



SARS Severe Acute Respiratory Syndrome 

Evolution of Data Management System After SARS Outbreak

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Department of Health

SARS Severe Acute Respiratory Syndrome 

Outline of Presentation

- Principles of data management
- Overview
- Enhanced data management system
- Significant impacts

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Data Management

- Data capture
- Problems detection
- Outbreak monitoring
- Data analysis
- Information extraction
- Alerts communication
- Response formulation

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Overview

- Statutory notification system (Cap. 141)
- Statutory notification form, through fax and phone
- Face to face interviews and field visits by field epidemiologists
- EPI-INFO v.6 for storage and analysis

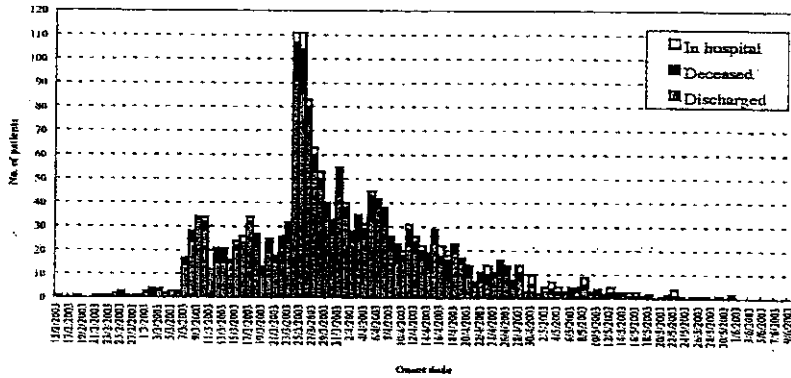
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SARS Outbreak



- 1755 SARS cases
- March to June

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SARS Outbreak

- Unprecedented outbreak
- Multiple foci
- Requires timely response; demands immediate public health measures
- Traditional data management system not sufficient
- No sharing between DH and HA systems
- SHWF initiated online computer system to access patient information directly by DH

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Enhanced Data Management System

eSARS
MIIDSS
SARS-CCIS

eSARS

- Two components:
 - Case list component
 - Contact tracing component
- Case list component: hospital admission, clinical information, clinical status
- Contact component: enable Designated Medical Centres conduct 10-day medical surveillance, capture information of close contacts
- Launched on 12 April 2003
- Information downloaded to DH

SARS Severe Acute Respiratory Syndrome



SARS CONTACT TRACING SYSTEM

Filter Area: (All) (SARS) (SUSPENDED) (ALL) (SARS)

Filtering Criteria: All Out of Area In Area Out of Area In Area Out of Area In Area

Regional Office: ALL SA State: ALL Name: [REDACTED]

Patient Information

Ward	Name	Hospital Code No.	Ward Code	STATUS	Name Tel. / IA Status	DN Status	Name Address	ADMISSION DATE	Symptoms Onset Date	Discharge Date	Discharge Disposition
S4	[REDACTED]		MONKONG	Under Obs.	NA	NA		20/02/2003	19/02/2003	20/02/2003	H-FU
ICU	[REDACTED]		SHI KING	Clin. SARS	NA	NA		12/02/2003	12/02/2003		
ICU	[REDACTED]		SHA TIN	Clin. SARS	NA	NA		13/02/2003	10/02/2003		
ICU	[REDACTED]		SHA TIN	Suspected	NA	NA		14/02/2003	11/02/2003		
IS	[REDACTED]		TUEN MUN	Clin. SARS	NA	NA		14/02/2003	10/02/2003		
SA	[REDACTED]		KHUN TONG	Clin. SARS	NA	NA		21/02/2003	04/02/2003		

Buttons: Status Change Report, Download, Total No. of Records: 6

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SARS CONTACT TRACING SYSTEM

Select other information displayed for your patient: (LSD000)

Personal Information

Name: [REDACTED] HMO: [REDACTED] Age: 9 DOB: 01/12/03 Sex: F Nationality: LINGCHOW

Address: [REDACTED] Telephone No.: [REDACTED]

Home: [REDACTED] Room: [REDACTED] Block: [REDACTED] Home: [REDACTED]

Workplace: [REDACTED] Office: [REDACTED] Other: [REDACTED]

SARS Case/Status

Diagnosis Status: Clin. SARS Disposition Status Date: 18/02/2003

Reference Start Date: [REDACTED] Coronavirus: yes PCR: IF

Condition: Stable

Admission Details

Hospital: PWH Case No.: [REDACTED] Admission Date: 13/02/2003

Ward: IC Discharge Date: [REDACTED]

Transfer From: NA Transfer To: NA

On First Admission

Temperature (C): 38.2

Chart: [REDACTED] Early Changes: NR CT

Symptoms: Fever = 38°C 17/02/2003

Respiratory

Healthcare: [REDACTED] Workplace: [REDACTED]

Non-healthcare: [REDACTED] Contact/Work Details: [REDACTED] Home: [REDACTED] Other: [REDACTED]



MIIDSS

- Requires a tool quickly identify linkage between cases and contacts
- Purpose for rapid implementation of public health measures
- MIIDSS-crime investigation programme, designed to identify linkage between people, between people and events
- Police produce regular "hotspot" on potential clustering
- Hotspot reports commenced on 13 April 2003

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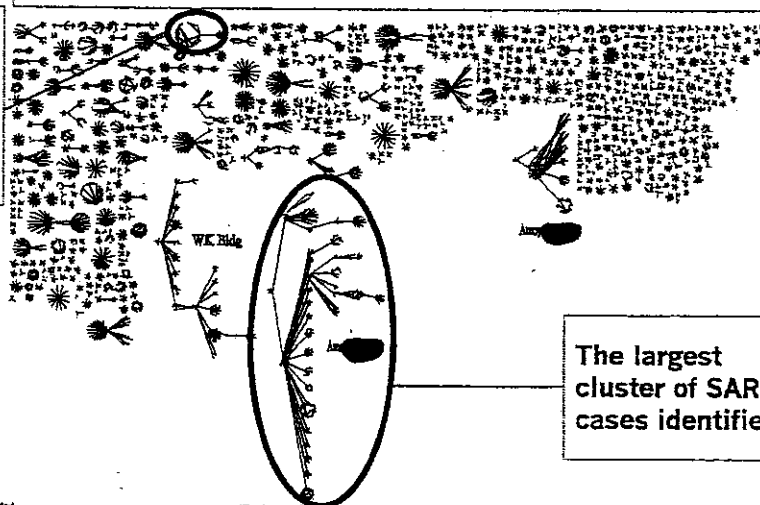
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Cluster Relationships

