

SARS

Symptoms, Clinical Course, Outcome & Diagnosis

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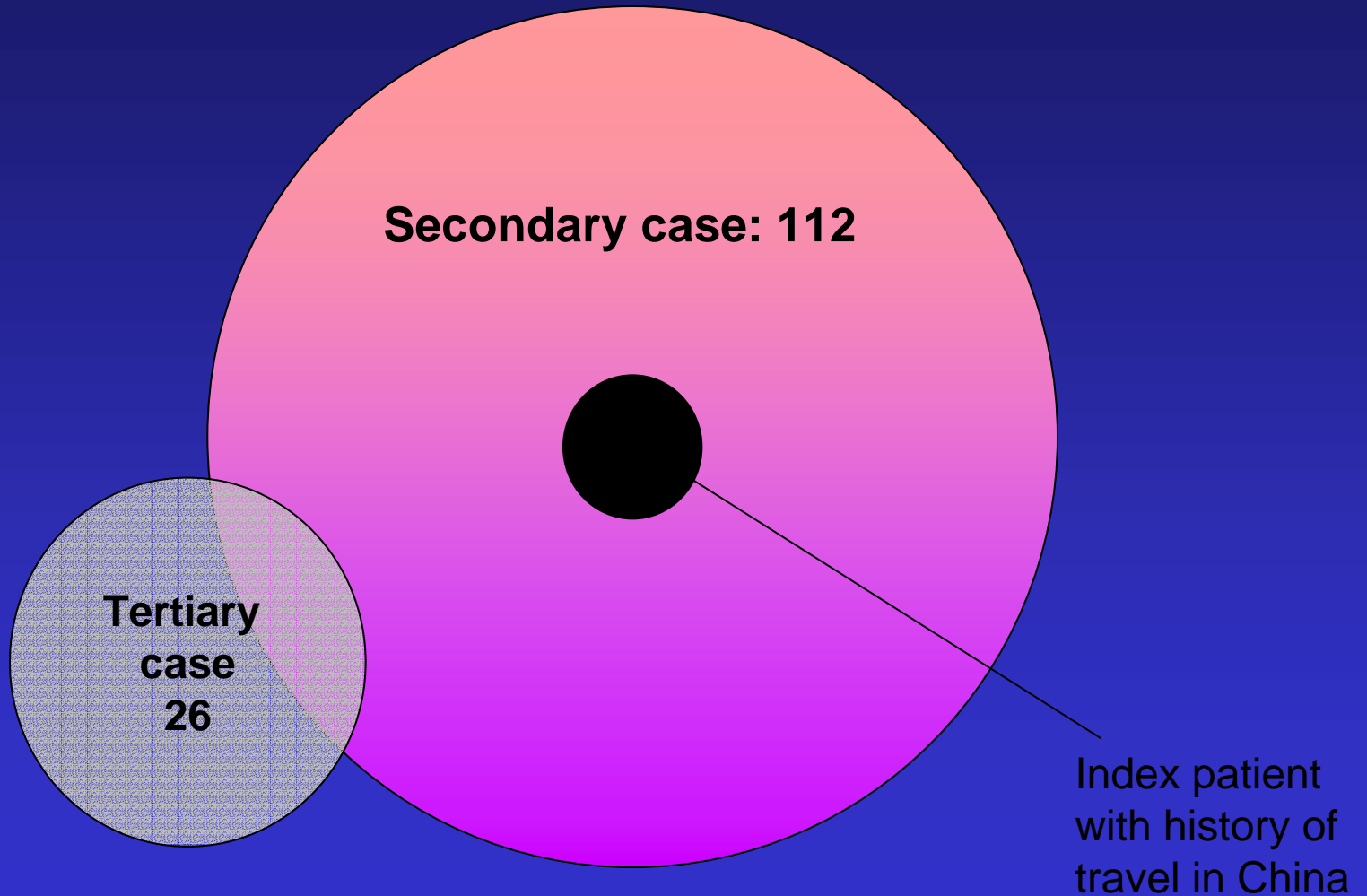
Prince of Wales Hospital

The Chinese University of Hong Kong

Outbreak

- March 10, 18 HCW reported sick
- March 11, 50 HCW screened, 23 admitted to hospital
- March 25, 156 admitted (including 138 with direct/indirect contact with index case)

