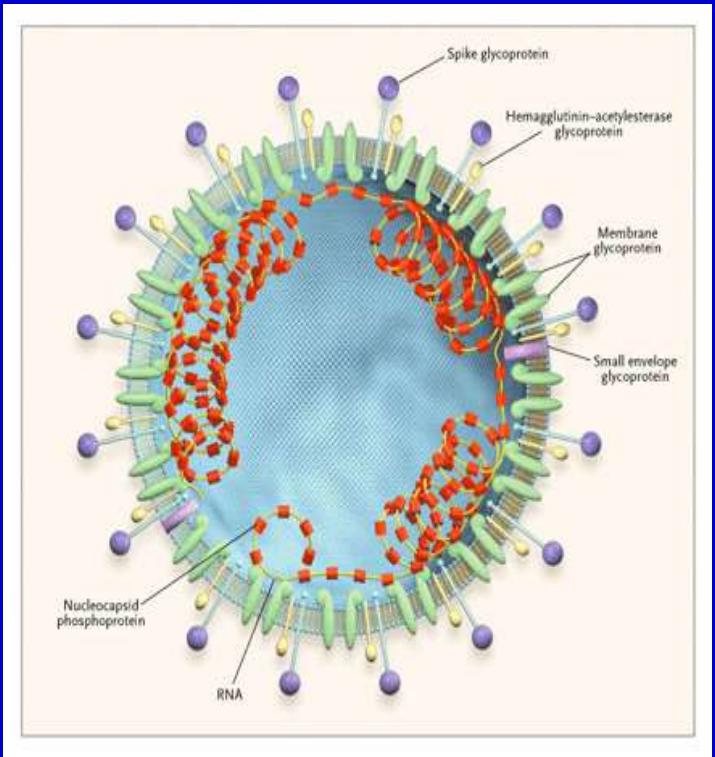
SARS – 2003
Epidemiology and risk factors for infection

