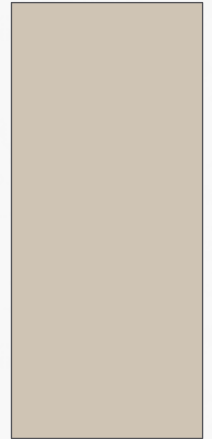


**THE MUHC PLEURAL CARE PROGRAM  
TURNING CHALLENGES INTO  
OPPORTUNITIES**

STÉPHANE BEAUDOIN MD, FRCPC  
JULIE DALLAIRE INF. MSc



# DISCLOSURE OF CONFLICTS OF INTEREST

- No conflicts of interest to declare

# EDUCATIONAL OBJECTIVES

- After this presentation, attendees will be able to:
  - Recognize some of the challenges faced by patients suffering from pleural diseases at the MUHC
  - Identify and apply strategies to alleviate those challenges
  - Describe some of the MUHC pleural care program initiatives

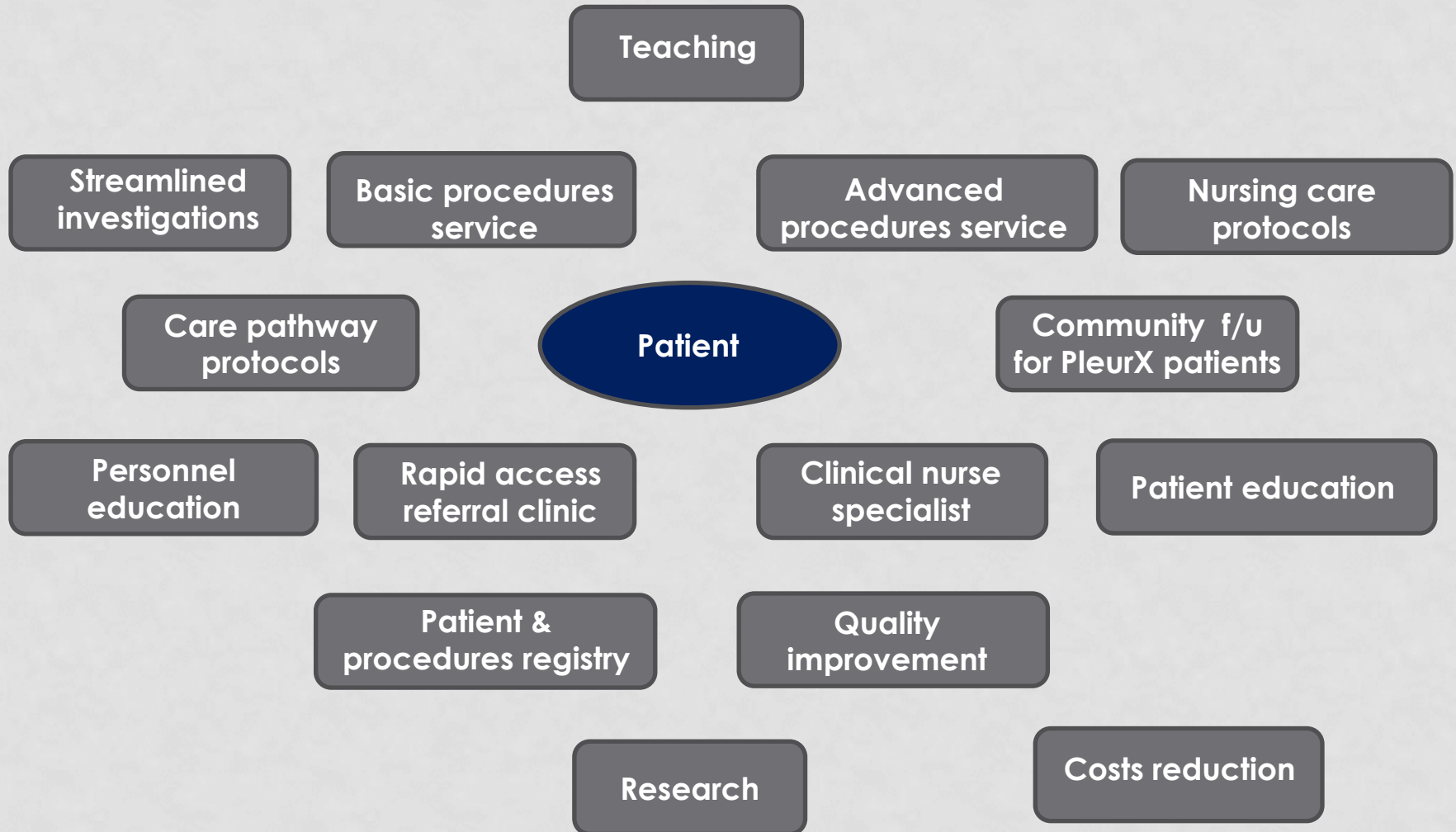
# BURNING QUESTIONS

- **What are the barriers to palliation faced by patients suffering from a malignant effusion at the MUHC?**
- **How can the outcome of patients with pleural infection be improved at the MUHC?**

# WHAT IS THE MUHC PLEURAL CARE PROGRAM?

An interdisciplinary and patient-centered plan for improving the quality of care provided to patients with pleural diseases