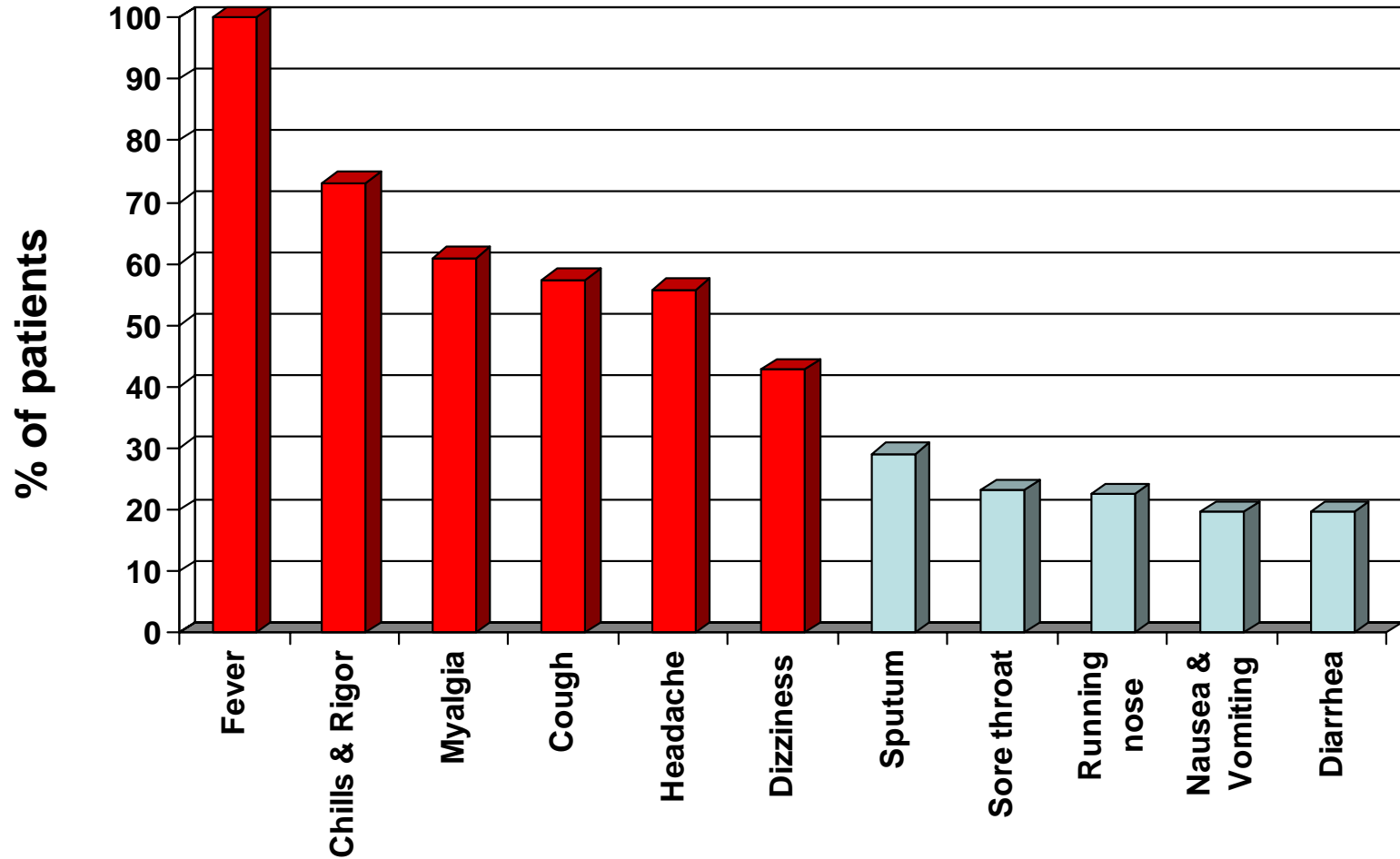
Outbreak



Demography

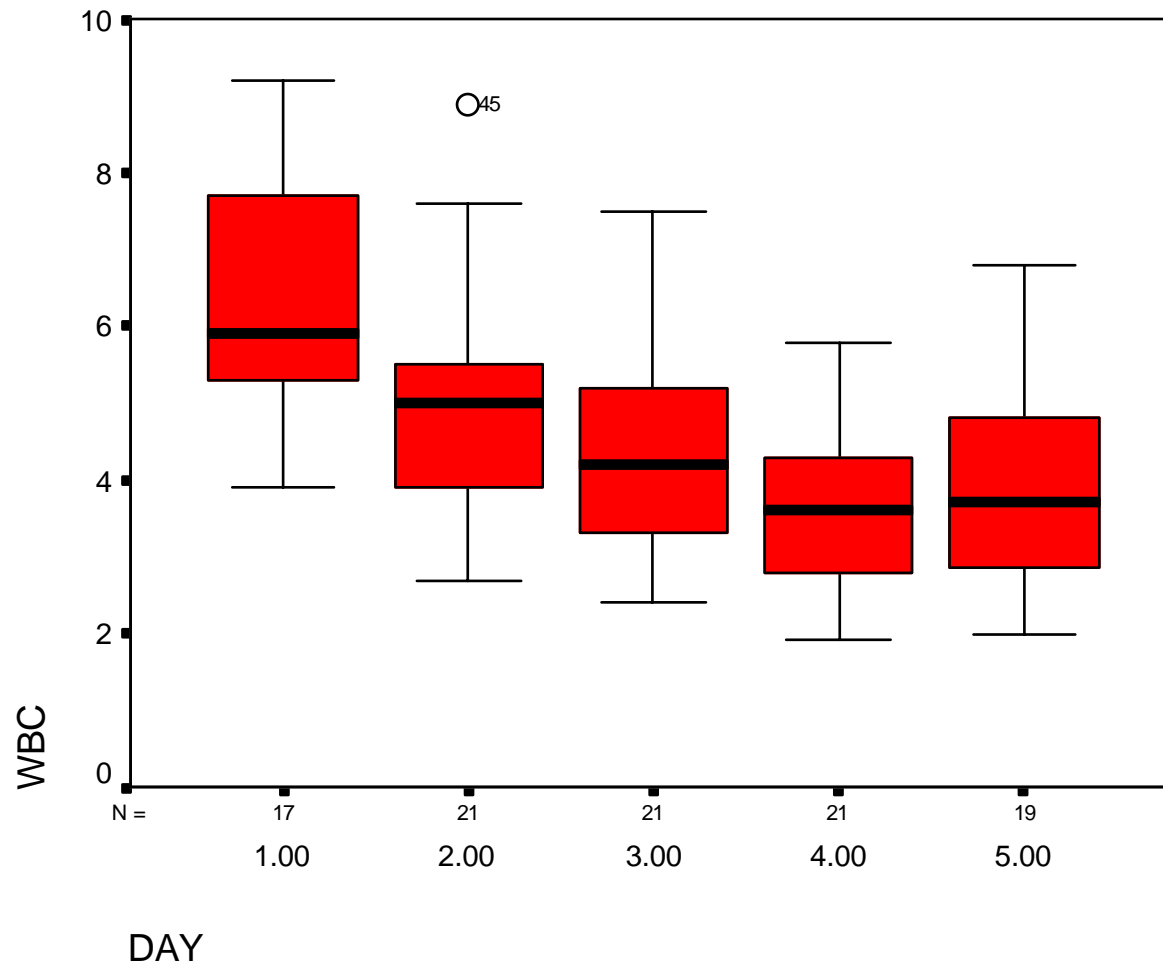
• Total	138
• Female	72
• HCW	69
– Doctors	20
– Nurses	34
– Allied health workers	15
• Medical students	16
• Patients	19
• Relatives	34