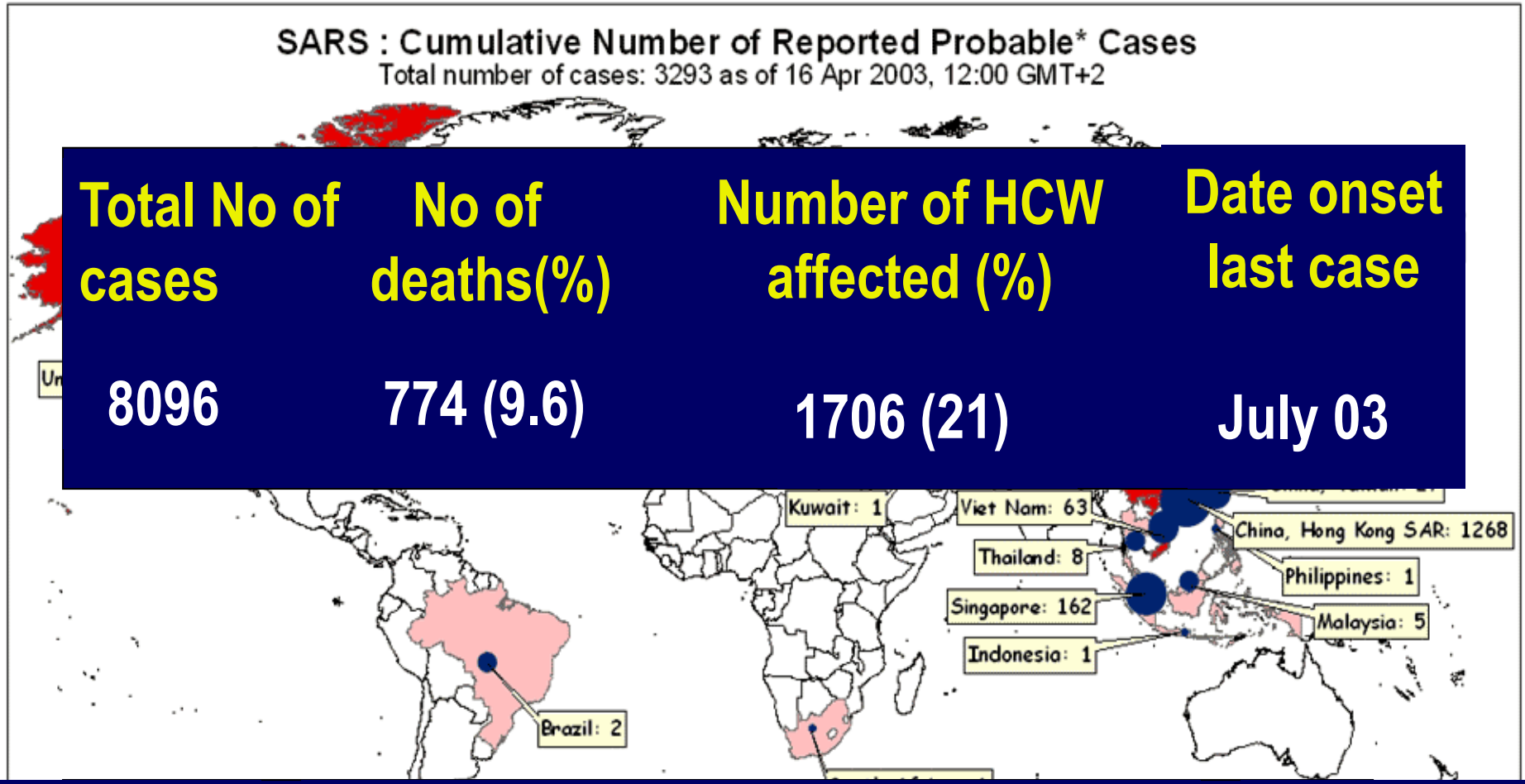


WH Seto
Hong Kong

Tsang Respirology 2003

Tsang AJRCCM 2003

2003
Scares us
to death

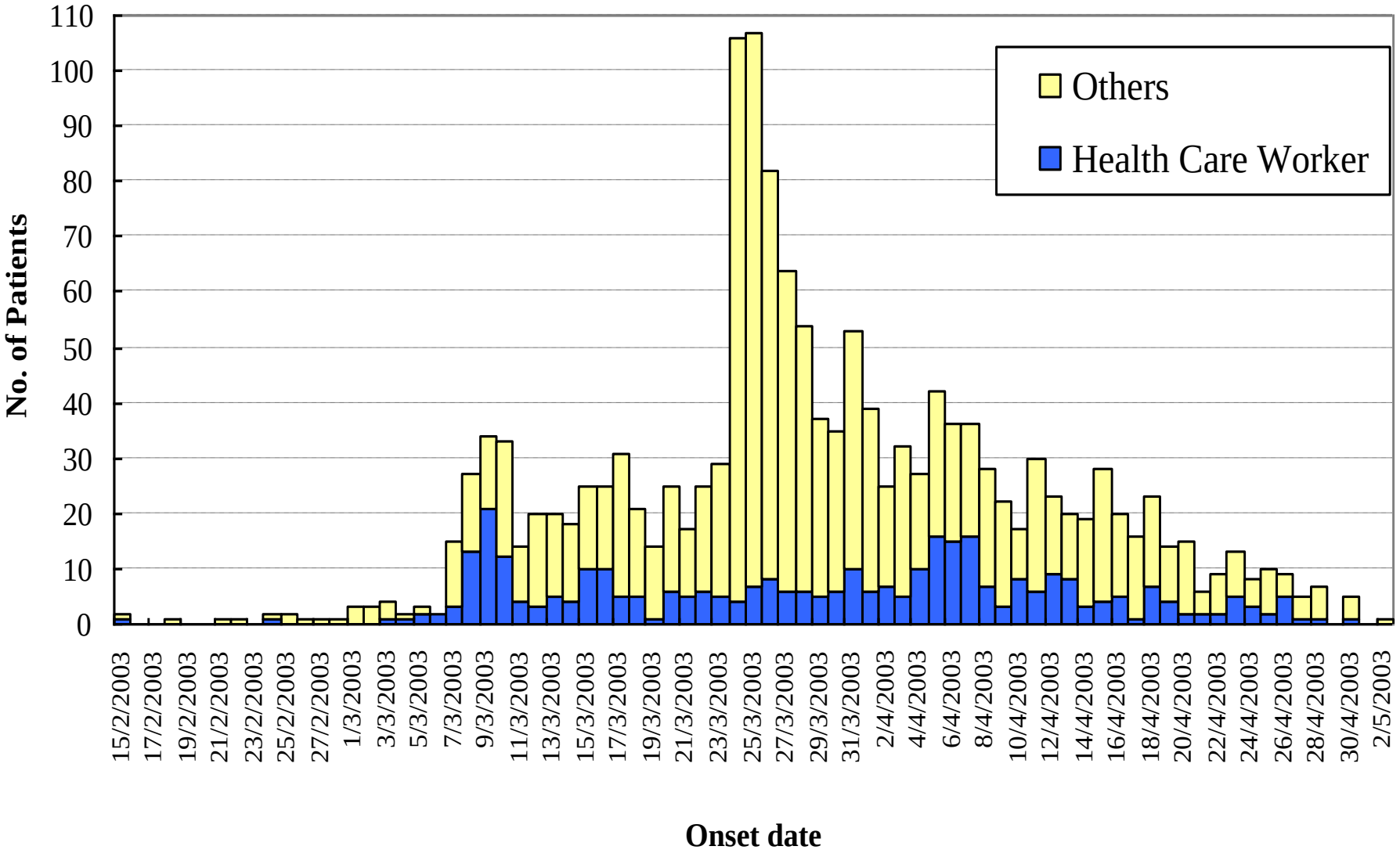


Total No of cases	No of deaths(%)	Number of HCW affected (%)	Date onset last case
8096	774 (9.6)	1706 (21)	July 03

Country/ Province	No of cases	No of deaths(%)	Number of HCW affected(%)	Date onset last case
Hong Kong	1755	302 (17)	405 (23)	31 May 03

Annals Int Med. 04;141 (9), 622

Date of onset of Severe Acute Respiratory Syndrome Cases



Research letters

Studies done in early March 2003

Effectiveness of precautions against droplets and contact in prevention of nosocomial transmission of severe acute respiratory syndrome (SARS)

*W H Seto, D Tsang, R W H Yung, T Y Ching, T K Ng, M Ho, L M Ho, J S M Peiris, and Advisors of Expert SARS group of Hospital Authority**
**Members listed at end of report*

We did a case-control study in five Hong Kong hospitals, with 241 non-infected and 13 infected staff with documented exposures to 11 index patients with severe acute respiratory syndrome (SARS) during patient care. All participants were surveyed about use of mask, gloves, gowns, and hand-washing, as recommended under droplets and contact precautions when caring for index patients with SARS. 69 staff who reported use of all four measures were not infected, whereas all infected staff had omitted at least one measure (p=0·0224). Fewer staff who wore masks (p=0·0001), gowns (p=0·006), and washed their hands (p=0·047) became infected compared with those who didn't, but stepwise logistic regression was significant only for masks (p=0·011). Practice of droplets precaution and contact precaution is adequate in significantly reducing the risk of infection after exposures to patients with SARS. The protective role of the mask suggests that in hospitals, infection is transmitted by droplets.

SARS 2–7 days after exposure, with no exposure to cases outside the hospital.

For this study, index patients were selected only when there was documented clustering, indicating recent spread of infection. We could identify infected staff because since early February, notification of staff with SARS was mandatory in hospital-authority hospitals. We tested sera taken from index patients and infected hospital staff during the acute phase of the infection and during convalescence for antibodies to the corona-like virus[4] associated with SARS using an indirect immunoflourescence test.[4]

We excluded one hospital that had a large nosocomial outbreak because a drug nebuliser was used on an index patient with SARS for longer than 10 days. Droplets precautions have never been recognised as an effective infection control measure for such aerosol-generating

Questionnaire (Initiated on 12 March) – 13 infected staff

- Given to all staff in clinical areas where confirmed SARS cases are given care
- Staff who did not participated in patient care of SARS were excluded
- Staff who participated in the care of SARS were asked on their used of mask, gloves and gowns when exposed to the SARS patients.
- Answers were obtained from >80% of staff.