# THE MUHC PLEURAL CARE PROGRAM



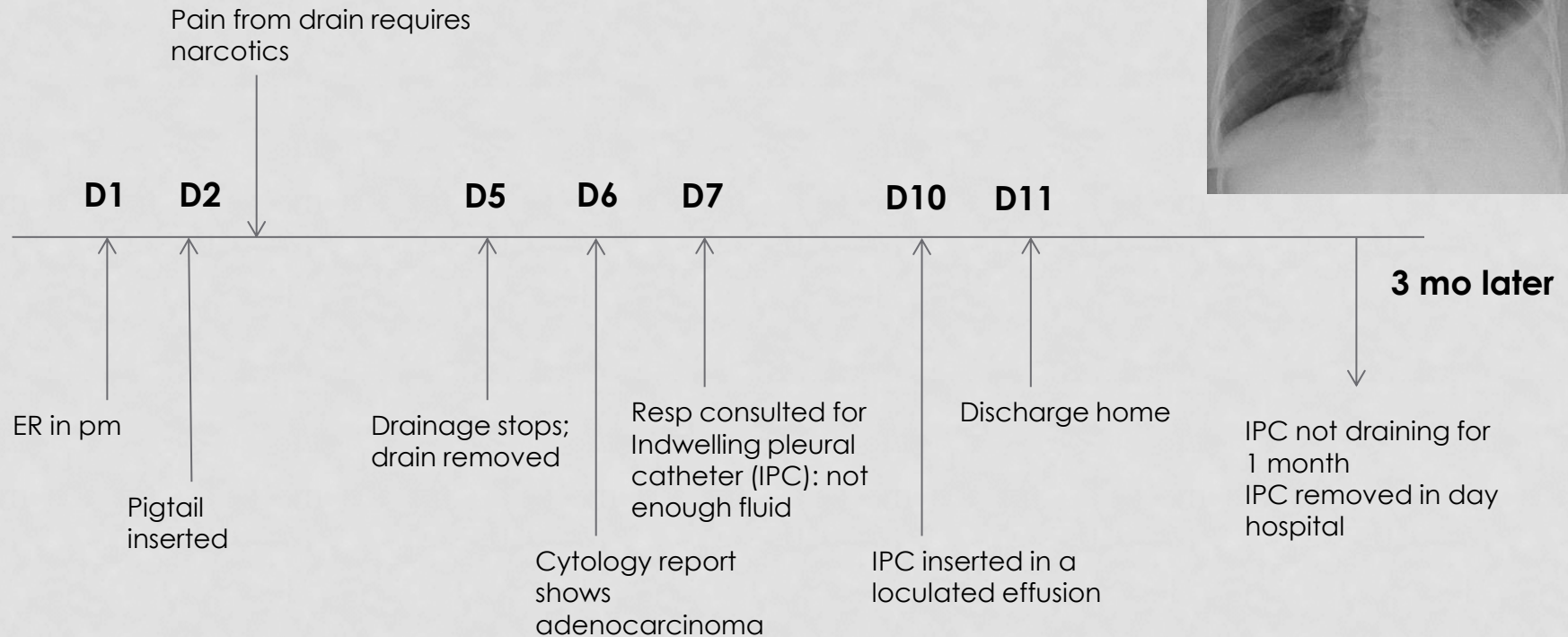
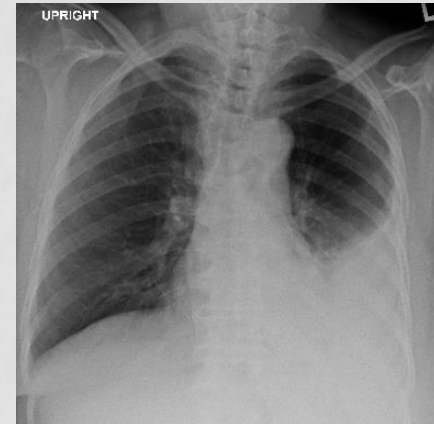
# MS D, 60F WITH PRIOR BREAST CANCER

- Presents to ER with new & progressive dyspnea on exertion over two weeks
- Afebrile, no WBC elevation
- Not hypoxemic
- A chest drain is inserted



# UNFORTUNATE SCENARIO

60F with prior breast Ca, presents to ER with MRC 4 SOB





# OBJECTIVES OF THE MUHC PLEURAL CARE PROGRAM

- To improve the access to & quality of care provided to patients with pleural diseases
  - Better align the procedures with the needs of the patients
  - Optimize patient care pathways
- To improve the knowledge and competencies of health care workers regarding pleural care
- To promote research initiatives

# THE PLEURAL CARE WORKGROUP

- An interdisciplinary team assembled to tackle the organizational and educational challenges