Common Symptoms



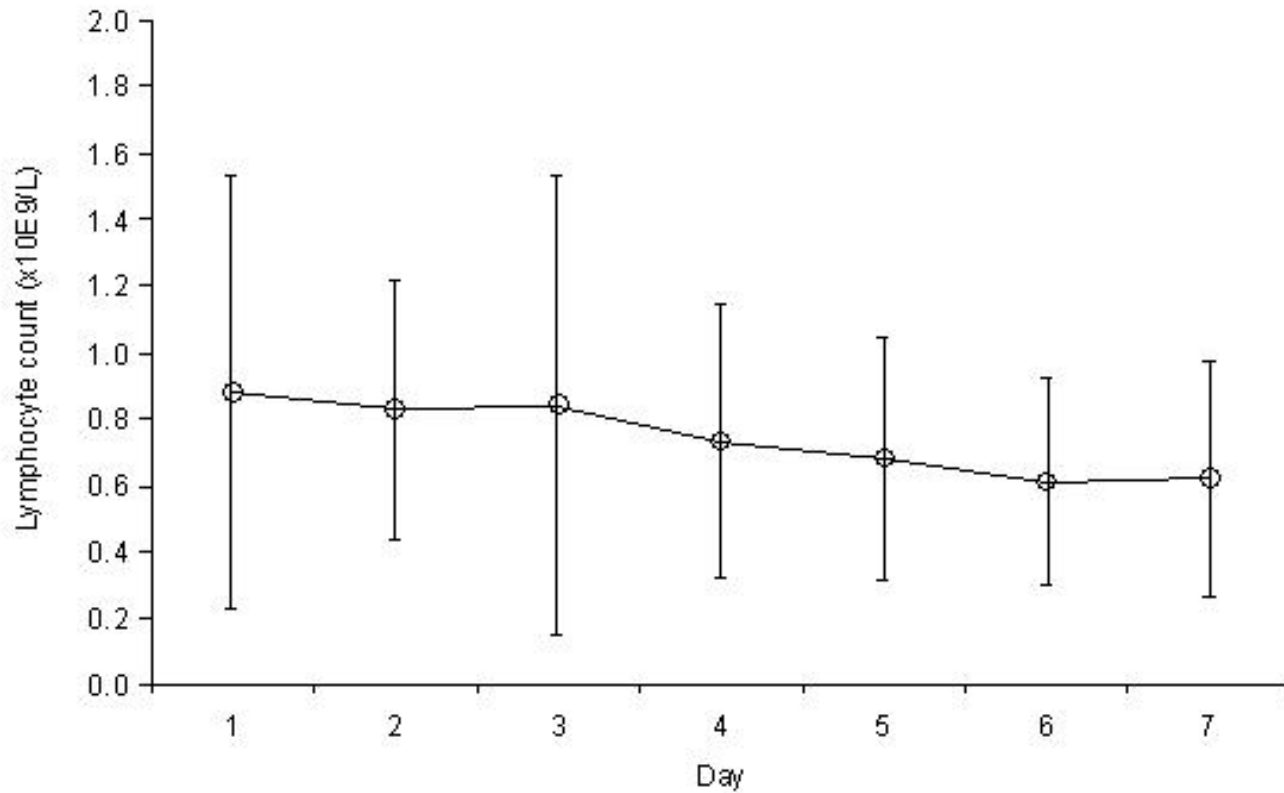
Leucopenia

Leucopenia ($WBC < 3.5 \times 10^9/L$): 33.9%



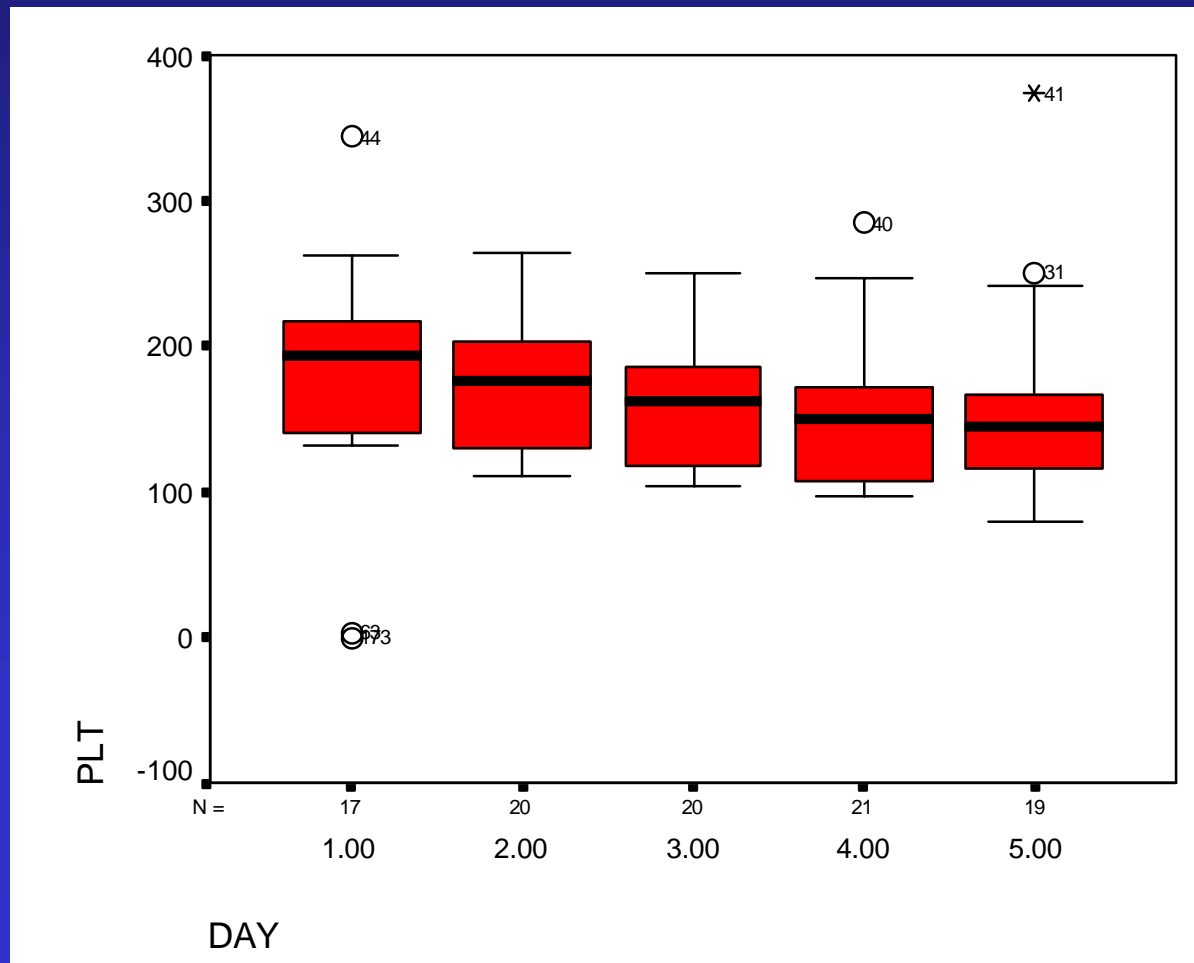
Lymphopenia

Lymphocyte count $< 1.0 \times 10^9/L$: 69.6%



Thrombocytopenia

Platelet count < 150 x 10⁹/L: 44.8%



Clotting Profile

- Prolonged APTT (>38sec): 42.8%
- Elevated D-dimer: 45.0%

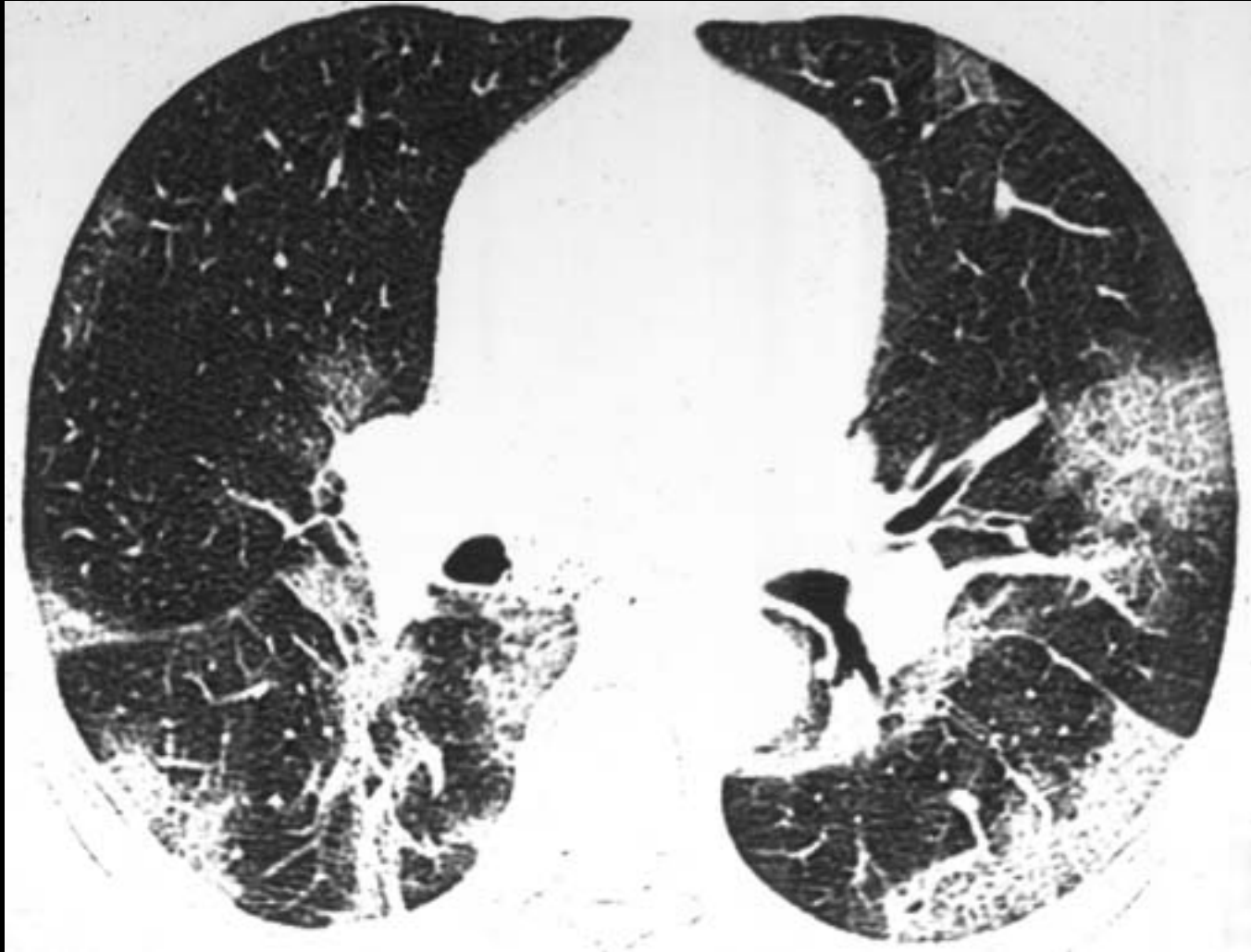
Serum Chemistry

- Elevated ALT 23.4%
- Elevated CPK 32.1%
– (median 126 U/L, range: 29-4644)
- Elevated LDH 71.0%
- Hyponatremia 20.3%
- Hypokalemia 25.2%

Chest Radiographs



CT Thorax



Microbiology

- Sputum culture
 - H. influenzae 3
 - S. pneumoniae 1
 - K. pneumoniae 1
- Nasopharyngeal aspirates
 - Influenza A 1
 - Influenza B 1
 - RSV 2
- EM: viral particles resembling both paramyxovirus and coronavirus

Treatment Protocol – Prince of Wales Hospital, Hong Kong, 4/1/01

Fever & Chills
Suspected SARS



IV Cefotaxime
IV Levofloxacin

De-saturation



Oral Ribavirin 3.6g per day
Oral Prednisolone 1mg/kg/day

IV Ribavirin 1.2g per day
IV hydrocortisone 100mg q6h



IV Methyl-prednisolone 0.5 g/day
For 2 consecutive days

Treatment Protocol – Prince of Wales Hospital, Hong Kong, 4/1/01

IV Methyl-prednisolone 0.5 g/day
For 2 consecutive days



Fever persist
Radiograph show sign of deterioration



3rd or 4th Pulse Steroid



Convalescent serum therapy



Plasma exchange

Fail to maintain oxygen saturation: ICU?



