Infectious Diseases in 2003 - where science, medicine and politics need to meet

Professor R G FINCH

The City Hospital & University of Nottingham, UK

Current Infectious Disease Challenges

Respiratory tract infections - new, unknown and resistant pathogens Foodborne gastrointestinal infections Drug resistant hospital acquired infections - MRSA, Gram-negative bacilli HIV infection Hepatitis B & C \bullet **Tuberculosis – including drug resistant disease** Influenza – the next pandemic \diamond Malaria **Bioterrorist pathogens** \diamond

Public and political concerns

- Hospitals MRSA
- Untreatable infections antibiotic resistance
- Contaminated blood HIV/HCV
- Contaminated surgical instruments
 CJD/nvCJD
- Eggs Salmonella
- Asylum seekers Tuberculosis/HIV

Current Infectious Disease Challenges

- Poverty and ignorance
- Poor hygiene
- Unsafe water supply
- Infected food chain
- Prisons / orphanages
- Nursing homes
- Inadequate surveillance systems
- Inadequate diagnostic or therapeutic solutions
- Insufficient professionals skilled in diagnosis, management and prevention of infection

Diagnosis

Infectious Disease Control

Treatment

Prevention

Medicine definitions clinical features diagnosis treatment prevention

Science

epidemiology pathophysiology microbiology genomics pharmacology therapeutics vaccinology

Politics healthcare provision public health economics higher education drug licensing vaccine policy research funding public accountability



COPD Around the World (all ages)

Region or Country

Established Market Economies Former Socialist Economies of Europe India Sub-Saharan Africa Latin America and Caribbean Middle Eastern Crescent

1990 Prevalence per 1000 Males/Females

6.98/3.79
7.35/3.45
4.38/3.44
4.41/2.49
3.36/2.72
2.69/2.83

Comparison of COPD Direct and Indirect Costs (US\$ millions)

Country	Year	Direct Cost	Indirect Cost*	Total	Per Capita
UK	1996	778	3,312	4,090	65
Sweden	1991	179	281	460	60
US	1993	14,700	9,200	23,900	87

* Working days lost, disability, premature death

NIH (2001)

CAP – the problem

Incidence worldwide:1.1–4.0 per 1000 population ♦ 5–12% of LRTIs in adults (UK) • 22–42% of adults with CAP are hospitalised Mortality rates community treated <1% hospital treated 5.7-15% ICU treated >50%

Frequency of investigations performed in the management of patients with LRTI including pneumonia by GPs in different European countries

	Any	Chest	White Blood	Sputum
	Investigation	Radiograph	Count	Examination
Country	(%)	(%)	(%)	(%)
All	29	22	15	7
Germany	43	27	27	12
Spain	36	31	18	5
Italy	24	21	7	4
France	21	18	14	3
UK	18	13	8	6

Number of documented infections in studies of the aetiology of CAP

	Community	Hospital		Totals	
	(8)	(35)^	(14)^	(57)^	
UK	236	1137	185	1558	
Europe (excluding UK)	654	6026	1148	7828	
Rest of world	149	1759	-	1908	
TOTAL	1039	8922	1333	11294	

*() = number of studies

Microbial aetiology (%) of adult CAP in the UK

Pathogen	Community ^a (n=236)	Hospital ^b (n=1137)	Intensive care ^b (n=185)	
S. pneumoniae	36.0	39.0	21.6	
H. influenzae	10.2	5.2	3.8	
S. aureus	0.8	1.9	8.7	
<i>Legionella</i> spp.	0.4	3.6	17.8	
M. pneumoniae	1.3	10.8	2.7	
C. pneumoniae	?	13.1	?	
C. psittaci	1.3	2.6	2.2	
C. burnetii	0.0	1.2	0.0	
Viral	13.1	12.8	9.7	
Mixed	11.0	14.2	6.0	
Other	1.7	2.0	6.5	
Not established	45.3	30.8	32.4	

a 1

Penicillin-resistant & intermediate pneumococci

0-10%	11-20%	21-30%	31-40%	41-50%	>50%
Netherlands	UK	Switzerland	Hungary	France	Saudi Arabia
Italy	Belgium	Repub. Ireland		Spain	Hong Kong
Germany	Poland	Portugal		Mexico	
Austria		Slovak Republic		S. Africa	
		USA			
		Brazil			

MRSA bacteraemia (England & Wales) as % of all *Staph. aureus - 2001*



Impact of antimicrobial resistance

•	Senate USA/ASM	1995/6
•	House of Lords Select Committee	1998
•	SMAC - set up SGAR (UK)	1997/8
•	European CMOs Copenhagen	1998
•	WHO Global Strategy	2000
•	Specialist Committee on	
	Antimicrobial Resistance (UK)	2001
•	EU 'The Microbial Threat' Visby	2001
•	EC Framework VI- NoE	2002
•	EU 'Antibiotic resistance – research	2003

Controlling resistance to antimicrobial agents

Government strategies

microbiological surveillance
monitor drug utilisation
promote prudent prescribing
educate professionals & public
promote infection control and hygiene

Sales of different classes of antibiotics expressed as DDD/1000 inhabitants and day to outpatients 1997 in the 15 EU countries.



Surveillance – critical questions

Why is surveillance required? How can the information be obtained most efficiently? How much information is needed? How will the information be used? How will it support evolving strategies for the control of a particular disease? How will success or failure be judged?