Overview of the clustering of SARS cases in HK

An individual cluster of SARS cases

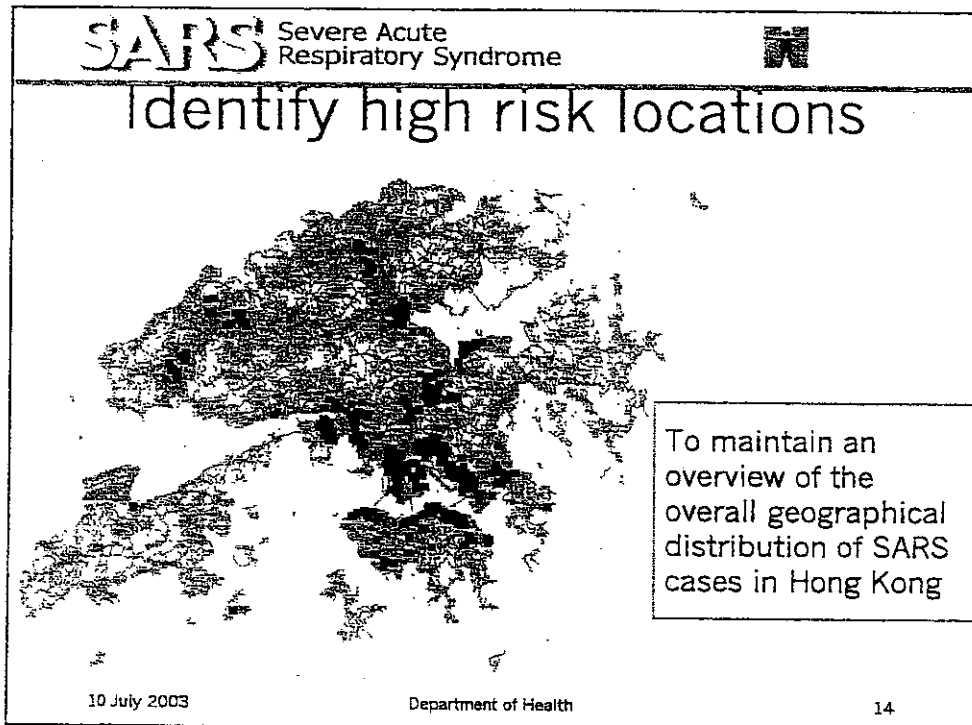
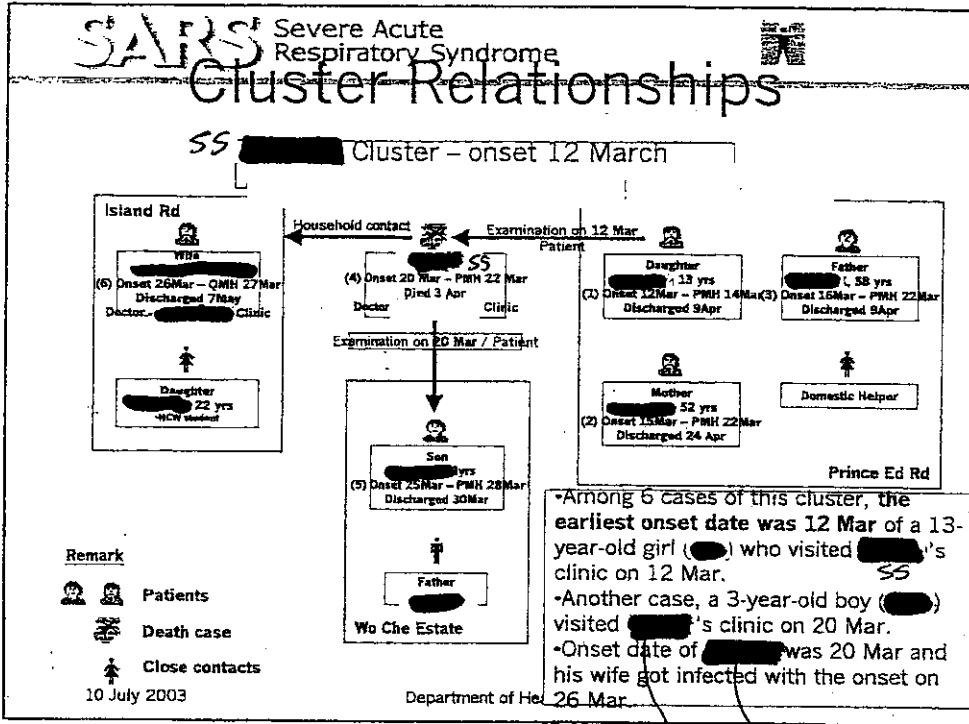


The largest cluster of SARS cases identified

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Identify high risk locations

- Case study of Sau Mau Ping district

- By the league table, MIIDSS facilitates the tracking of the accumulation of SARS cases in each district / housing estate / building to flag up high risk locations of SARS occurrence.

SARS Case Distribution (dated 2003-04-20)

DISTRICT	ESTATE	COUNT
ST	AMOY GARDENS	330
	NGAU TAU KOK LOWER ESTATE	46
	LEE KEE BUILDING	14
	LOK WAI ESTATE	9
	WANG KWONG BUILDING	9
	TELFORD GARDEN	7
	SAL MAU PING ESTATE	3
ST	SHUN TAI ESTATE	4
	TAK BO GARDEN	4
	PT SHUI ESTATE	23
	KWONG JIAK ESTATE	11
	TAI WOI ESTATE	9
	TAI VEEN ESTATE	9
	CHEUNG WAI ESTATE	3
	PY HENG ESTATE	4
	TAI PO CENTRE	4
	KING SHING COURT	4
ST	CITYONE	10
	SUNSHINE CITY	10
	WU CHEE ESTATE	10
	LONG HANG ESTATE	4
	HENG ON ESTATE	7
	JAT LUN CHUEY	7
	KWONG LAM COURT	7
POK HING ESTATE	7	

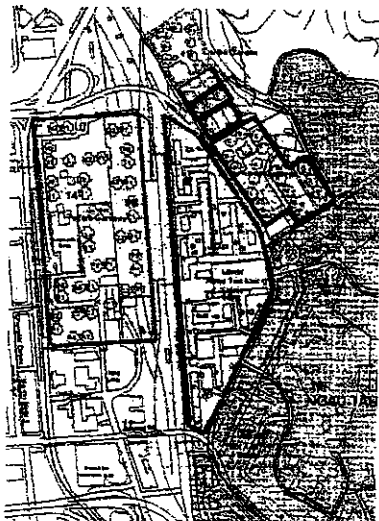
The league table indicated that Sau Mau Ping (SMP) district had the highest number of accumulative SARS cases on 20 April 2003, most of which came from Amoy Gardens.