**Nursing**

**Radiology**

**Thoracics**

**Respirology**

**Pharmacy**

# THE PLEURAL CARE WORKGROUP

**Samia Saouaf**, nursing educator, thoracics/ general surgery

**Ludovic Aubin**, thoracic surgery nurse coordinator

**Pierre Chassé**, nursing educator, ER-Glen

**Pauline Machon**, Chest day hospital nurse

**Megan McQuirter**, nursing educator, cardiology

**Denis Gaumond**, nursing practice consultant, nursing department

**Julie Dallaire**, clinical nurse specialist, respirology

**Céline Dupont**, assistant chief pharmacist

**David Valenti**, interventional radiologist

**Jonathan Spicer**, thoracic surgeon

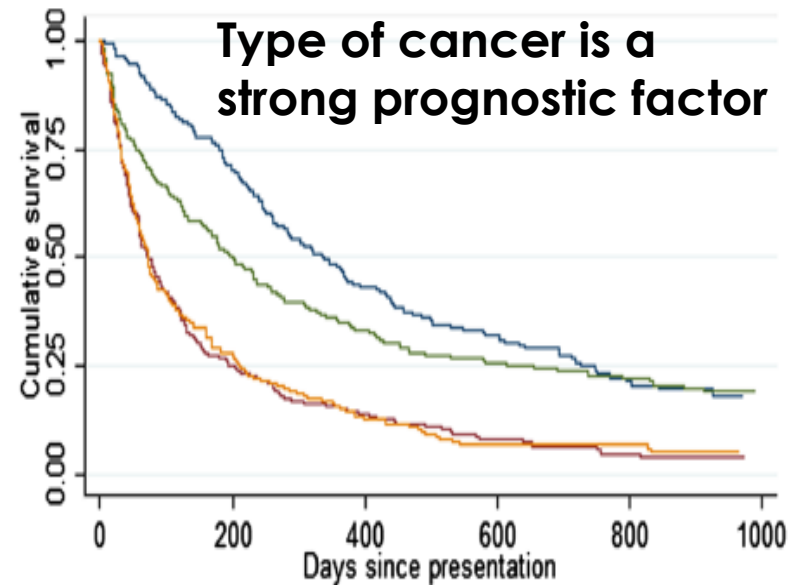
PATIENTS SUFFERING FROM  
MALIGNANT EFFUSIONS

# MALIGNANT PLEURAL EFFUSIONS

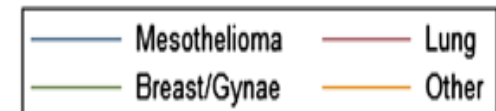
- Malignant pleural effusions (MPE) are a common and debilitating problem
  - Present in up to 15.9% of new cases of lung cancer  
Morgensztern D et al. JTO2012
  - Present at some point in the course of metastatic lung cancer in up to 50% of cases
  - Seen in 7-11% of patients with breast cancer  
ATS statement on MPE 2000

# MPE: A POOR PROGNOSTIC FACTOR

Cell type	Median survival in days (95% CI)	n
→ Mesothelioma	339 (267 to 422)	170
Haematological malignancy	218 (160 to 484)	35
Gynaecological malignancy	203 (97 to 279)	59
→ Breast cancer	192 (133 to 271)	140
Renal cell carcinoma	114 (33 to 334)	22
Adenocarcinoma of unknown primary	87 (13 to 286)	11
→ Lung cancer	74 (60 to 92)	215
Other	71 (46 to 102)	33
Gastrointestinal cancer	61 (44 to 73)	61
Sarcoma	44 (19 to 76)	12
Melanoma	43 (23 to 72)	23
Urological cancer (bladder, prostate, testis, penile)	33 (22 to 168)	8
→ Overall	136 (119 to 167)	789



Number at risk						
Mesothelioma	170	118	68	44	25	11
Lung	215	53	27	14	6	3
Breast/Gynae	199	100	61	40	29	13
Other	205	56	24	11	10	6



# TAKE-HOME MESSAGE

**Goal of care**

**=**

**Palliation of Symptoms**

**&**

**Quality of life optimization**

# AVAILABLE PALLIATIVE OPTIONS

- Talc pleurodesis
  - Through a chest drain
  - By medical thoracoscopy
  - By VATS surgery
- Indwelling pleural catheter (IPC) insertion



# MUHC DATA

- Retrospective review of patients who underwent either thoracoscopic talc pleurodesis or indwelling pleural catheter insertion (IPC) at the MUHC
  - Study period: Jan 1st 2014 to Dec 31st 2015
  - Patients identified through the Chest's visits database
  - Patients with a malignant pleural effusion (MPE) confirmed by cyto/pathology (or obvious from the clinical picture) who underwent either thoracoscopic pleurodesis or IPC insertion
  - Exclusion:
    - Patients not followed at the MUHC
    - Procedures performed for non-malignant conditions

# OBJECTIVES

- Determine the number and type of pleural procedures performed prior to definitive palliation
- Determine the number of ER visits and hospital admissions for MPE in patients needing palliation
- Measure the time from first presentation to definitive intervention for MPE

# DEFINITION OF “IDEAL MANAGEMENT”

- $\leq 2$  thoracenteses
- No chest tube insertions
- $\leq 1$  ER visits
- No hospital admissions
  
- Not meeting 1 or more of these criteria was considered “Non-Ideal Management”

# STUDY FLOW

## 167 IPC / thoracoscopy cases

- 61 no definitive intervention
- 26 no procedure done
- 35 diagnostic thoracoscopy only



## 106 interventions for MPE

- 23 patients not followed at MUHC
- 4 non-MPE
- 7 inadequate charts



## 72 cases included

- 69 patients, 3 with bilateral procedures done

# RESULTS

Baseline Characteristics		69 patients / 72 MPE cases
Age (mean in years, SD)		70.3 ± 13.6
Women (%)		59
Type of malignancy (%)	Lung	42
	Breast	19
	GI/GU	16
	Mesothelioma	6
	Lymphoma	4
	Unknown primary	6
	Other	7
MPE proven pathologically (%)		75
Side of effusion (%)	Left	47
	Right	53
Intervention performed (%)	Indwelling pleural catheter	94
	Talc insufflation	6

# THE PATH TO DEFINITIVE MPE PALLIATION

Procedure type	N=72 MPE
All procedures (mean/MPE)	138 (1.9)
Simple thoracentesis (mean/MPE)	78 (1.1)
Pigtail thoracentesis (mean/MPE)	16 (0.2)
Chest tube* (mean/MPE)	36 (0.5)
Attempted pleurodesis (mean/MPE)	3 (0.02)
Diagnostic thoracoscopy (mean/MPE)	5 (0.04)
ER visits due to effusion (mean/MPE)	49 (0.7)
Admissions to hospital <sup>†</sup> for effusion (mean/MPE)	37 (0.5)