Outcome

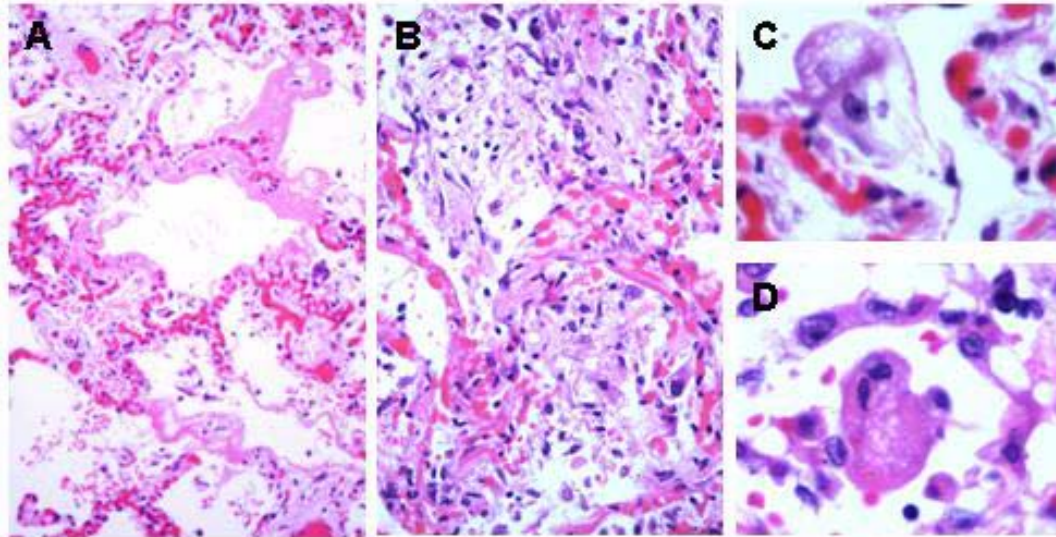
- ICU admission 32 (23.2%)
- Ventilation (PEEP) 19 (13.7%)
- Death 5 (3.6%)
 - MDS 2
 - Liver failure 2
 - Heart failure 1

CXR Resolution

- > 25%: 113/138 82%
- > 50%: 95/138 69%

Median duration: 7 days

Postmortem Findings

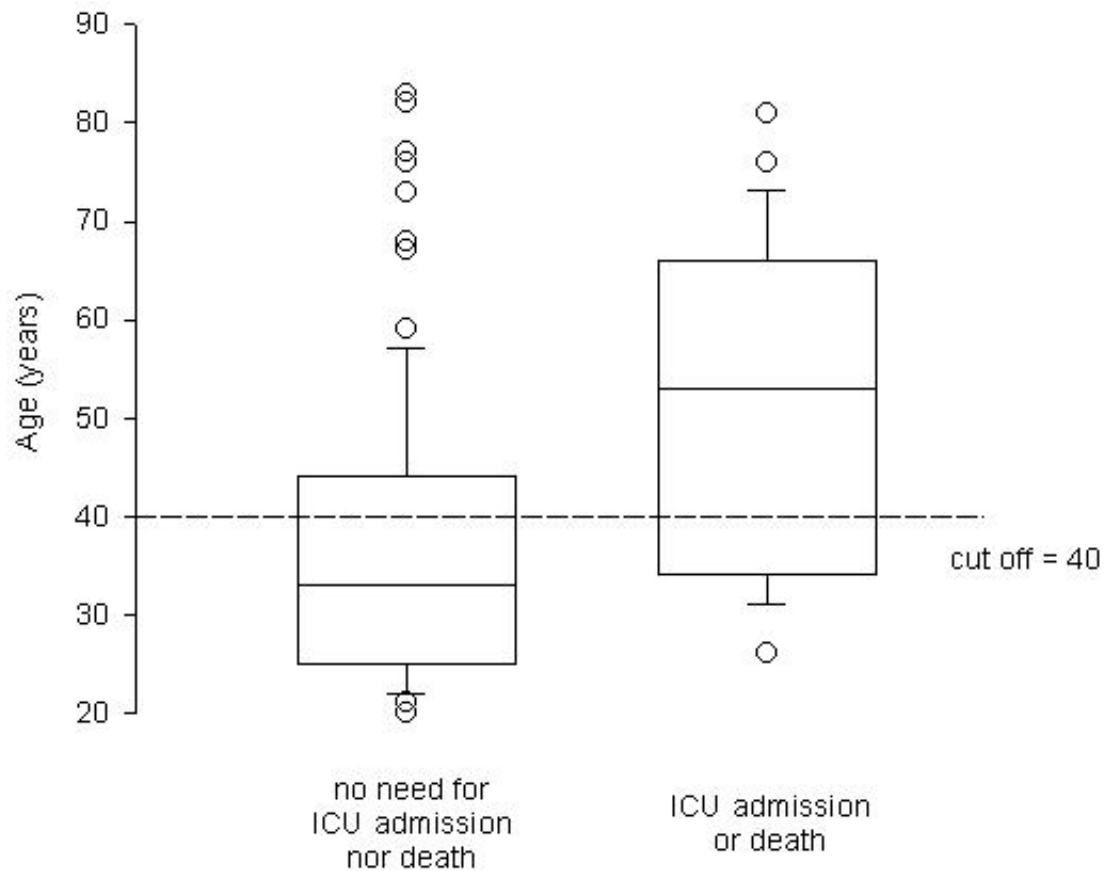


- Early phase of alveolar damage, pulmonary edema, hyaline membrane
- Features suggestive of ARDS.
- Lymphocytic inflammatory infiltrates
- Vacuolated and multi-nucleated pneumocytes
- Viral inclusion