Comparison of infected and non infected staff and wearing mask hospitals with index cases

Surgical Masks

PMH, PYNEH, KWH, QEH, QMH

	No Mask	With Surgical Mask
Infected staff	**11**	**0**
Non-infected staff	**72**	**92**

P = 0.006
(Fisher's)

31% wears surgical mask

Comparison of infected and non infected staff and handwash reported in hospitals with index cases

PMH, PYNEH, KWH, QEH, QMH

N95

	No Mask	With N95
Infected staff	**11**	**0**
Non-infected staff	**72**	**92**

P = 0.0009
Chi-square

53% wears N95

Comparison of infected and non infected staff and wearing mask hospitals with index cases

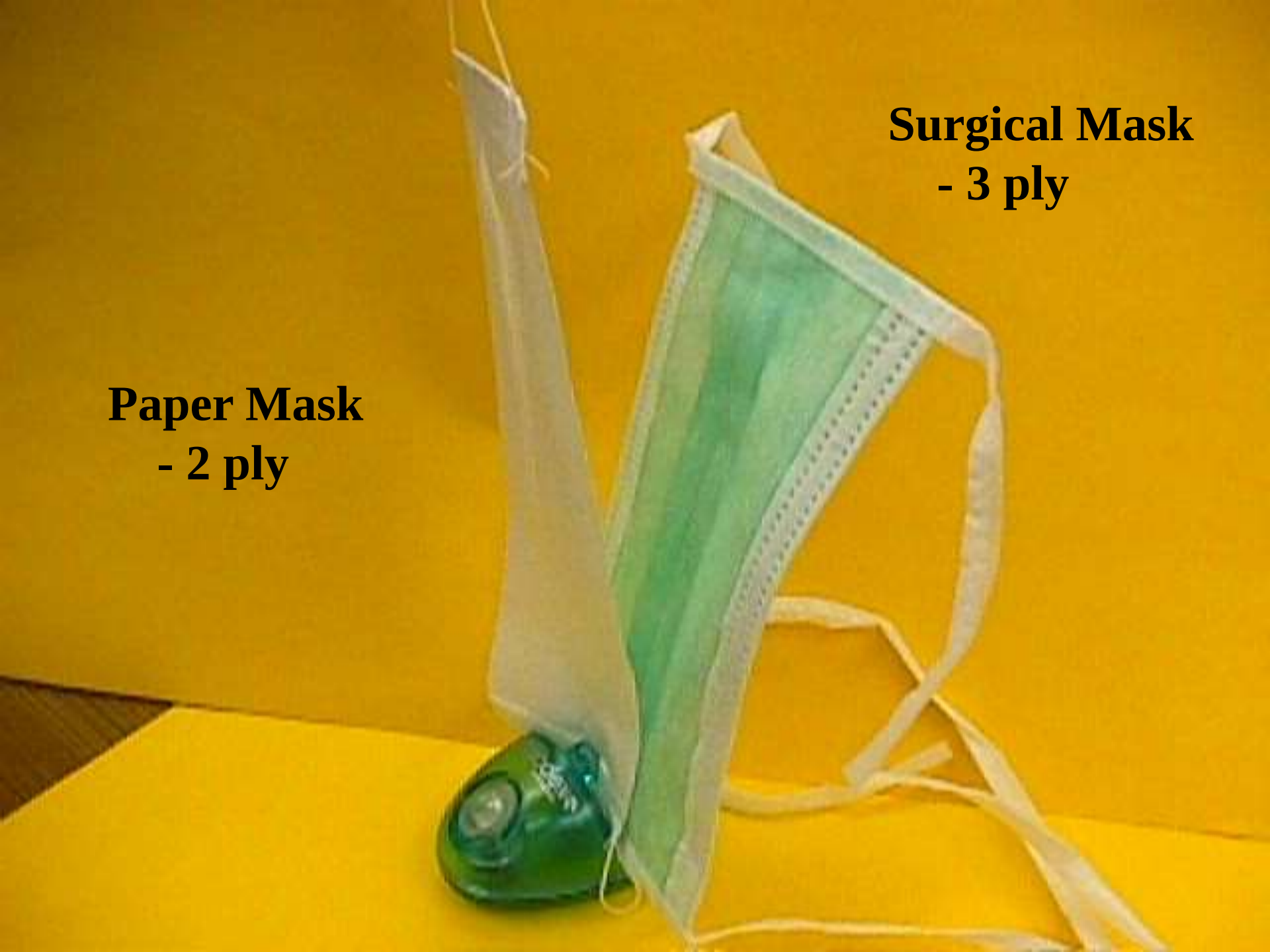
Paper Masks no difference

PMH, PYNEH, KWH, QEH, QMH

	No Mask	With Paper Mask
Infected staff	**11**	**2**
Non-infected staff	**72**	**26**

P = 0.51 (Fisher's)

14% wears paper mask


Surgical Mask
- 3 ply
Paper Mask
- 2 ply

No difference in surgical and N95 in this data set

PMH, PYNEH, KWH, QEH, QMH

	Surgical Mask	N95
Non-infected staff	**51**	**92**
Infected staff	**0**	**0**

Fisher exact = 1

Comparison of infected and non infected staff and wearing Gloves in hospitals with index cases

Gloves -no difference

PMH, PYNEH, KWH, QEH, QMH

	No Gloves	With Gloves
Infected staff	**9**	**4** *
Non-infected staff	**126**	**115**

p = 0.36
Chi-square

OR = 2

2 wear domestic gloves

Comparison of infected and non infected staff and handwash reported in hospitals with index cases

Hand wash

PMH, PYNEH, KWH, QEH, QMH

	No HW	With HW
Infected staff	**3**	**10**
Non-infected staff	**14**	**227**

P = 0.046
(Fisher's)

OR= 5

Comparison of infected and non infected staff and wearing Gowns in hospitals with index cases

Gowns

PMH, PYNEH, KWH, QEH, QMH

	No Gowns	With Gowns
Infected staff	**13**	**0**