**\*Average number of days spent with chest tube: 3.7 d (SD 3.0)**

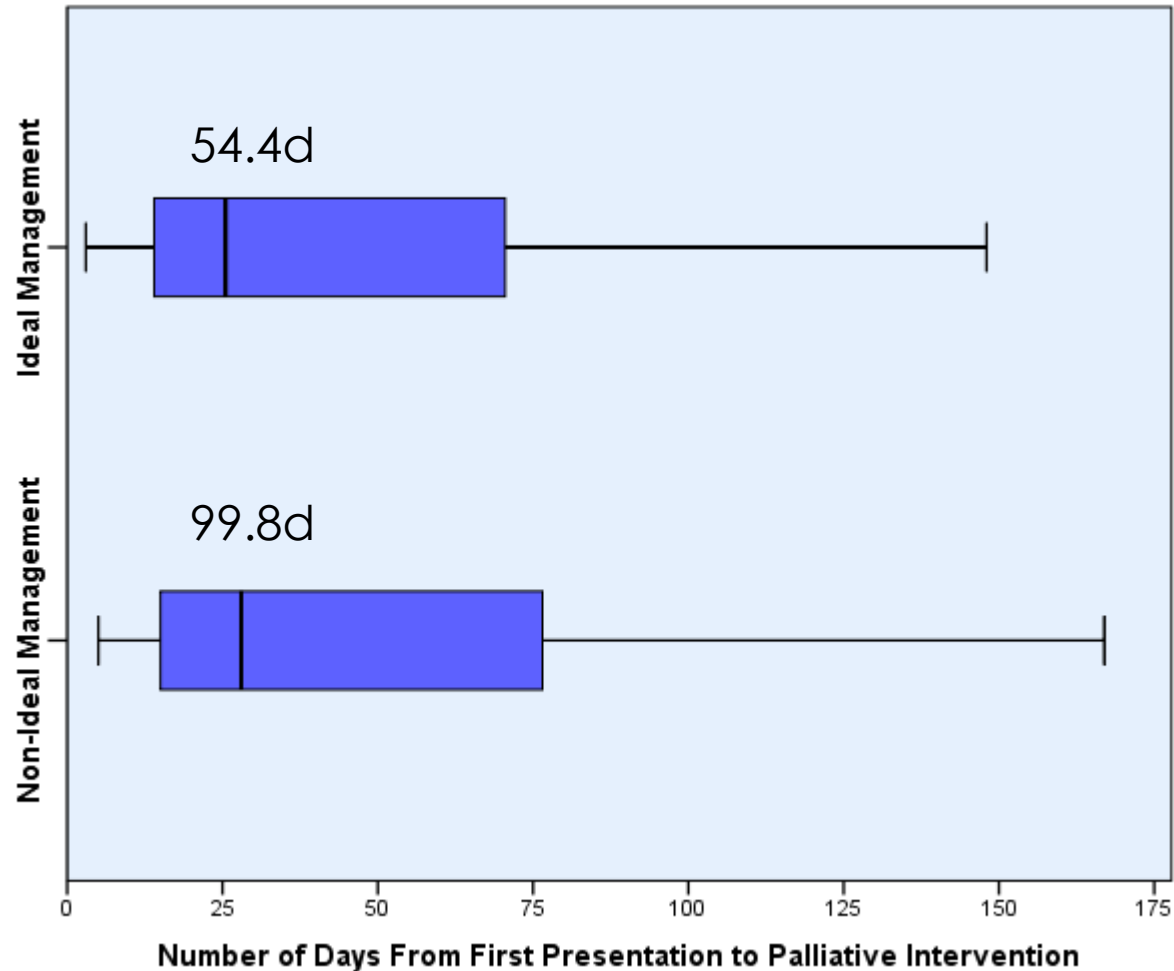
**† Average duration of hospitalization: 17.1 d/admission (SD 19.3)**

# IDEAL VS NON-IDEAL

- 36/72 patients experienced non-ideal management

	<b>Ideal N=36</b>	<b>Non-Ideal N=36</b>
Admissions	0	37
ER visits	9	40
Total procedures	48 1.3/pt	90 2.5/pt
Patients with chest drain	0	27/36 (range 1-5)
Chest drain duration	0	3.7d
Days in hospital	0	17.1/pt SD 19.3

# TIME FROM INITIAL MPE PRESENTATION TO DEFINITIVE PALLIATIVE INTERVENTION



Outliers beyond ½ year not shown (10 cases)



# BOTTOM LINE

- 50% of patients with a malignant effusion who require a definitive palliative procedure undergo potentially harmful and avoidable procedures
- There is a high rate of ER visits and hospitalization among patients with a MPE requiring a palliative procedure
- Significant delays between initial presentation and palliation exists and could possibly be improved

# MPE: PLEURAL CARE PROGRAM'S SPECIFIC GOALS

- Avoid ER visits and hospitalizations
- Reduce the use of pigtaails for malignant effusions
- Improve the access to definitive palliative procedures
- Improve the community follow-up of patients with an IPC

# MPE: PLEURAL CARE INITIATIVES

- Corridor of referral for urgent thoracenteses between oncology and Chest day hospital
- « Walk-in » services for patients with malignant effusions through the Chest day hospital
- Corridor of referral for stable patients with pleural effusions between ER and Chest day hospital
- Corridor of referral from the community through the CRDS