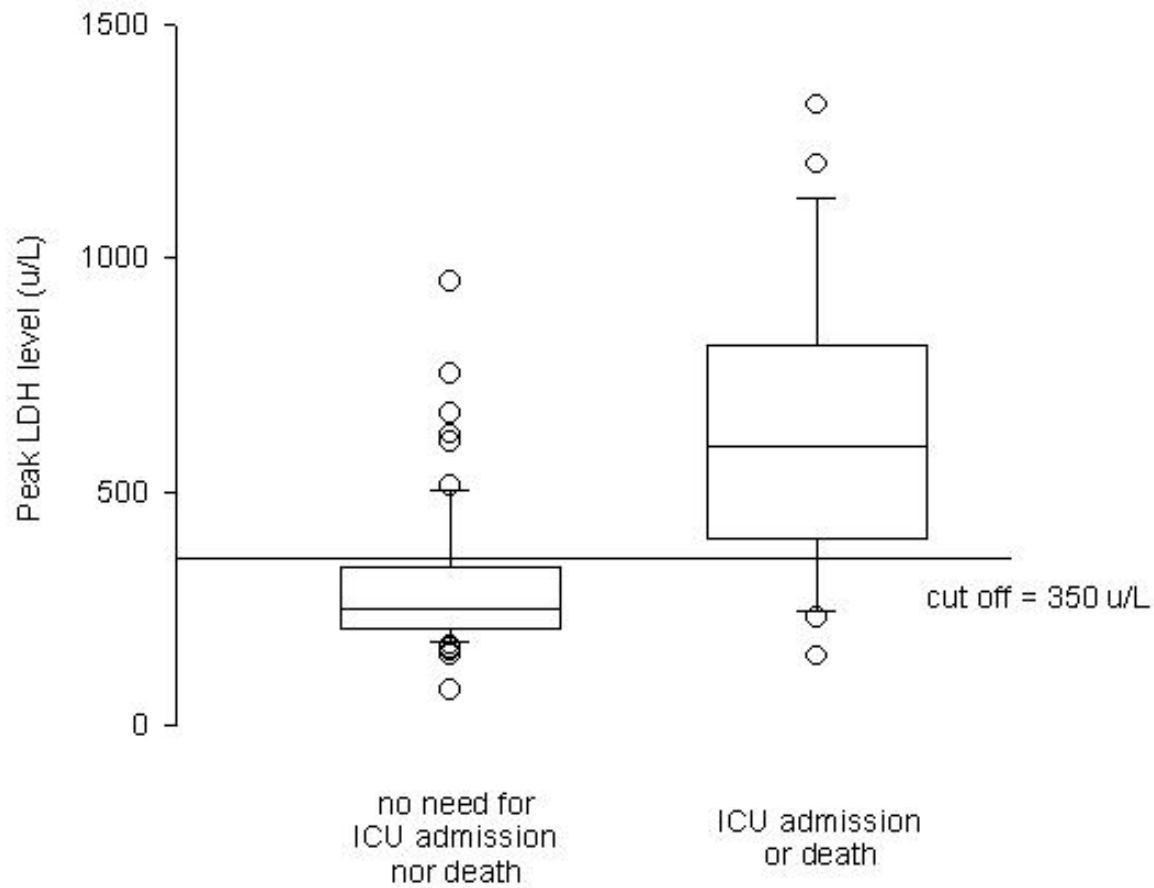
Predictive factor of poor outcome

	No ICU care (mean ± SD)	ICU care or death (mean ± SD)	P value
Age (years)	36.1±14.6	50.2±18.4	0.007
Male sex *	41.9%	66.7%	0.013
Peak D-dimer (ng/ml)	951.0±1197.9	1686.9±2132.3	0.310
Platelet (x 10 ⁹ /L)	156.8±61.2	131.7±64.9	0.059
Neutrophil count (x 10 ⁹ /L)	3.7±1.9	4.6±2.1	0.021
Lymphocyte count (x 10 ⁹ /L)	0.9±0.7	0.8±0.5	0.493
Activated partial thromboplastin time (sec.)	41.0±7.5	43.6±11.7	0.225
Sodium (mmol/L)	136.1±2.7	134.0±4.6	0.022
Urea (mmol/L)	3.8±1.1	7.3±9.6	0.046
Creatinine (μmol/L)	86.1±19.4	135.5±218.0	0.21
Alanine transferase (IU/L)	46.5±81.4	99.4±262.0	0.269
Creatinine kinase on presentation (U/L)	268.5±434.8	609.3±973.2	0.059