Non-infected staff	**158**	**83**

p = 0.005
(Fisher's)

"Practice of droplets precaution and contact precaution is adequate in significantly reducing the risk of infection after exposures to patients with SARS"

Lancet 03:361:1519

Lancet Press Release (1st May 03)

"69 staff who reported use of all four measures were not infected, whereas all infected staff had omitted at least one measure"

Study two

Done in May: comparing infected and non infected staff in general medical wards

Comparison between Non-infected & Infected staff*

	Non-infected staff (%) n = 331	Infected staff (%) n = 127	p#	OR
1. Mask	99.4	85.8	0.0 *(Fisher's)*	26
2. Handwash	97.2	90.6	0.004	3.9
3. Glove	93.6	86.7	0.026	2.3
4. Gown	99.9	88.6	0.000	4.8
5. Cap	87.0	49.2	0.000	6.5
6. Eye protection	85.6	45.2	0.000	7.1
7. Mask + glove + gown + handwash	81.2	40.5	0.000	6.4

#(by χ^2)

*** All General Medical**

Infection Control measures implemented – now it is June 2003

All HCWs are now trained and have adequate PPEs

What is now the main factor correlated with HCWs infected when caring for SARS patients?

Methods: done in June

1. Conducted in ten hospitals with SARS patients admitted
2. Two general medical wards were selected
3. Information obtain on whether staff was infected in these wards
4. Rounds with procedures were observed
5. Nursing staff and HCA caring for SARS surveyed

Observe Practices

Total practices observed: 844 by 397 subjects

Questionnaire Survey

Total subjects surveyed: 331

Questionnaire

Insertion of RT
Oral feeding
RT feeding
Bed bath
Change napkin
Give bedpan/urinal
Oral temperature
Escort patient
Last offices
Intubation
Oral / ETT suction
Resuscitation

Observation

(link practices)

Bedpan
Bed - making
Change napkin
Bed bath
Oral suction
Oral feeding
RT feeding
Tub bath