# MPE: PLEURAL CARE INITIATIVES

- Indwelling pleural catheter (IPC) nursing care protocol development
- Patient education booklet for IPC care
- Creation of an IPC patient registry
- Proactive community follow up of IPC patients

# PIGTAAILS!?

- They should be avoided in non-infected effusions
  - They cause hospitalization
  - They can prolong hospital stay
  - They cause discomfort and patient immobilization
  - They create adhesions and ultimately cause loculations
  - They are associated with infections & other complications
  - They complicate or even render impossible further diagnostic or therapeutic interventions
  - They cost more than simple pleural aspiration and they require complex nursing care

They add little to no therapeutic value in most cases

# MUHC CHEST DRAIN OPTIMIZATION POLICY

**Patient with a pleural effusion**

**Resp involvement suggested**

**Chest drain criteria present?**

**No**

**Diagnostic +/- therapeutic tap**

**Yes**

**Chest drain insertion**  
Pre-defined size as per indication

# MUHC CHEST DRAIN OPTIMIZATION POLICY

- Primary spontaneous pneumothorax that failed aspiration
- Secondary / iatrogenic/ traumatic pneumothorax
- Confirmed or highly suspected para-pneumonic effusion or empyema
- Massive effusion (> 2/3 of hemithorax) of any etiology with severe dyspnea / hypoxemia unlikely to resolve with thoracentesis
- Confirmed hemothorax
- Effusions in ventilated patients in ICU & CCU & ER
- Other effusion deemed to require a chest drain by a thoracic surgeon or a respirologist

PATIENTS SUFFERING FROM  
PLEURAL INFECTION



# WHY IS PLEURAL INFECTION IMPORTANT?

- A parapneumonic effusion (PPE) is present in 20-57% of pneumonias

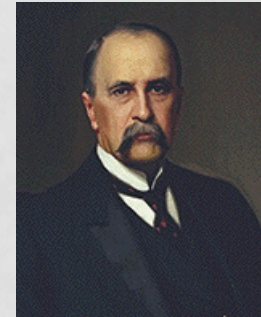
Bhatnagar R. Clin Chest Med 2013

- Rates of pleural infection are increasing in several developed countries

Finley C et al. CRJ 2008

- PPE and empyema are associated with great morbidity, mortality, & health care costs

- It killed William Osler



# PLEURAL INFECTION MANAGEMENT PRINCIPLES

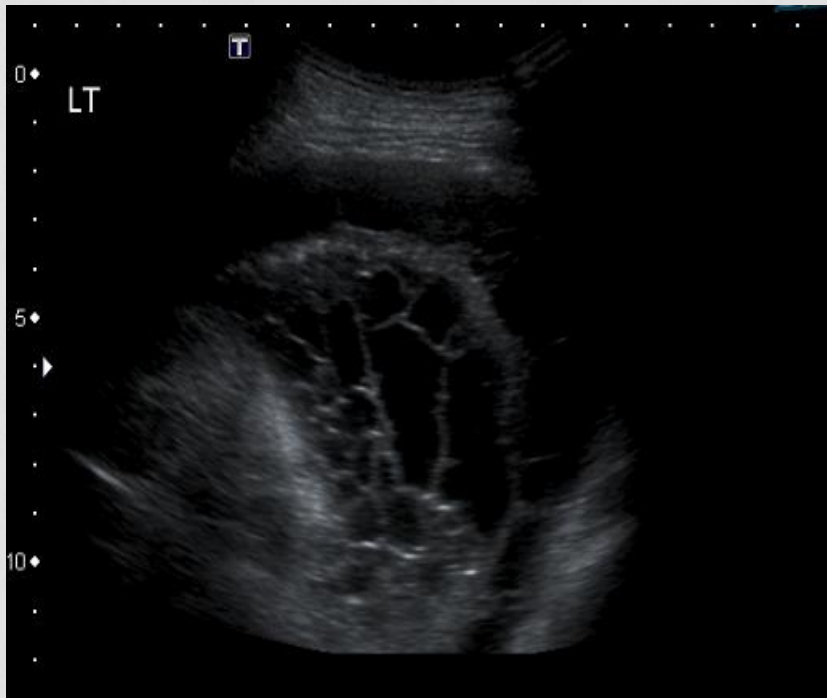
- Pleural effusion drainage
- Antibiotic therapy
- Nutritional support, early mobilisation
- Interdisciplinary care