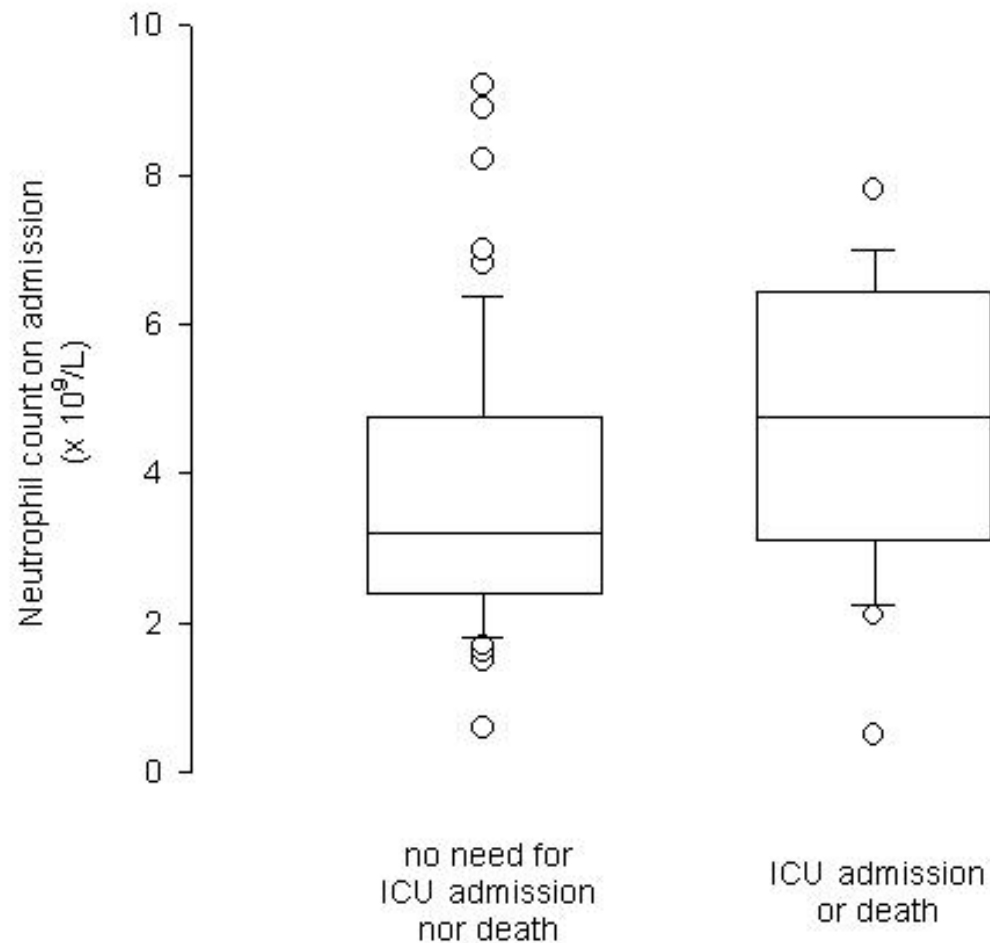
Advanced Age



LDH



Neutrophil count

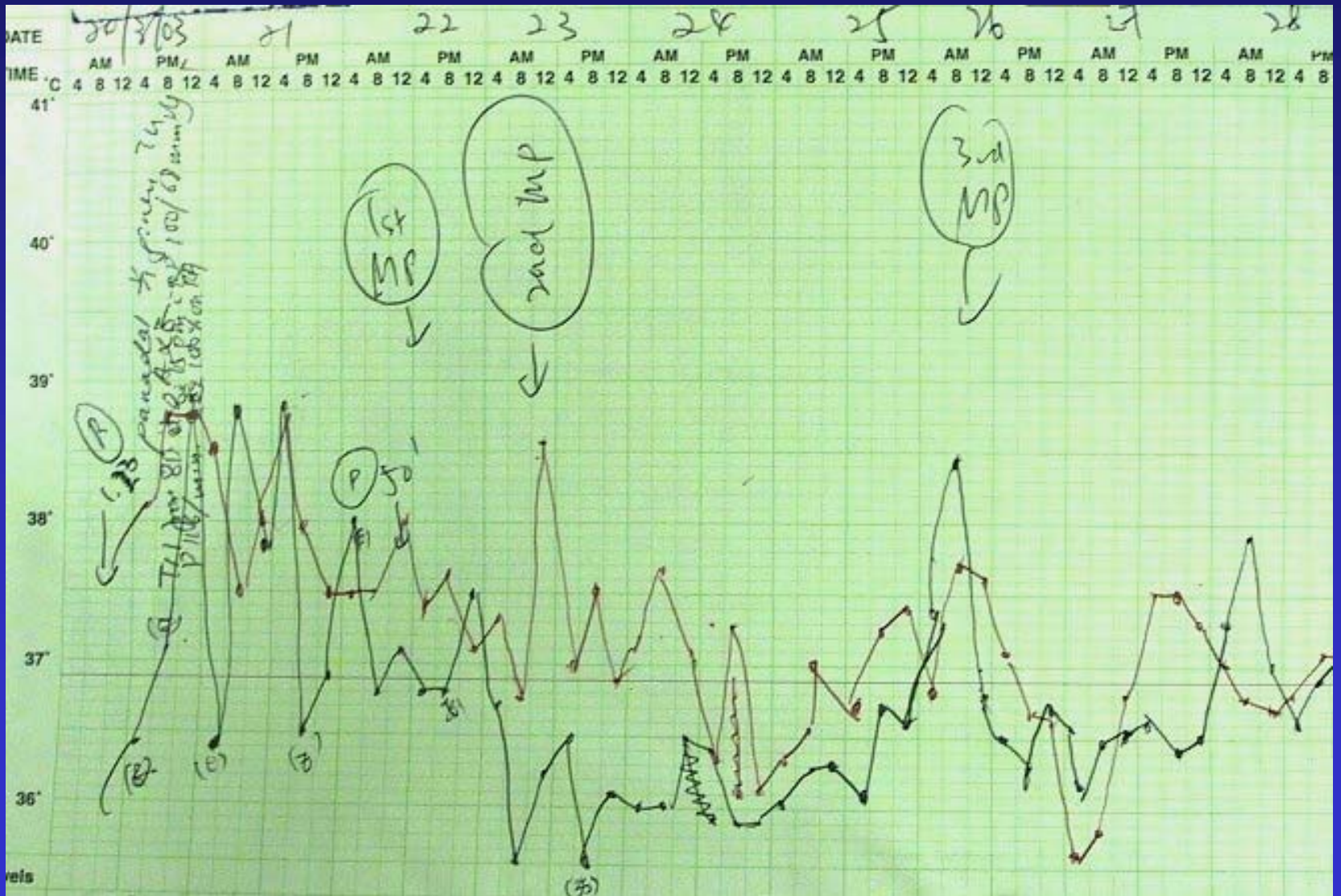


Ribavirin

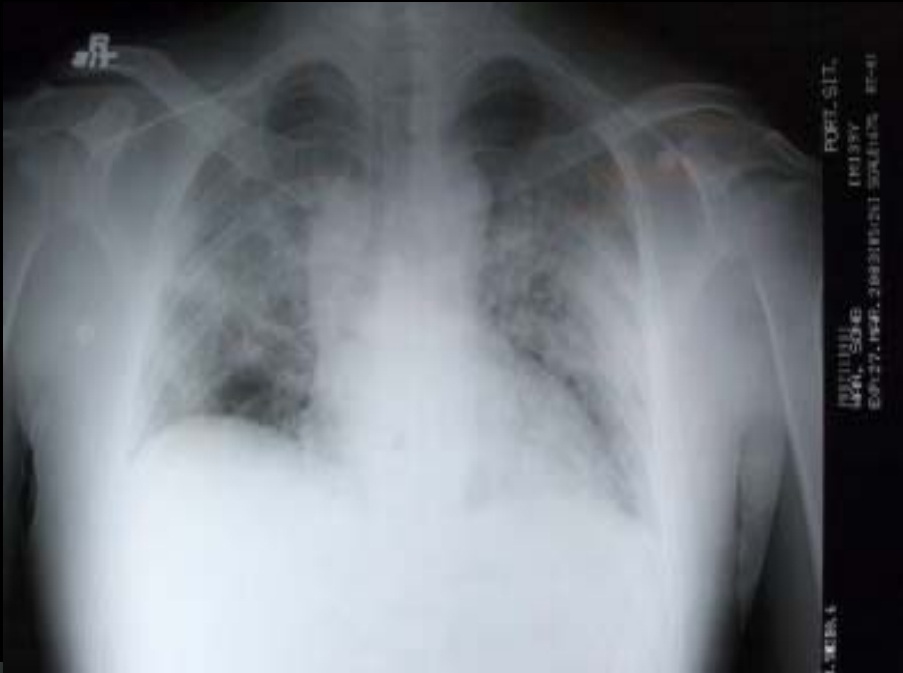
Guidelines from Prince of Wales Hospital, Hong Kong, 4/1/01