Survey

	Mean (%)	Correlate (Spearman) with whether ward had staff infected*	p
1. Mask	99	0.15	0.53
N95	55	0.23	0.36
Surgical	25	0.06	0.80
both	19	0.04	0.88
2. Glove	90	0.48	0.85
3. Gown	81	0.05	0.85
4. Faceshield	61	0.09	0.72
5. Goggles	46	0.18	0.47
6. Cap	76	0.20	0.43
7. Shoes-cover	15	0.02	0.92
8. Hand Hygiene	97	0.09	0.74
9. SARS Patient duration of stay in ward (m = 13.3 days)		0.56	0.010

*** 34 infected staff**

Observe Practices

	Mean %	Correlate (Spearman) with whether ward had staff infected*	p
1. Mask	100		
N95	41	0.11	0.63
Surgical	20	0.10	0.66
both	39	0.25	0.30
2. Glove	91	0.29	0.22
3. Gown	99	0.15	0.53
4. Faceshield	69	0.12	0.62
5. Goggles	46	0.13	0.60
6. Cap	92	0.27	0.24
7. Shoes-cover	7	0.22	0.35
8. Hand rub	65	0.00	0.99
Handwash	78	0.03	0.90
9. SARS Patient duration of stay in ward (m = 13.3 days)		0.56	0.010

*** 34 infected staff**

With good infection control practices, the only risk factor is duration of exposures