# PLEURAL INFECTION: INTRAPLEURAL THERAPY

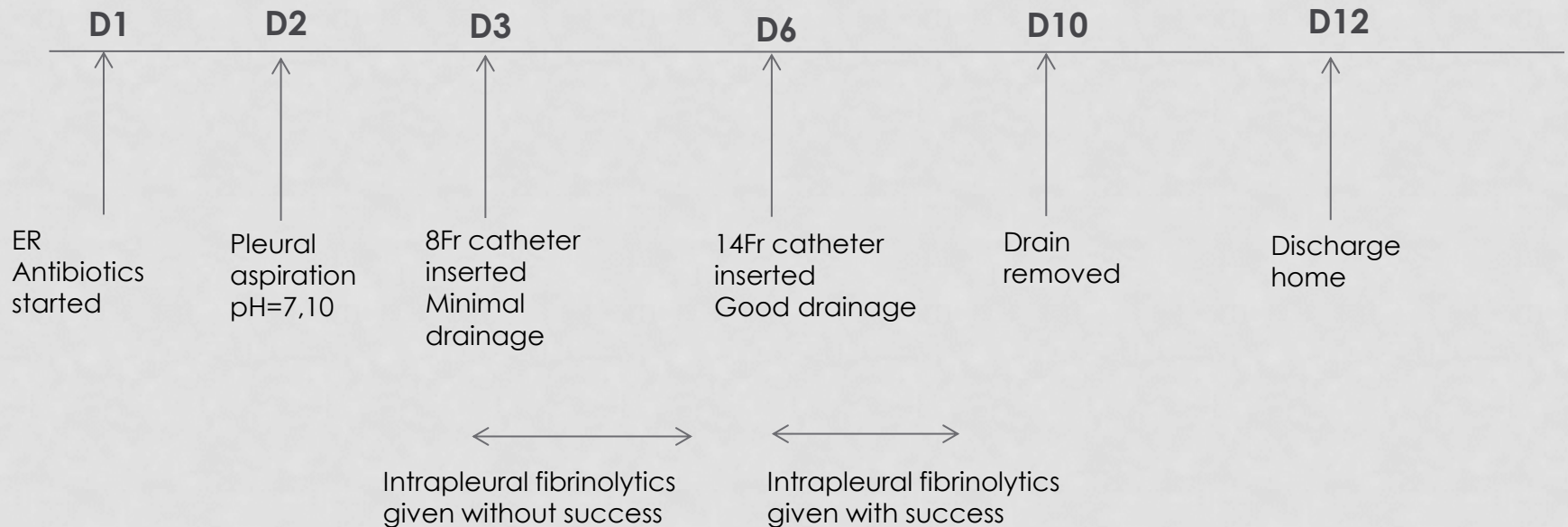
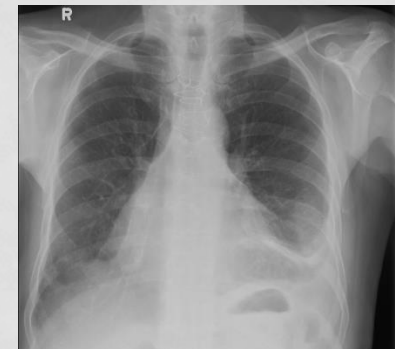
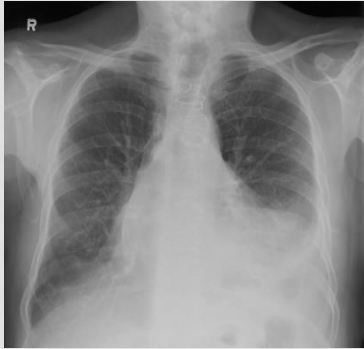
- Single-agent intrapleural fibrinolytic therapy does not improve outcomes  
MIST-1 trial. NEJM 2005
- Combination of tissue plasminogen activator (tPa) and dornase alpha (DNAse) can improve fluid drainage, reduce hospital stay, and reduce referral for surgery  
MIST-2 trial. Rahman NM et al. NEJM 2011
- Regular pleural drain flushing is recommended by the British Thoracic Society guidelines  
Davies HE et al. Thorax 2010

# MR B, 76M WITH COPD

- Presents to ER with cough, yellow sputum, L-sided pleuritic chest pain
- Afebrile, WBC 16



# UNFORTUNATE SCENARIO



# MUHC DATA

- Retrospective review of all the cases of pleural infection treated with intrapleural fibrinolytics
  - Study period: April 2013-April 2016
  - Patients identified through the pharmacy database
  - Included patients:
    - Were prescribed the combination of intrapleural tissue plasminogen activator (tPa) and dornase-alpha (DNAse) for complicated parapneumonic effusions / empyema or pleural infections of other origin
  - Exclusions
    - tPa/DNAse used for non-infectious indications

# OBJECTIVES

- To review the outcomes of patients treated with intrapleural therapy for pleural infection at the MUHC since its introduction into practice
  - Compare them with outcomes reported in the literature.
- To identify potential factors predictive of success or failure in patients receiving intrapleural therapy, as a basis for quality improvement initiatives

# RESULTS

145 patients had tPa/DNase prescribed from 2013 to 2016



36 excluded

tPa/DNase given for hemothorax / loculated effusion /  
blocked catheters



109 patients included



# RESULTS: BASELINE CHARACTERISTICS

	Patients treated with tPa/DNAse N=109
<b>Age, yrs (mean)</b>	61
<b>Female, %</b>	38 (34%)
<b>Site</b>	
MGH	66%
RVH/Glen	28%
Old Chest / MNI	6%
<b>Specialty</b>	
Thoracics	31%
Medicine/Resp	42%
ICU	18%
Other	9%

# MUHC VS PUBLISHED DATA

	<b>MUHC</b> tPa/DNase N=109	<b>MIST-2</b> tPa/DNase N= 48 <small>Maskell NA. NEJM 2011</small>	<b>MIST-2</b> Placebos N= 51 <small>Maskell NA. NEJM 2011</small>	<b>Real-life series</b> tPa/DNase N=107 <small>Piccolo F. Ann ATS 2016</small>
<b>Duration of hospital stay in days mean (SD)</b>	30 (29)	11.8 (9,4)	17,0 (n/a)	10 (IQR 6-17)
<b>Mortality, n (%)</b>	12 (11%)	4 (8%)	2 (4%)	9 (8,5%)
<b>Need for surgery</b>	15 (13,7%)	2 (4%)	6 (12%)	8 (7,5%)
<b>Survival to discharge without surgery</b>	85 (78%)	n/a	n/a	96 (89,7%)
<b>Pleural bleed requiring intervention</b>	8 (7,3%)	2 (4,2%)	0	2 (1,8%)