- Intravenous 5-8 mg/kg q8h
- Oral 1.2 g tds
- Aerosolized ribavirin should NOT be
used

Pulse Steroid



Pulse Steroid



Pulse Steroid



Side effects of MP

- Superimposed infection 18 (13%)
 - ICU 13 (9.4%)
- Hypokalemia (<3.0): 18 (13%)
- Hyperglycemia (>11.0): 20 (15%)

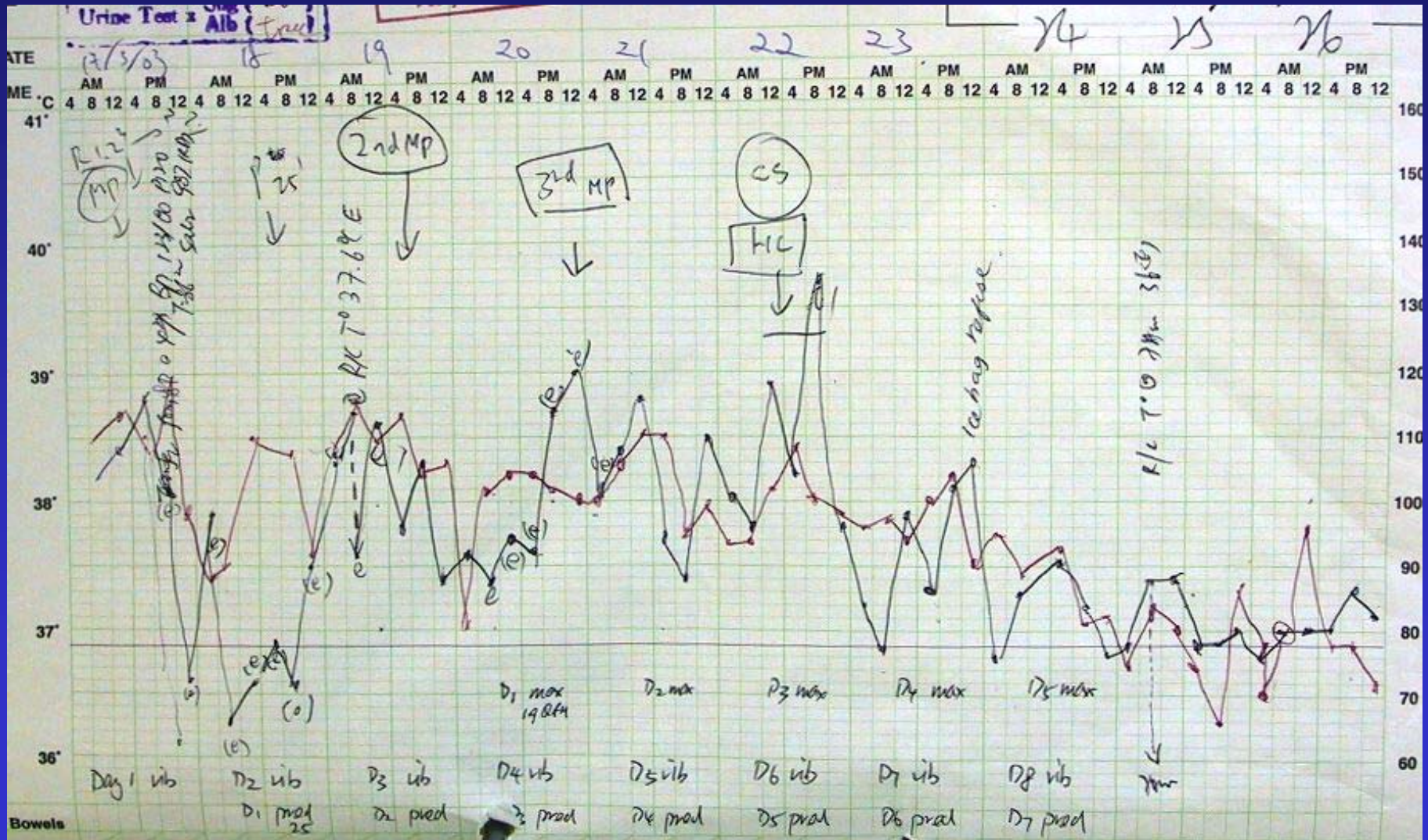
Convalescent Serum

- Machine: Baxter CS 300 Cell Separator
- Collection mode: 'Plasma Exchange Mode'
- Anticoagulant: ACD-A, at 1:12 concentration, (about 120-150 cc infused to patient)
- Processing volume: 2000 to 2500 cc whole blood,
- Plasma harvested: 600-900 cc per donor,
- Replacement fluid: normal saline equal volume,
- Running time: about 100 minutes (depends on flow rate and catheter size)
- Calcium replacement: 10 cc 10% calcium gluconate per every 1000 cc whole blood processed.

Convalescent Serum

- Fever persist after 3 pulses of steroids
- Fever recur with leucocytosis
 - ? Reactivation of SARS
 - ? Superimposed infection

Convalescent Serum



Convalescent Serum



Lessons learned

Prince of Wales Hospital, Hong Kong, 4/1/01

- Early high dose steroid is worthy
- Don't use nebulizer
- Don't use NPPV
- Chest physiotherapy may help