Prudent prescribing - definition

'The use of antimicrobials in the most appropriate way for the treatment or prevention of human infectious diseases, having regard to the diagnosis (or presumed diagnosis), evidence of clinical effectiveness, likely benefits, safety, cost (in comparison with alternative choices), and propensity for the emergence of resistance. The most appropriate way implies that the choice, route, dose, frequency and duration of administration have been rigorously determined.'

Dept of Health, UK

Outstanding gaps

Limited evidence base

- bacterial aetiology
 - impact of resistance
 - attributable morbidity/mortality (ie distinguishing patients who fail from R pathogens from those who fail with R pathogens)
 - outcome relative to appropriate/inappropriate therapy
- Definition of appropriate
 - drug dosage
 - treatment duration
 - shorter courses to ψ AB usage?

Outstanding gaps

Empirical therapy untenable for resistance control

need better/more rapid diagnostic methods preferably at the point of prescribing

Strategy for effective implementation of guidelines

- national implementation influenced by local
 - aetiology
 - resistance patterns
 - healthcare delivery
 - on-line prescribing systems in development
- Means of audit of guidelines
 - physician adherence
 - impact on patient outcomes
 - impact on bacterial resistance

Recommended immunization schedules (childhood)

N Ameri	ca Vaccine	UK	Vaccine
2 m	DaPTP, Hib	2 m	DPT, Hib, OPV, MenC, BCG*
4 m	DaPTP, Hib	3 m	DPT, Hib, OPV, MenC
6 m	DaPTP, Hib	4 m	DPT, Hib, OPV, MenC
12 m	MMR (1 st)	12-15 m	MMR
18 m	DaPTP, Hib	3-5 y	DT, OPV, MMR
4-6 y	DaPTP, MMR (2 nd)	10-14 y	BCG
Grade 5	Hep B (3 doses)	13-18 y	DT, OPV
14-16 y	Td		

*Children at high risk of contact with tuberculosis

www.escmid.org



EUROPEAN SOCIETY OF CLINICAL MICROBIOLOGY AND INFECTIOUS DISEASES



... improving the management of infections in Europe and beyond

MISSION

... to improve the diagnosis, treatment and prevention of infectious diseases in Europe and beyond

- by promoting and supporting research, education and training in the infection disciplines
- by fostering the recognition and functional integration of clinical microbiology and infectious diseases
- by facilitating professional exchange and stimulating an open and collaborative spirit

ESCMID Study Groups



ESCMID supports 12 Study Groups engaged in the advancement of scientific knowledge and/ the dissemination of professional guidelines in clinical microbiology and infectious diseases.

ESGAP	Antibiotic Policies
ESGARAB	Antimicrobial Resistance in Anaerobic Bacteria
ESGARS	Antimicrobial Resistance Surveillance
ESGCD	Clostridium difficile
ESGEM	Epidemiological Markers
ENSEI	Experimental Infections
EHSG	Helicobacter
ESGMD	Molecular Diagnostics
ESGNI	Nosocomial Infections
EUWOG	Rickettsia, Coxiella, Ehrlichia and Bartonella
EFISG	Fungal Infection
ESGT	Toxoplasmosis





INFECTIOUS DISEASES

TRAINING in the EUROPEAN UNION

	Duration (y)	Content of training	Training program	Common trunk	Number of trainees
Switzerland	5-7	theory-laboratory-clinic	yes	internal medicine or pediatrics	15
Germany	not specified	various	no	varies	
Denmark	10.7	theory-laboratory-clinic	yes	internal medicine	6
United Kingdom	6	theory-laboratory-clinic	yes	internal medicine	45
Italy	4	theory-laboratory-clinic	yes	internal medicine	440
Norway	9	theory-laboratory-clinic	yes	internal medicine	15
Portugal	5	theory-laboratory-clinic	yes	internal medicine	11
Sweden	5 (min)	theory-laboratory-clinic	yes	internal medicine	40

http://uems.be/infect-e.htm

Clinical Governance

Definition

" A framework through which healthcare systems are accountable for continually improving the quality of their services and safeguarding high standards of care by creating an environment in which excellence will flourish."

Medical Research Council (UK) – budget (£m)

	2001-02	2002-3	2003-4
Total (£m)	349.6	371.9	387.2
Real terms increase (%)	0.4	3.9	1.6
Total extra funding	0 7	32 0	/7 3
	9.7	20.0	24.0
	9.0	20.0	5.0
core programmes & PhD stinends	0.4	2.0	12.3
canital	0.0	 6 0	6.0
oupriur			

European Commission Research & Technology Development 2002-06



<u>Thematic priority: Life sciences, genomics and biotechnology</u> <u>for health</u>

Main objectives:

Integrating post-genomic research into the more established biomedical and biotechnological approaches. Involvement of key stakeholders e.g. industry, healthcare providers and physicians, policy makers, regulatory authorities, patient associations and experts on ethical matters

US experience - academic perspective

- diversity of research environments federal, state, university and private research organisations
- acceptance of research led solutions to health challenges
- fewer traditional boundaries observed
- early recognition of commercial opportunities for research initiatives
- collaborations actively pursued and fostered
- cutting edge science and academic excellence from biotechnology companies

The microbial genome and disease expression

Should be understood in relation to -

- genomics
- ecology
- physiology
- evolution