So staff with IC lapse will still get infected

A study done on Intubation

From PL Ho et al

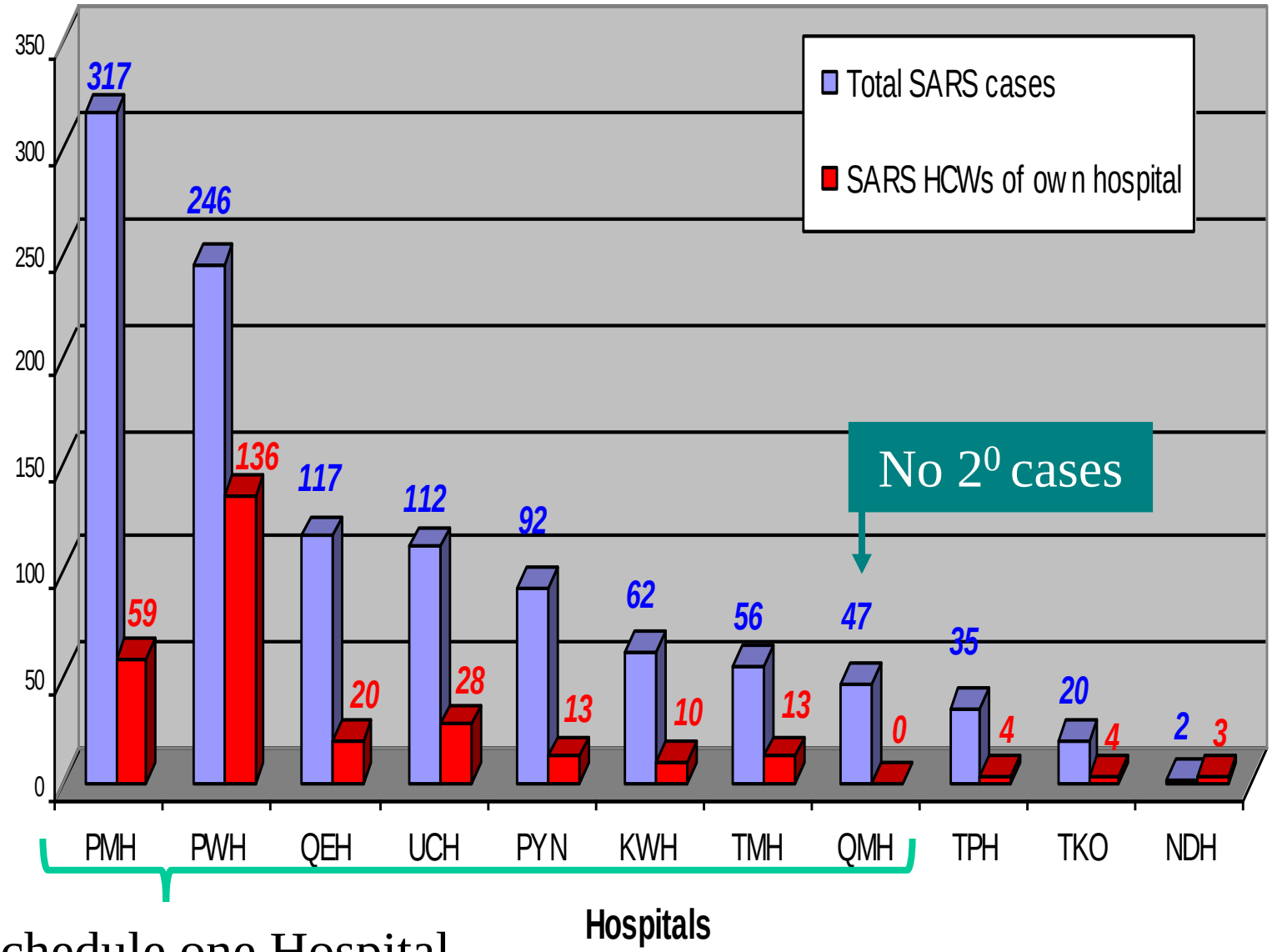
Episodes of Intubation

	With Infected Staff (n = 5)	Without Infected Staff (n = 83)	p	OR
1. Difficult Intubation	5 (63%)	13 (16%)	0.002	8.8
2. Extensive Bagging	5 (63%)	5 (6%)*	<0.001	25.9
3. Gross Contamination	3 (38%)	0	<0.001	NC
4. Intubate in General Wds	4 (50%)	9 (11%)	0.008	8.2
5. Immediate Showers	0	28 (34%)	0.045	NC

*2 has filters

Lessons from Queen Mary Hospital

SARS cases analysis in HA hospitals as at 6 May 2003



Schedule one Hospital

Two most important Infection Control practices

3 SARS patients admitted to General Medical Wards in QMH,

No staff got infected

RANK	**Exposed**	(%)
Nurses	23	46
HCA/WA	12	24
Doctor	11	22
Others	4	8
Total	50	100

Precautions	n	(%)	Rank non-conform
Mask (46 surgical, 4N95)	50	100	
Gown	13	26	
Glove	14	28	
handwashing	45	92	2 RN + 2 HCA, 1 not sure

General ward during SARS 2003

The use of gloves (CDC)

Fundamentals:

"Wearing gloves does not replace the need for hand hygiene"

"Failure to change gloves between patient contacts is an infection control hazard".

Look at the gloves

Photo from SCMP – newspaper in HK

Inconsistency of practices


北京军区总医院

Clinical Characteristics

Clinical Features of Cases vs Controls meeting WHO definition

	SARS (n=44)	Controls (n=251)	OR	p
Mean Age	39	42	0.98	0.17
Male	22(50)	140(56)	0.79	0.5
#Epidemiological link	32(73)	18(7)	34.52	0.000
Cough	19(43)	163(65)	0.41	0.007
Sputum↑	6(14)	97(39)	0.25	0.003
Dyspnoea	6(14)	41(16)	0.81	0.65
Myalgia	22(50)	75(30)	2.35	0.01
Chills	25(58)	99(39)	2.02	0.03
Fever (>38°C) in 48hrs	43(97)	227(90)	4.55	0.17
URI symptoms	10(23)	71(28)	0.75	0.45
GI symptoms	9(21)	44(18)	1.21	0.64
Platelets↓, day 1-3	17(39)	41(16)	3.22	0.001
WBC↓, day 1-3	11(25)	85(34)	0.65	0.25
Lympho↓, day 1-3	38(86)	143(57)	4.78	0.001
ALT ↑, day 1-3	31(71)	103(41)	3.43	0.001
*CXR deteriorate	26(59)	35(14)	8.91	0.001

contact with SARS case or hosp

*CXR score on day 3>day1

Significant Variables from 10 parameters* by logistic regression

	OR	95% CI
1. Epidemiological Link **(contact SARS case or hospital)**	234	29 -1895
2. Myalgia	4.1	1.4 -12.2
3. Lymphopenia, day 1-3 (<1.5x10^9/L)	4.7	1.2 – 19.3
4. Elevated ALT (>53U/L)	3.8	1.3 – 11.1
5. CXR deterioration **(score on day3 > day 1)**	94.5	11.2 - 792