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Identify high risk locations

- Case study of Sau Mau Ping district



SARS Case Distribution in Ngau Tau Kok as at 20 April 2003 (Source: Hospital Authority)

COLOUR	ESTATE	COUNT
————	AMOY GARDENS	330
————	NTK LOWER ESTATE	46
————	LEE KEE BUILDING	14
————	WANG KWONG BUILDING	9
————	TELFORD GARDEN	7
————	TAK BO GARDEN	4
————	JADE FIELD GARDEN	1

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Identify high risk locations

- Case study of Tai Po district

- MIIDSS league table of 20 April indicated that Tai Po district had the **second highest number** of accumulative SARS cases after Sau Mau Ping at that time.

SARS Case Distribution
(dated 2003-04-20)

DISTRICT	ESTATE	CASES	
SMP	ARROY GARDEN	236	
	NGAI LAC KOP TOWER ESTATE	46	
	LEF LEE BUILDING	14	
	LOK WAI ESTATE	9	
	WANG KWONG BUILDING	9	
	TELFORD GARDEN	7	
	SAU MAU PING ESTATE	5	
	SHUN TIN ESTATE	4	
	TAK HO GARDEN	4	
	TP	FU SHIN ESTATE	13
KWONG FUK ESTATE		11	
TAI WO ESTATE		9	
TAI YUEN ESTATE		8	
CHEUNG WAI ESTATE		5	
FU HENG ESTATE		4	
TAI PO CENTRE		4	
KING SHING COURT		4	
ST		CITY ONE	10
		SI WSHINE CITY	10
	WO CHEE ESTATE	10	
	LUNG HANG ESTATE	8	
	HENG ON ESTATE	7	
	JAT MIN CHIES	7	
	KWONG LAM COURT	7	
	POK HONG ESTATE	7	

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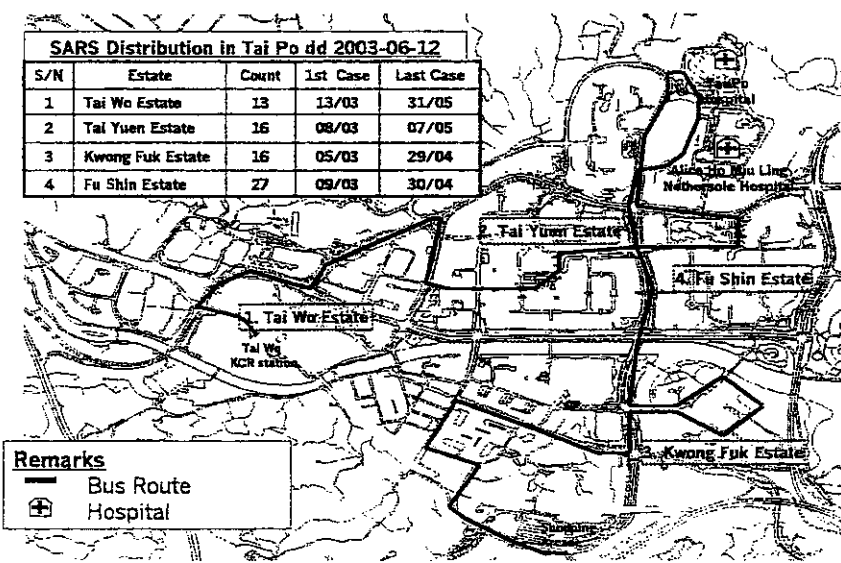
Compiled by SARS MIIDSS

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Identify high risk locations

- Case study of Tai Po district

S/N	Estate	Count	1st Case	Last Case
1	Tai Wo Estate	13	13/03	31/05
2	Tai Yuen Estate	16	08/03	07/05
3	Kwong Fuk Estate	16	05/03	29/04
4	Fu Shin Estate	27	09/03	30/04



Remarks
 — Bus Route
 ⊕ Hospital

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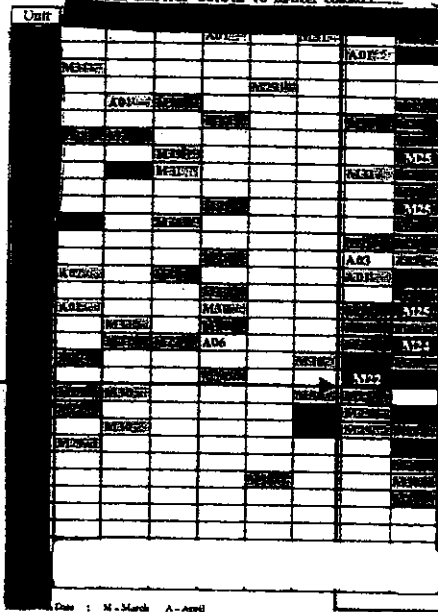
SARS Severe Acute Respiratory Syn Spread pattern analysis

A noticeable spread pattern of SARS on consecutive floors of the same vertical stack of units, particularly units 07 and 08

Spread pattern was also tracked by the onset dates and address locations of the SARS cases in Block E, Amoy Gardens with a colour scheme to indicate the sequence of onset dates (from darker colours to lighter ones).

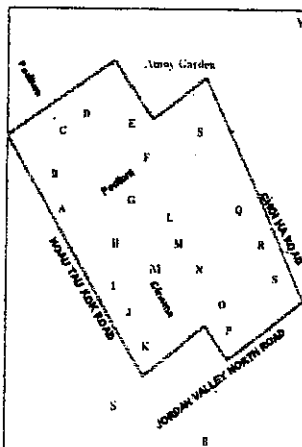
Investigation efforts were promptly steered to look into the environmental factors possibly transmitting the disease along the same vertical stacks of buildings in Amoy Gardens.

Spread Pattern AMOY - Block E (as at 7.4.03)
(from darker colour to lighter colour)



SARS Severe Acute Respiratory Syndrome Spread pattern analysis

Accumulative SARS cases



SARS Trends in Amoy Garden (as 2003-04-20)

BLK	Cases	Units	Units in last 7 days								
			1/20	2/20	3/20	4/20	5/20	6/20	7/20		
A	18	1									
B	42	1									
C	44	1									
D	30	1									
E	131	1									
F	21	1									
G	9	1									
H	2	1									
I	2	1									
J	6	1									
K	1	1									
L	2	1									
M	2	1									
N	2	1									
O	2	1									
P	2	1									
Q	2	1									
R	2	1									
S	2	1									
Total	316	228									

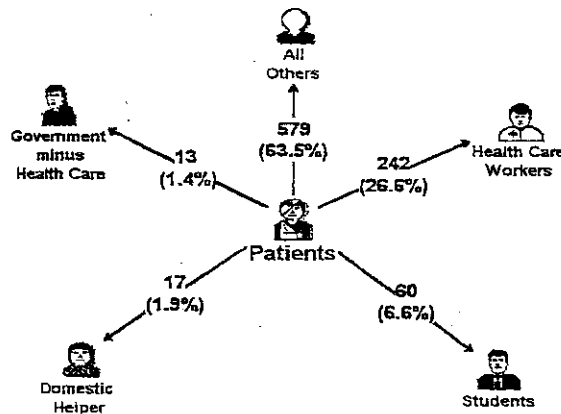
Continuous monitoring of the latest spread pattern

