

# RESEARCH ACTIVITIES ON EMERGING AND REEMERGING DISEASES

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**Abstract:** This paper showed the trend in the number of paper published on emerging and reemerging diseases by using the list of the Medline, which is one of the most valuable databases in the clinical and biological medicine. The number of research papers published on the emerging and reemerging infections in that database decreased in 1997, in comparison with those between 1994 and 1996, in spite of the fact that the total number of the paper published has been increasing year by year. There is also a report showing that the number of the published papers of noticeable infectious diseases such as AIDS, Hepatitis B, Gonorrhoea, Pertussis and Tuberculosis declined by 15% or more in the USA from 1993 to 1995. It also became clear that USA is the highest in rank for the number of papers published and it was well ahead of the other countries. However, as for *Vibrio cholerae* O139, Human T-lymphotropic Virus type 1 and Plague, a lot of papers have been published by responding countries like India, Japan and Russia, respectively. This result might be showing that research activity of each country for each disease relates to the extent of their concern over each disease.

**Key words:** Emerging disease, Reemerging disease

## INTRODUCTION

There was a paper titled "Infectious Diseases-A global health threat" published by US government in 1995, which showed the importance of arising awareness of the infectious disease. According to the WHO and CDC in Atlanta, United States, the term of "emerging and reemerging diseases" refers to diseases of infectious origin whose incidence in human has either increased within the past two decades or threatens to increase in the near future (Institute of Medicine, 1992). And CDC listed at least thirty diseases as representatives of emerging and reemerging diseases.

National opinion leaders generally had considered the threat of infectious diseases to be of only historical interest in 1960s and 1970s (Lederberg *et al.*, 1992; Garrett, 1994; Martine, 1996; Sande, 1996; Schwartz, 1997; Stephens *et al.*, 1998). However, the emergence of HIV or Ebola virus as well as the resurgence of Tuberculosis or Malaria has changed the political circumstances that surround the infectious diseases.

Infectious diseases also remain the leading courses of death not only in the developing countries but also in developed countries like USA (World Bank, 1993; McGinnis *et al.*, 1993). Further, emerging and reemerging infections

have been attracting greater attention from not only the public health viewpoint but also national security viewpoint in recent years. Under those circumstances, we had a strong interest in whether research activities on emerging and reemerging infections have changed or not, and how.

We thought that the number of paper published is one of the appropriate indicators to estimate their research activities on those infectious diseases.

## METHODS

Medline on Internet was chosen for this survey because it has a broader coverage about biomedical studies. Papers written in English were also selected. There are 105,676 papers in total. The reason why papers written in other languages were excluded is that those might be inferior in quality to the international journals written in English and less reading worldwide. Medline is published by National Library of Medicine (NLM) in the United States and is the main database for secondary reference materials in the field of medicine. Papers were selected by the title including the name of pathogens and were categorized by country, in which corresponding institutions were located, even if studies were conducted through international col-

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Table 1 The number of published paper of emerging diseases