# HYPOTHESES: NON-MODIFIABLE FACTORS

- Higher proportion of nosocomial cases
  - 36% vs 9-13% in other series
- Referral bias due to our tertiary role & concentration of thoracic surgery activities at the MUHC
- Sample of sicker patients?
- Delays in access to the OR
  - Average wait time from decision to OR of 6 days
- Discharge planning challenges

# HYPOTHESES: MODIFIABLE FACTORS

- Delays in clinical pathway
  - 2,5 d between effusion identification and drain insertion
  - 5 d between drain insertion and intrapleural fibrinolytics
  - Significant delays in radiologic follow up
- Suboptimal intrapleural pharmacotherapy
  - 41% of the patients did not complete the therapy
  - Administration of doses was erratic

# HYPOTHESES: MODIFIABLE FACTORS

- Use of inadequate drains
  - 42 drains were of size 8-10Fr (39%)
- Lack of regular flushing of pigtails
- Delayed recognition of blocked drains
- Very high rate of re-intervention
  - 67/109 patients required a second drain
  - 33/109 patients required a third drain insertion

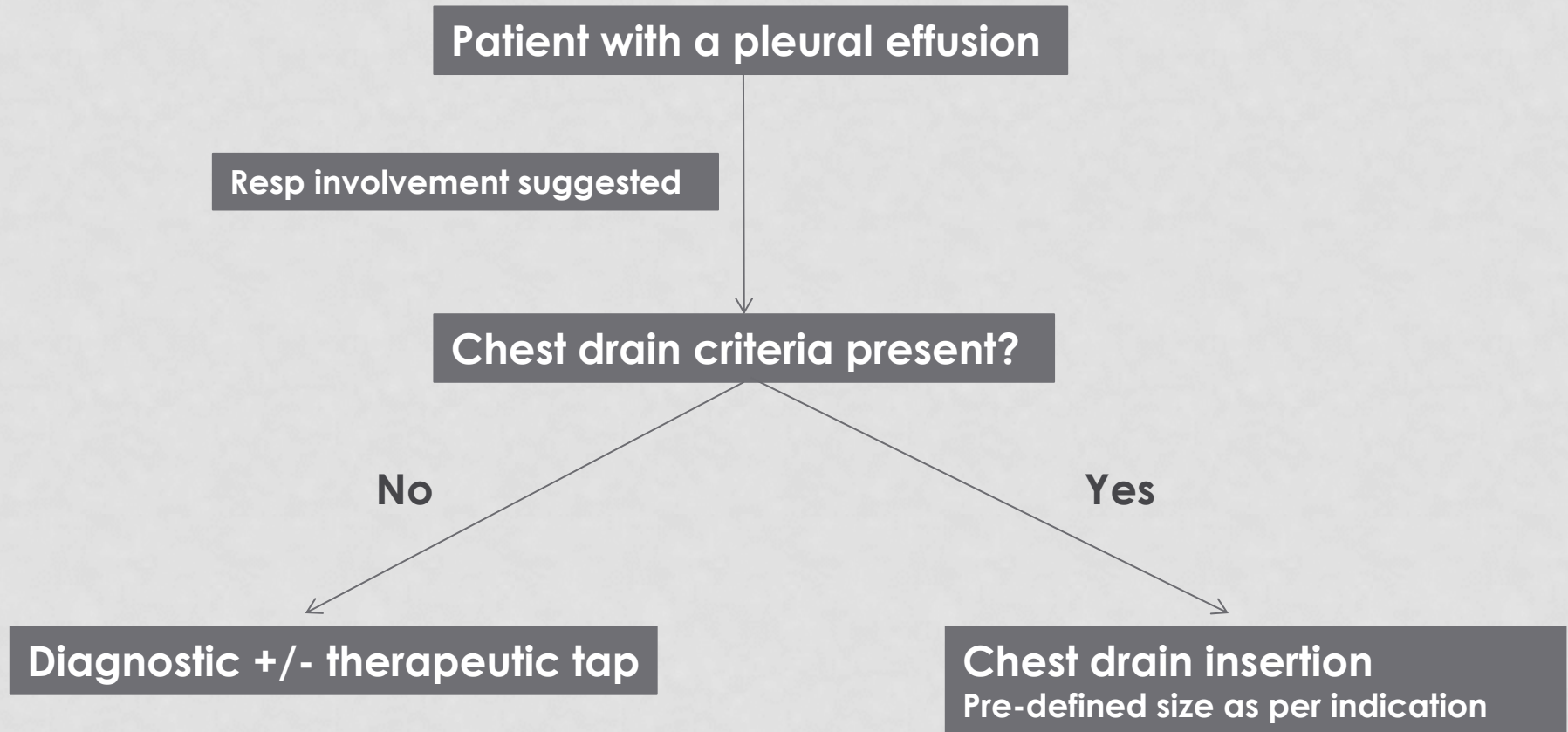
# BOTTOM LINE

- Patients suffering from a pleural infection at the MUHC may have poorer outcomes than in centers of excellence
- Delays in recognition and intervention for infected effusions are encountered
- A large proportion of patients must undergo repeat procedures
- The use of intrapleural tPa/DNAse therapy is often incomplete and given erratically

# PLEURAL CARE PROGRAM INITIATIVES

- Development / update of protocols for chest drain care
- Implementation of pigtail flushing by nurses
- Creation of a pre-printed order / protocol for intrapleural pharmacotherapy
- Creation of local guidelines to optimize the care pathway of patients with possible pleural infection