- B Bus Terminus
- V Mini Bus Terminus
- S School
- M Market
- Star Suspected Case

Analysis by HRP - MITDSS

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Patients categorization

Infected Persons by Category



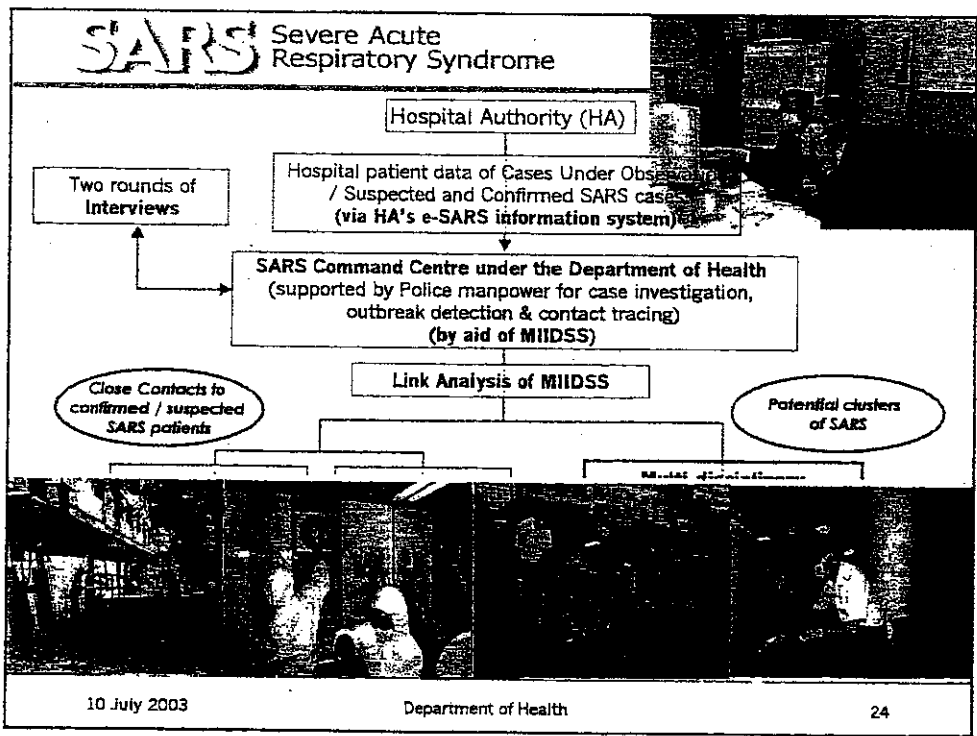
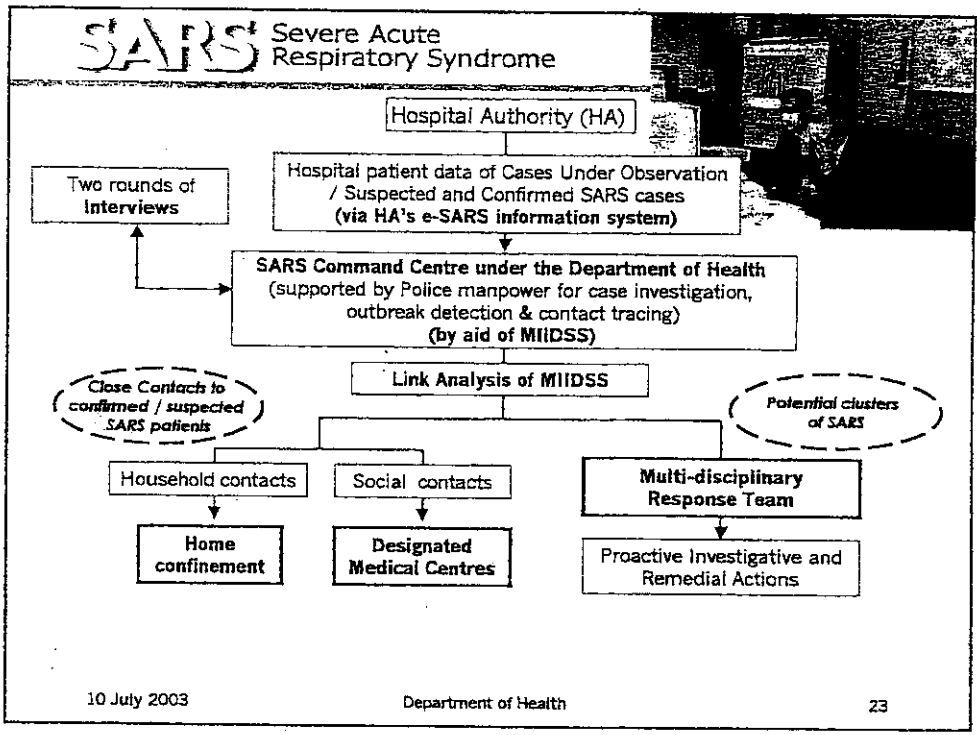
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Response Management





SARS-CCIS

- EPIINFO v.6 not run on shared network
- Few opportunities to efficiently consolidate and compare information kept at separate dataset at Regional Offices
- Enhance existing data management system to provide common dataset and common questionnaire in electronic format
- Enable construction of cluster trees
- Launched on 2 May 2003

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Case Questionnaire - Long Form

Form No. 1802 Region G H R K O E C W Ref. No. (S/1 No.) Input Date 2003/05/17

Verified:	<input checked="" type="radio"/> Yes <input type="radio"/> No	Verification Date:	
Case Status:	<input checked="" type="radio"/> Confirmed <input type="radio"/> Suspected <input type="radio"/> Under Observation <input type="radio"/> Deleted		
Status Date:	2003/05/17	Confirmed Date:	
Report Date:	2003/05/17	Receive Date:	2003/05/15
		Interview Date:	2003/05/14

Patient Ref. | 1st-Gen. Inf. | 2nd-Gen. Case Cont. | 3rd-Gen. Inf. | HIV-Ductus searched | HIV-Status of Infct. | HIV-Plan of Exam. | HIV-Test. Result | 2nd. Person

(Part I) Clinical History

Fever: Y Temperature: 38.0 C

Fever Onset Date: 2003/04/15

Symptom Onset Date: 2003/05/07

Symptoms:

Flu Like		Night Sweats	
Fatigue	Y	Sore Throat	N
Cough	N	Color of Sputum	
Sputum	N	Headaches	N
SOB	N	Diarrhoea	N
Ruamy Nasal		Rigor	N
Malaise	Y	Diarrhoea	N
Chills	N	Loss of Appetite	
Myalgia	N	Nausea	N

1. Hospital/Ward admitted: PWH10A
 Admission Date: 2003/04/15
 2. Hospital/Ward admitted: PWH100
 Admission Date: 2003/05/12
 3. Hospital/Ward admitted: PWH100
 Admission Date: 2003/05/15
 Conditions: Satisfactory
 CBC: Atypical Pneumonia
 White Blood Cell Count:
 Virus Result:
 Rhizovirus given:
 Rhinovirus Chest Test:

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Case Questionnaire - Total Notes

Form No. 1512 Region CH R E G I O W Ref. No. (SAR No.) Input Date 2003/05/17

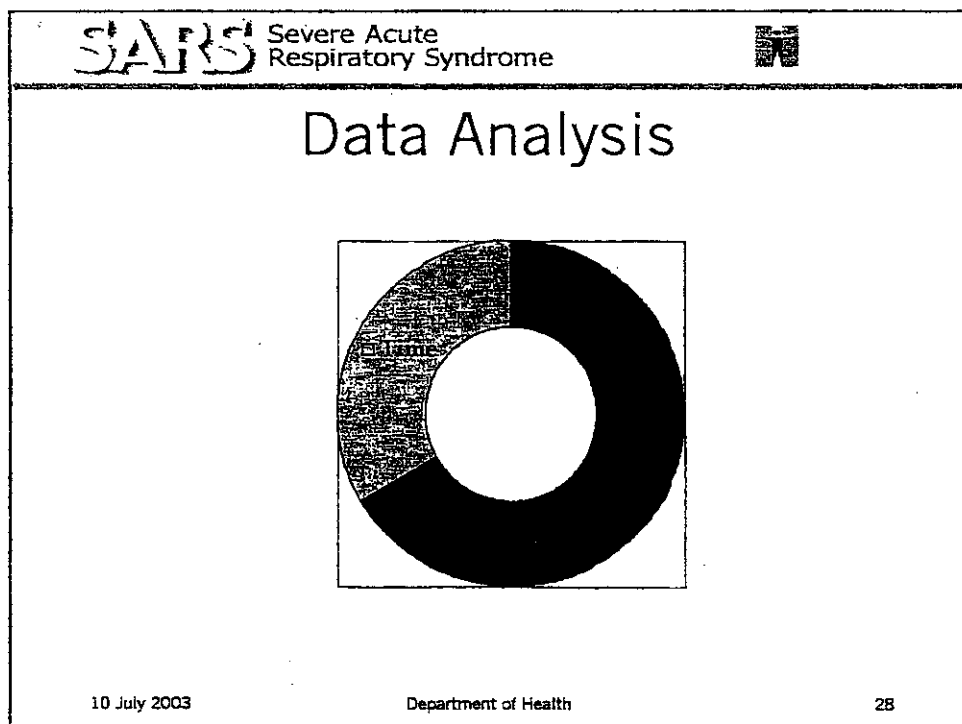
Case Status: Confirmed Suspected Under Observation Deleted

Shed Date: 2003/05/17 Confirmed Date: Report Date: 2003/05/17 Placation Date: 2003/05/19 Interview Date: 2003/05/14

Patient Part. Clin. Hist. Hx-Subj. Case Cont. Hx-Subj. Mtd. Hx-Subj. Contact Hx-Subj. of Infect. Hx-Subj. of Expos. Hx-Subj. Risk Subj. Progress

(Print ID) Subject's close contact 密切接觸者 - 密切接觸15分鐘以上、曾同處一室、曾與病人同住(家人)或曾與病人密切接觸之親屬人士、公司同事

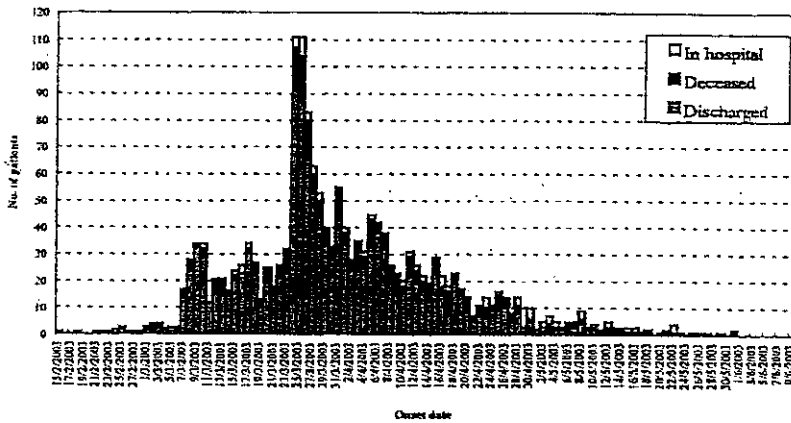
Contact Type	Contact Name	Contact Chinese/Gen	Age	HEID	Contact No.	Relationship
H		F	58			WIFE
H		M	28			NEPHEW
H		M	22			SON
H		F	29			DAUGHTER
H		F	35			DAUGHTER





Data Analysis

Time



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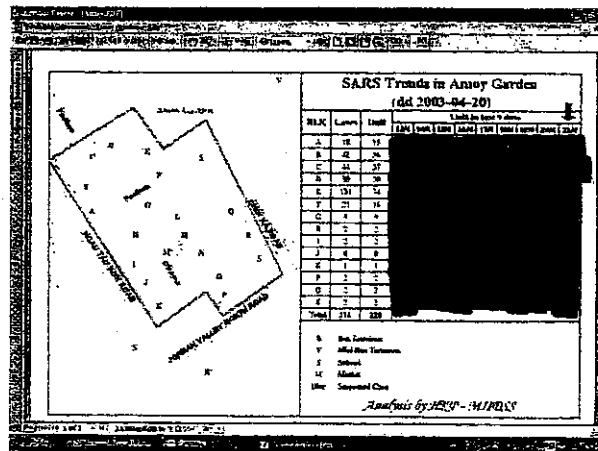
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Data Analysis