Pathogen	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	Total
HIV							108	977	2,035	2,267	2,853	3,244	3,482	3,787	3,728	3,610	3,856	2,514	32,461
Hepatitis C	9	11	11	9	18	10	16	19	24	66	285	528	747	879	1,106	1,379	1,213	904	7,234
<i>Helicobacter pylori</i>										7	213	409	390	589	564	809	913	589	4,483
HTLV-1		3	6	31	115	366	613	291	192	230	230	259	269	280	235	228	229	126	3,703
Rotavirus	97	122	126	182	166	139	167	181	204	197	199	164	151	155	152	123	161	66	2,752
<i>Borrelia burgdorferi</i>						12	39	53	73	118	106	131	167	194	164	145	143	97	1,442
<i>Campylobacter jejuni</i>	44	60	99	11	130	72	114	88	91	61	77	63	72	80	77	95	61	40	1,335
<i>Legionella pneumophila</i>	47	70	66	85	66	64	74	72	77	76	57	65	75	49	67	63	50	23	1,146
Hepatitis E	26	31	27	19	23	23	29	18	18	30	32	69	72	78	102	107	92	77	873
Prion			4	3	8	17	22	26	30	23	42	59	63	95	90	102	158	109	851
enterohemorrhagic <i>Escherichia coli</i> O157				2	1	6	12	20	15	26	17	22	22	42	48	65	80	92	470
Hantavirus				2	1	3	11	12	10	8	21	14	48	83	65	53	31		362
<i>Cryptosporidium parvum</i>						1	5	5	3	13	36	29	34	53	41	72	46		338
Ehrlichia	6	1	4	1		4	7	11	15	16	17	21	21	18	25	18	33	23	241
Ebola virus	10	6	10	10	1		3	1	1	3	6	2	7	8	5	45	30	16	164
<i>Vibrio cholerae</i> O139														13	40	51	38	16	158
Bartonella		1				1	1		2		2	3	6	4	7	46	52	31	156
Encephalitozoon	10	3	3		2	1	6	4	14	6		7	4	15	11	13	17	16	132
<i>Staphylococcus aureus</i> toxin shock			3		3	6	5	10	9	24	7	3	4	5	9	2	7	2	99
Cyclospora											1			6	13	20	26	18	84
HHV 6	1	1	3	3	2	1	1	1	3	6	5	10	11	5	9	3	7	5	77
<i>Enterocytozoon bienersi</i>											3	3	3	8	5	10	8	9	49
HHV 8			2		1	1	2	2		2		2		2	3	2	5	12	36
Guanarito															1	1	1		3
Sabia																	1	1	2
Total	250	309	364	356	538	724	1,223	1,790	2,820	3,171	4,173	5,121	5,609	6,394	6,597	7,043	7,306	4,863	58,651
No. of papers on Medline	263,310	265,496	275,406	287,713	297,353	249,485	333,854	258,200	378,147	369,645	376,690	375,903	377,414	207,871	388,433	398,231	403,323	405,173	6,011,647

Table 2 The number of published paper of reemerging diseases

Reemerging disease	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	Total
Tuberculosis	808	772	968	825	813	578	901	1,055	1,030	895	1,120	1,070	1,023	1,186	1,172	1,451	1,399	773	17,839
Malaria	221	271	325	368	376	367	387	494	555	688	568	596	624	606	617	577	580	396	8,616
Pertussis	55	86	89	122	141	183	216	240	341	312	309	342	280	261	255	235	238	188	3,893
Schistosomiasis	164	160	150	166	180	143	196	307	244	222	151	123	166	135	136	135	156	67	3,001
Leishmaniasis	85	83	107	122	134	117	184	195	163	146	188	174	186	239	226	226	224	94	2,893
Cholera	137	142	141	127	130	88	127	142	142	169	169	232	231	216	194	203	156	90	2,836
Rabies	121	143	171	104	122	93	150	140	197	122	135	125	145	145	144	129	141	73	2,400
Toxoplasmosis	122	111	114	127	136	78	118	113	126	143	158	135	171	138	138	134	121	68	2,251
Dengue	44	49	57	62	62	41	51	97	58	87	84	79	78	101	100	100	96	62	1,308
Plague	47	38	51	54	40	32	39	39	46	46	47	35	57	46	103	70	35	38	863
Echinococcus	22	32	35	34	41	22	47	52	55	44	60	58	56	61	52	52	42	43	808
Yellow fever	15	33	17	23	25	17	35	25	16	24	28	18	21	31	14	31	25	15	413
Diphtheria	1	1															1		3
Total	1,842	1,921	2,225	2,134	2,200	1,759	2,451	2,899	2,973	2,898	3,017	2,987	3,038	3,165	3,151	3,343	3,214	1,907	47,124
No. of papers on Medline	263,310	265,496	275,406	287,713	297,353	249,485	333,854	258,200	378,147	369,645	376,690	375,903	377,414	207,871	388,433	398,231	403,323	405,173	6,011,647

laboration.