***Epi. link, myalgia, chest s/s (cough, sputum, dypsnea, & chills), fever (>38oC) in 48 hrs, URI s/s, GI s/s, platelets↓, WBC↓, lymphopenia, ALT↑.**

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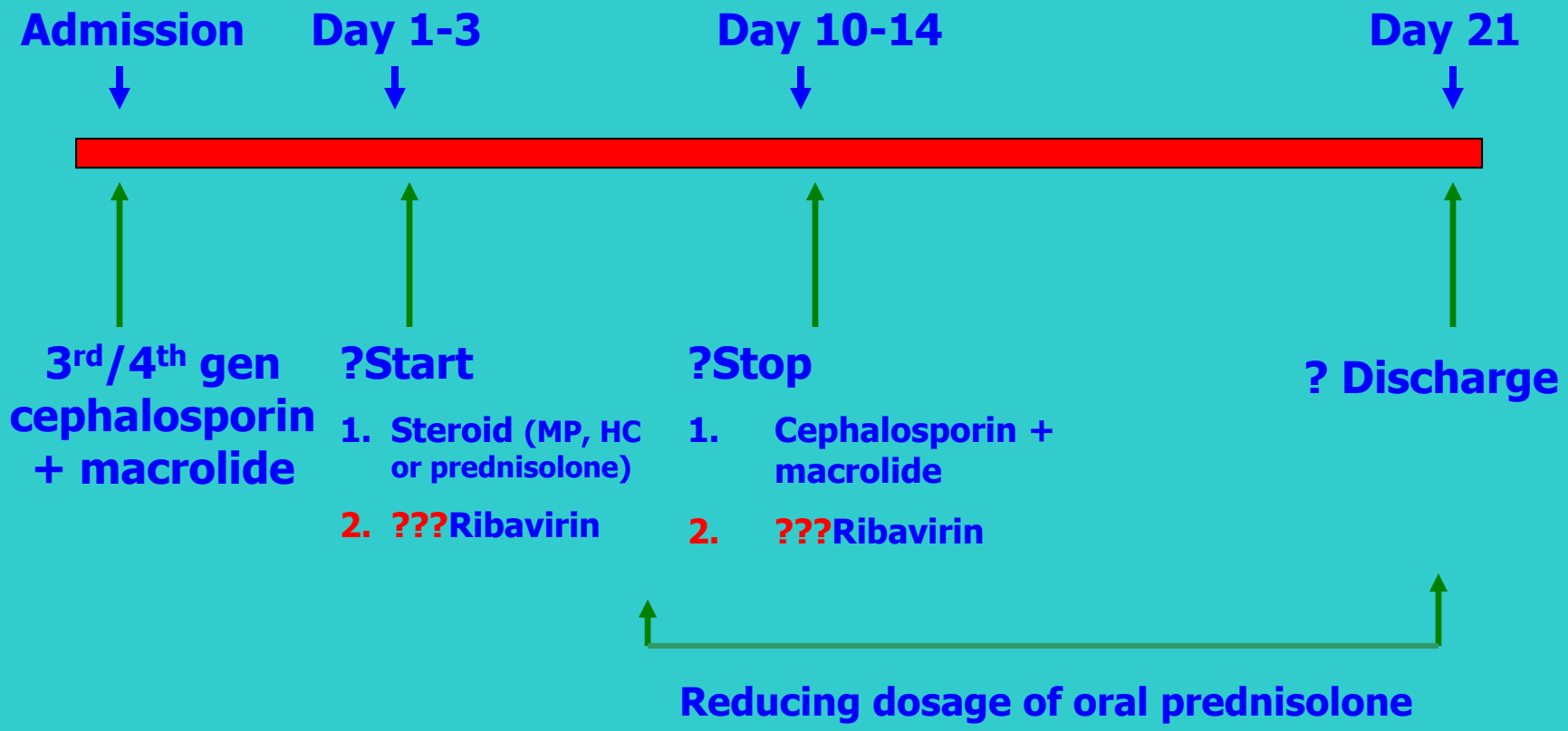
Current QMH treatment plan for a typical SARS patient



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