Place

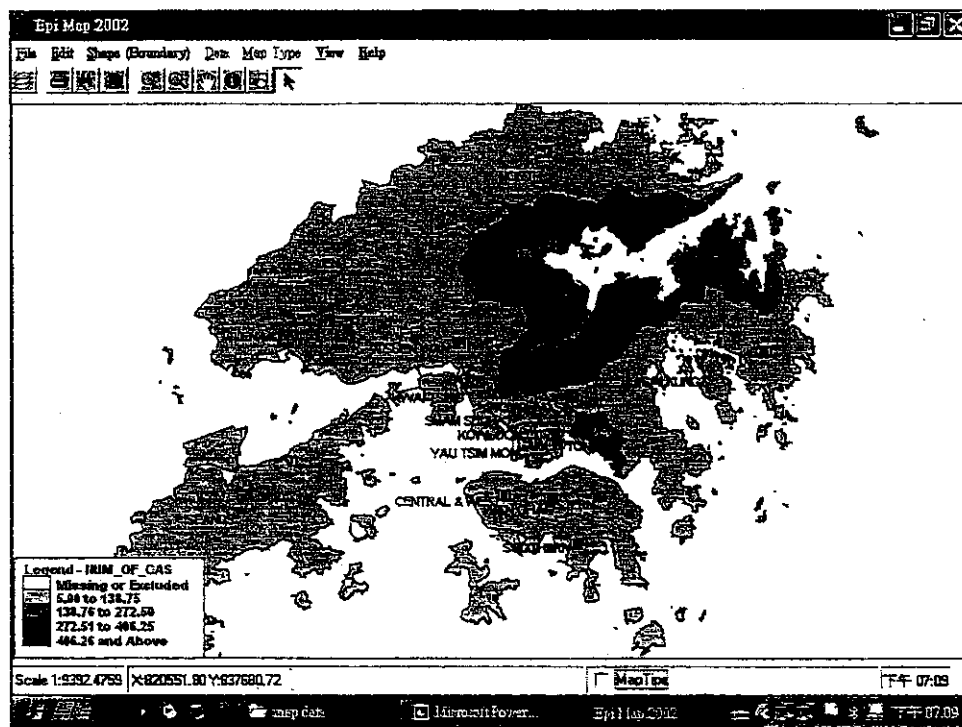
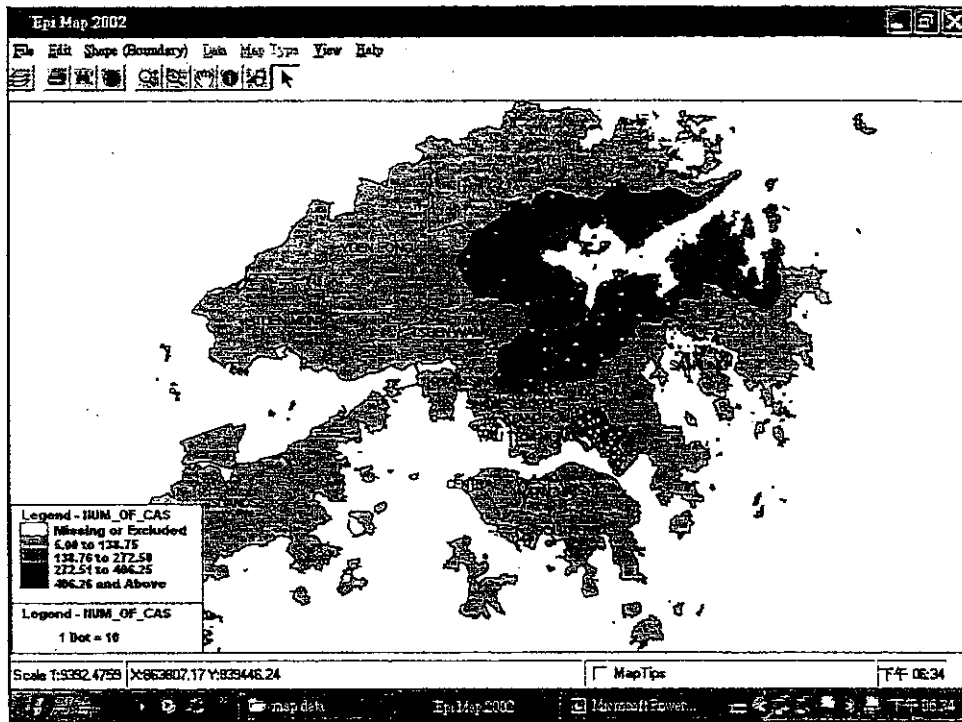
- Geographical information extracted from central dataset
- Produce hotspot report
- Identify potential clustering

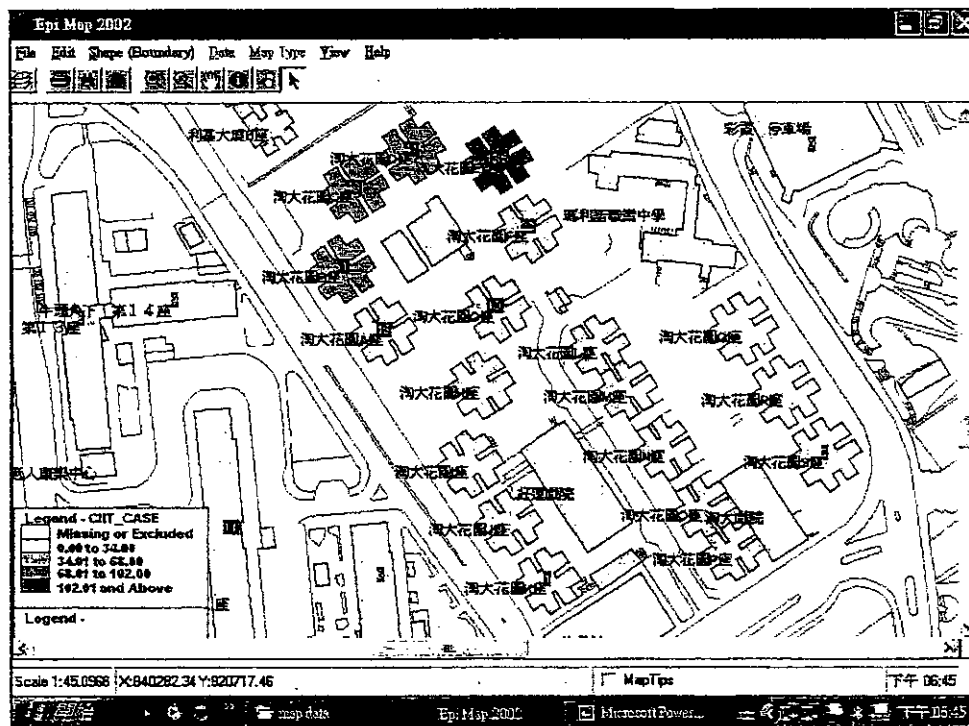
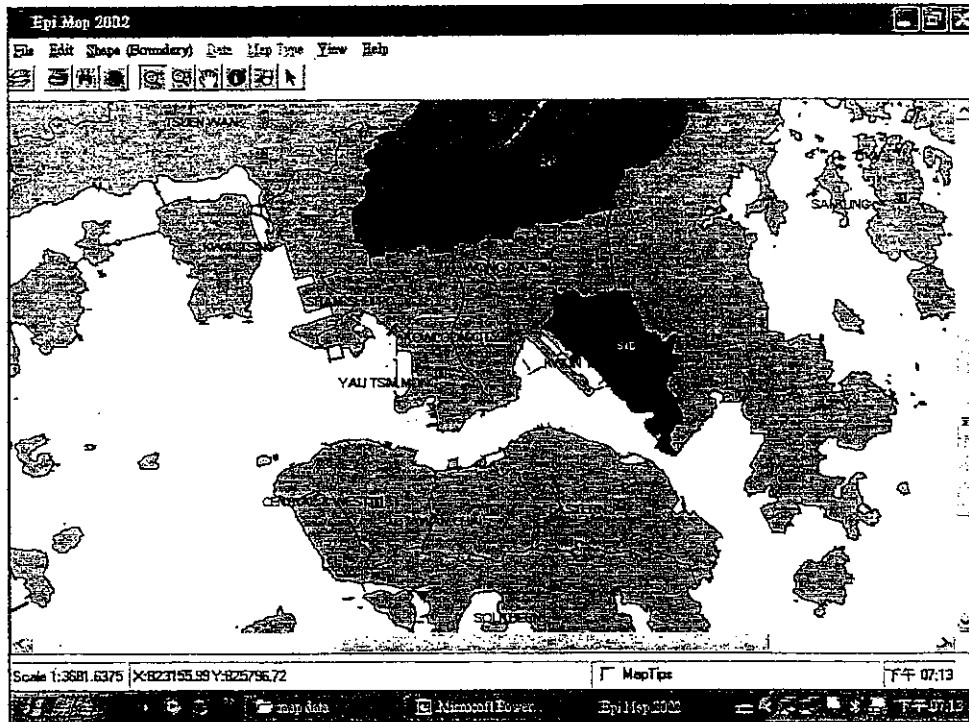