The total ranking list was made by giving scores to the countries. In terms of the number of papers, the first, sec-

ond and third ranking countries were given five, three and one, respectively and all the scores for each country were added up at the end.

## RESULT AND DISCUSSION

*Trend in the number of research papers:* In terms of emerging diseases, 58,552 papers had been published in Medline between 1980 and 1997, in total (Table 1). Human immunodeficiency virus (HIV), Hepatitis C virus (HCV) and *Helicobacter pylori* were the first, second and third in ranking for the number of papers, respectively. However, except for enterohemorrhagic *Escherichia coli* O157 and Human herpes virus 8 (HHV 8), the number of publication in 1997 is much fewer than the average number between 1994 and 1996. In recent year, enterohemorrhagic *E. coli* O157 endemic occurred in some developed countries and HHV 8 was shown to be associated with Kaposi's sarcoma.

Regarding the reemerging diseases, 47,124 papers were published in total in Medline between 1980 and 1997 (Table 2). The papers related to Tuberculosis take the first place and papers on Malaria take the second in number. The number of research papers listed as reemerging diseases decreased in 1997, compared with the average number of papers published between 1994 and 1996.

It is unknown whether the decreased number of the papers found may reflect reduced concern over emerging and reemerging diseases. The number of papers published reflects to some extents of concerning over those infectious diseases in the last several years. Thus, this result might be showing the decreasing of the concerning over emerging and reemerging diseases despite the fact that there are a lot of papers which advocate the importance of the research on emerging and reemerging diseases (Anthony, 1998; MMWR, 1998).

*High-ranking countries in the number of papers:* Regarding to the emerging diseases, USA was the highest in rank for the number of papers published except for HCV, Human T-lymphotropic Virus type 1 (HTLV-1), Ebola and *Vibrio cholerae* O139. Japan was the highest ranking for HCV and HTLV-1, and Russia was the highest for Ebola, and India was the highest for *V. cholerae* O139. UK is the second country for seven pathogens in terms of the number of paper published, and France and Japan were the second for five pathogens, and USA was the second for four, and Germany was the second for three. Excluding USA, UK, Japan, France and Germany, only Russia, India, Canada and Italy were seen in top three countries.

In terms of reemerging diseases, USA were also the highest in ranking for those except Leishmaniasis, Toxoplasmosis, Plague and Echinococcus. France was the highest in ranking for Leishmaniasis and Toxoplasmosis, and Russia was the highest for Plague, and New Zealand and Australia was the highest for Echinococcus. USA are also the second country for three pathogens in terms of the number of paper

Table 3 Total ranking of countries

	Emerging	(score)	Reemerging	(score)
1	USA	(117)	USA	(54)
2	Japan	(28)	France	(18)
3	UK	(24)	Russia	(12)
4	France	(22)	UK	(7)
5	Germany	(15)	NZ/Australia	(5)
6	Russia	(5)	India	(5)
7	India	(5)	Germany	(5)
8	Canada	(3)	Italy	(3)
9	Italy	(1)	Japan	(3)
10			Canada	(1)

published, and France, UK and Russia were the second for two pathogens. Japan was never seen in top two countries.

As for the *V. cholerae* O139, HTLV-1 and Plague, a lot of papers have been published by responding countries like India, Japan and Russia, respectively. This result might be showing that research activity of each country for each disease relates to the extent of their concern over each disease.

The total ranking was shown in Table 3. Regarding both emerging and reemerging diseases, USA were highest ranking and it was well ahead of the other countries. France and UK published papers in the field of both emerging and reemerging diseases were ranking within top four countries. On the other hand, Japan and Russia had tended to focus on emerging diseases and reemerging diseases, respectively. Although there is no clear reason why Japan and Russia had those tendencies, the paper on "Cholera" and "Plague" contribute Russia to the high ranking in the field of reemerging diseases.

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