# MUHC CHEST DRAIN OPTIMIZATION POLICY





OTHER PLEURAL CARE  
PROGRAM ACTIVITIES

# OTHER PLEURAL CARE PROGRAM ACTIVITIES

- Strategies for benign non-infected effusions and pneumothorax
- Costs analyses and costs reduction strategies
- Extension of the pleural care initiatives to other institutions
- EQUAL CARE Malignant Pleural Mesothelioma project

# NURSING PRACTICE INITIATIVES

JULIE DALLAIRE INF. MSc

# PLEURAL CARE WORKGROUP: WHAT HAS BEEN DONE SO FAR?

- Update of existing nursing practice protocols
  - Pleural and mediastinal tubes: Care of the Adult patient
- Development of new nursing practice protocols
  - Pleural pigtail
  - Indwelling Pleural Catheter (IPC)
  - Intrapleural Alteplase and Dornase + associated pre-printed order
- Baseline competency & knowledge assessment

# SURVEY OF COMPETENCY/KNOWLEDGE

- What
  - Online survey about bedside trouble-shooting for IPC and chest drains targeting key safety items
- When
  - From Oct 25 to Dec 20 2016
- Where:
  - Glen, MGH, Lachine
  - Units targeted: Critical care units (ICU/CCU, ED), Medicine/onco, surgery units
- Responses:
  - Chest drain: 239 questionnaires completed
  - IPC: 174 questionnaires completed

# CHEST TUBE SURVEY: EXAMPLE OF QUESTIONS

- Which of the following is (are) acceptable drainage device to connect to either a chest tube or a pigtail? Choose all that apply.
  - A Foley bag.
  - Any drainage bag, as long as it is graded and contains an outlet device.
  - X A Pleur-Evac unit.
  - A glass vacuum bottle.
- A patient with a chest tube is confused and makes the Pleur-Evac system tumble over. The patient is stable and the tube is still connected to the drainage system. You must ensure that the water-seal of the Pleur-Evac system is still present. Indicate which of the following proves that the water-seal is preserved.
  - Fluctuations of fluid are seen in the drainage line and through the chest tube.
  - There is no bubbling.
  - X In the water-seal chamber, the water level reaches the dotted 2cm line.
  - The chest tube is still draining well.

# CHEST TUBE SURVEY RESULTS: OVERVIEW

- Average proportion of right answers
  - 61% (range 43-90%)
- Number of questions for which the correct answer rate was  $\geq 80\%$ 
  - 2 (1 in medicine respondents)
- Nurses' comfort in dealing with chest drains
  - Only 32% indicated they were comfortable

# IPC SURVEY: EXAMPLE OF QUESTIONS

- Which of the following can be used to access the valve of an IPC to drain it? Choose all that apply.
  - A 14-18g Cathlon catheter.
  - A 16-20g needle.
  - Any luer lock syringe.
  - X The “PleurX”<sup>©</sup> drainage line.
- You perform the drainage of an IPC and you notice that the access valve of the catheter is leaking, even after the cap is put on. Before notifying the physician, what should be done?
  - Cover the catheter and the insertion site with an occlusive dressing.
  - X Clamp the catheter as close to the skin as possible.
  - Connect the catheter to a Pleur-Evac unit.
  - Cover the access valve with pink occlusive tape.



# IPC SURVEY RESULT OVERVIEW

- Average proportion of right answers
  - 36,8% (range 15-61%)
- Number of questions for which the correct answer rate was  $\geq 80\%$ 
  - 0
- Nurses' comfort in dealing with chest drains
  - Only 7% indicated they were comfortable

\*Results largely influenced by the fact that a majority of surgical RNs were the survey respondents\*

# PLEURAL CARE WORKGROUP'S EDUCATIONAL INITIATIVE

- Goals
  - Harmonize the care of chest tubes in adults across the MUHC
  - Support nurses in their practice with chest drain/pigtail/IPC
  - Ensure that proper monitoring and care is being provided to patients with chest tubes across all MUHC adult sites to decrease risks of complications or adverse events.
- Plan (based on new protocols + survey results):
  - Accredited E-learning : in development
  - Central Nursing Orientation (day4): in discussion

# BACK TO THE EDUCATIONAL OBJECTIVES

- At this point, attendees should be able to:
  - Recognize the challenges faced by patients suffering from pleural diseases at the MUHC
  - Identify and apply strategies to alleviate those challenges
  - Describe some of the MUHC pleural care program initiatives



# BURNING QUESTIONS

- **What are the barriers to palliation faced by patients suffering from a malignant effusion at the MUHC?**
  - Use & misuse of chest drains
  - ER visits & hospitalization
  - Suboptimal community follow up
- **How can the outcome of patients with pleural infection be improved at the MUHC?**
  - By better aligning the procedures performed with the needs of the patient
  - By reducing delays in recognizing and intervening for pleural infection
  - By developing streamlined clinical care pathways to facilitate intrapleural fibrinolytic therapy

# CONCLUSION

Although several challenges characterize the care of patients with pleural diseases at the MUHC, interdisciplinary initiatives to improve the situation are underway

# THE PLEURAL CARE WORKGROUP

**Samia Saouaf**, nursing educator, thoracics/ general surgery

**Ludovic Aubin**, thoracic surgery nurse coordinator

**Pierre Chassé**, nursing educator, ER-Glen

**Pauline Machon**, Chest day hospital nurse

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