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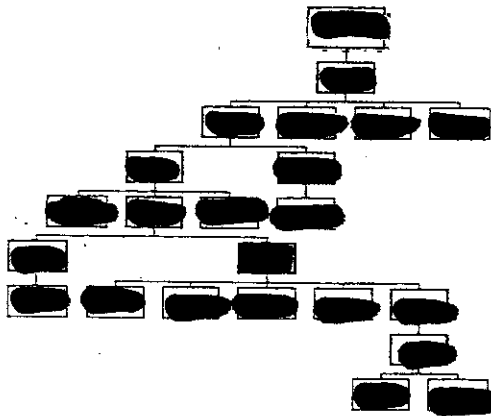
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Data Analysis



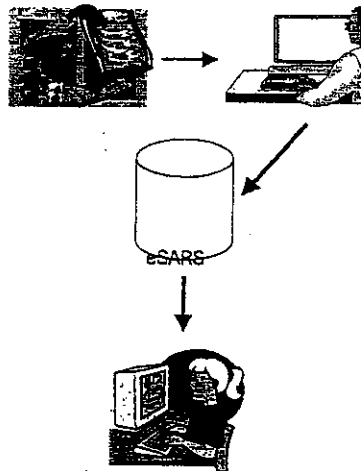
Person

- Need to identify linked up cases and contacts in cluster
- Cluster tree
- Cluster records for epidemiological analysis



Notification of SARS

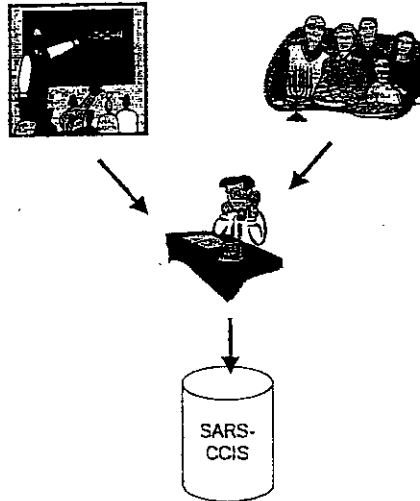
- SARS diagnosed
- Doctors fill up electronic medical record
- Immediately accessed by field epidemiologists at Department of Health





Contact Tracing

- Contact data collected through interview,
- Updated central dataset through online computer screen
- Field epidemiologist can review and update information collected by other field epidemiologist at other location

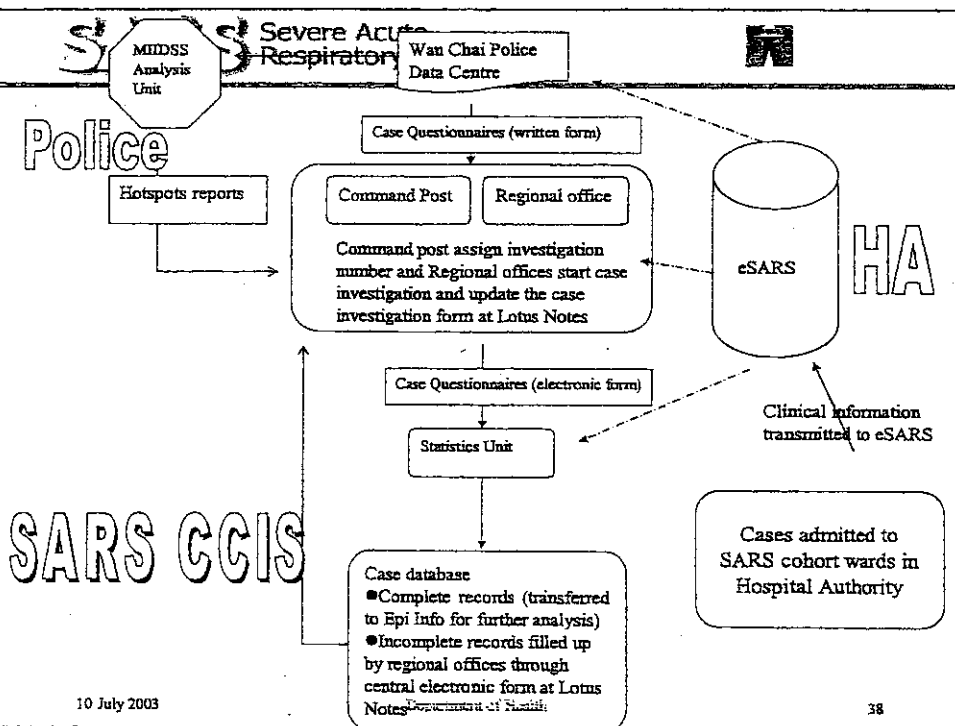


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Wan Chai Police Data Centre



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Significant Impacts (1)

- ✓ Timely access of patient information
- ✓ Instantaneous updating of confirmed and suspected cases
- ✓ Saved at least **one day** between identification of cases in wards and notification to DH



Significant Impacts (2)

- ✓ Hotspots report from MIDSS facilitate early identification of *potential clustering* of confirmed and suspected cases
- ✓ Enables to plan field visits and proactively deploy resources to handle potential problems

Significant Impacts (3)

- ✓ Real time dataset enable assessment of outbreak development in terms of ***time, place and person***
- ✓ Daily situation report on epidemic curve and summary of public health measures: ***response formulation***
- ✓ Timely generation of action lists: ***alerts communication***

Significant Impacts (4)

- ✓ Updated statistics and outbreak situation reported in ***SARS bulletin*** and published on SARS website
- ✓ ***SARS affected building*** published on SARS website



Thank You

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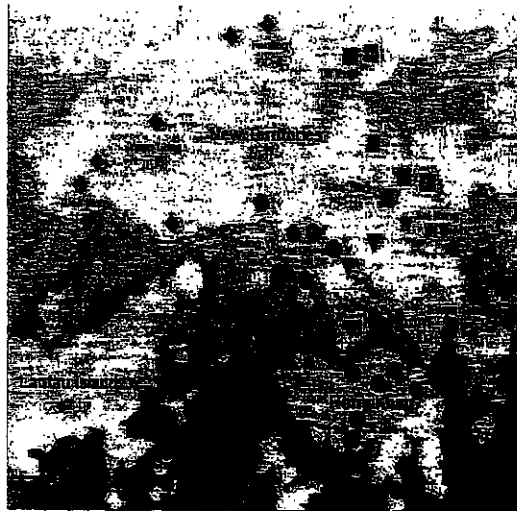
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Hospitals and Clinics in Hong Kong

- * 43 Public Hospitals
- * 46 Specialist
Outpatient Clinics
- * 64 general outpatient
clinics
- * 12 private hospitals



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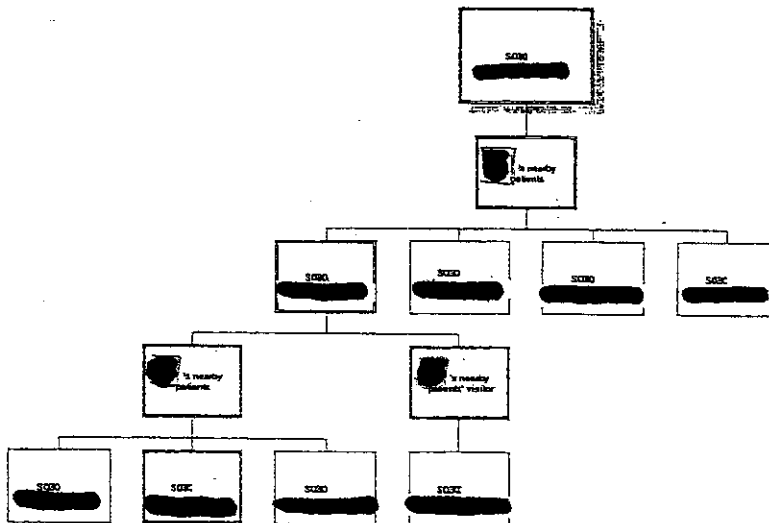
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Data Analysis

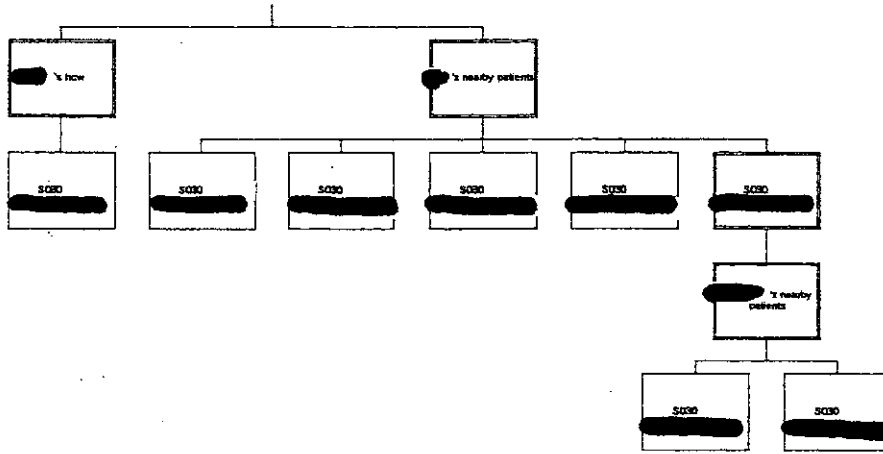


Cluster Tree





Cluster Tree



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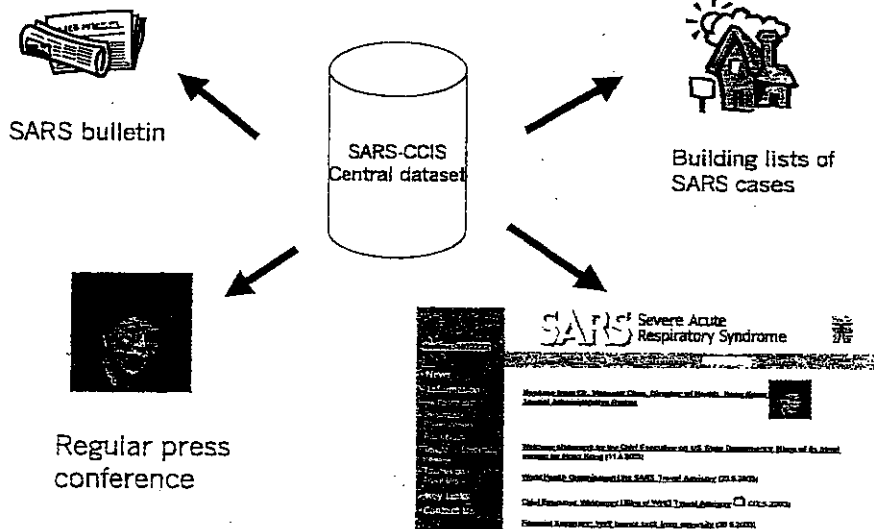


Data Dissemination

Data Dissemination

- Effective data dissemination
 - ✓ Shorten time to initiate investigation
 - ✓ Facilitate other departmental teams assist to implement public health measures
 - ✓ Inform public on outbreak situation

Data Dissemination





Lessons Learnt

- Timely access of epidemiological and clinical information
- Geographical analysis to identify cluster
- Cluster analysis to identify risk factors
- Central dataset and use of IT



Future Challenge

- Intelligence exchange among cities and countries in neighbourhood
- Establishment of data exchange network
- Real time detection alert system
- Mathematical modelling and data mining

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Thank You