

Table S1 The top 10 countries, institutions and authors for frequency of co-occurrence

Rank	Country			Institution			Author		
	CoF	Year	Name	CoF	Year	Name	CoF	Citation	Name
1	1454	1994	USA	355	1994	Centers for Disease Control & Prevention - USA	46	1047	Esposito, Susanna
2	421	1998	China	99	2000	University of California System	45	5011	Fry, Alicia M.
3	306	1994	England	95	1998	Harvard University	38	980	Principi, Nicola
4	289	1994	Japan	81	1994	Vanderbilt University	33	1428	Ambrose, Christopher S.
5	223	1994	Australia	78	2000	Emory University	33	1553	Cowling, Benjamin J.
6	208	1998	Canada	78	1996	Pennsylvania Commonwealth System of Higher Education (PCSHE)	28	2323	Monto, Arnold S.
7	184	1997	Italy	73	1995	Johns Hopkins University	27	1139	Ortiz, Justin R.
8	150	1994	France	73	1994	University of Colorado System	27	4149	Uyeki, Timothy M.
9	143	1997	Germany	70	1994	University of Colorado Anschutz Medical Campus	26	545	Widdowson, Marc-Alain
10	131	1997	Netherlands	67	1996	Baylor College of Medicine	25	2600	Belongia, Edward A.

CoF, co-occurrence frequency; Year, year of first collaboration appearance.

Table S2 The top 20 subject categories and keywords burst with a burst period from beginning to 2024

Rank	Subject category bursts					Keywords bursts				
	Begin	End	Strength	Year	Entity	Begin	End	Strength	Year	Entity
1	2023	2024	1.62	2006	Multidisciplinary sciences	2016	2024	32.47	2009	seasonal influenza
2	2021	2024	1.16	2007	Physiology	2019	2024	11.03	2019	baloxavir marboxil
3	2023	2024	1.14	2007	Integrative & complementary medicine	2021	2024	10.1	1995	influenza
4	2020	2024	1.02	2020	Engineering, environmental	2020	2024	7.23	2020	china
5	2021	2024	0.73	2015	Endocrinology & metabolism	2019	2024	6.14	1997	care
6	2023	2024	0.66	2023	Water resources	2021	2024	5.89	2009	coverage
7	2023	2024	0.57	1994	Virology	2021	2024	5.79	1995	epidemiology
8	2023	2024	0.55	2000	Genetics & heredity	2022	2024	5.78	2011	disease severity
9	2023	2024	0.49	1997	Neurosciences	2021	2024	5.59	2021	sars cov 2
10	2022	2024	0.43	1996	Surgery	2022	2024	4.81	2022	covid 19
11	2023	2024	0.41	2002	Chemistry, medicinal	2021	2024	4.66	2008	public health
12	2023	2024	0.41	2002	Medical informatics	2021	2024	4.59	1999	impact
13	-	-	-	-	-	2023	2024	4.21	2005	burden
14	-	-	-	-	-	2021	2024	4.04	2004	respiratory viruses
15	-	-	-	-	-	2022	2024	4.03	2006	infectious diseases
16	-	-	-	-	-	2023	2024	3.95	1995	influenza virus
17	-	-	-	-	-	2020	2024	3.79	2013	metaanalysis
18	-	-	-	-	-	2021	2024	3.5	2021	dynamics
19	-	-	-	-	-	2021	2024	3.5	2021	case report
20	-	-	-	-	-	2019	2024	3.32	1997	etiology

Begin: the burst' beginning year, End: the burst' ending year, Strength: the burst' strength index, Year: the first appearance time, Entity: the term.

Table S3 Summary of keyword clusters for the most recent stage (2019–2024)

ClusterID	Size	Silhouette	Average year	Label (LLR)	Representative keywords
0	66	0.658	2020	respiratory syncytial virus	respiratory syncytial virus; case fatality rate; poor outcome; antibody-based drugs; rapid influenza respiratory viruses; human bocavirus; community-acquired pneumonia; viral pneumonia; covid-19 pandemic
1	54	0.666	2020	influenza a	influenza b; unfavorable outcome; children; covid-19; transplant influenza; child; encephalitis; human; clinical management
2	46	0.729	2020	immunization	vaccine effectiveness; seasonal influenza; inactivated influenza vaccine; human influenza; covid-19 era influenza vaccine; human influenza; covid-19 era; spontaneous abortion; koean child
3	41	0.684	2020	oseltamivir	children; influenza virus; transmission; syncytial virus; parainfluenza virus adults; efficacy; metaanalysis; illness; people
4	35	0.635	2020	antibody	vaccination; children; africa; vaccines; bacterial immunogenicity; seasonal influenza; hospitalizations; prevention; immunization practices
5	31	0.773	2020	influenza vaccines	influenza vaccines; hemagglutinin antibodies; influenza immunity; neutralizing antibodies; human influenza immune response; influenza virus; influenza neuraminidase; monoclonal antibodies; influenza vaccines
6	29	0.773	2020	respiratory pathogens	respiratory pathogens; covid-19 pandemic; nonpharmaceutical interventions; attributable fraction; time series analysis impact; young children; seasonal influenza; infants; infection
7	9	0.96	2021	retrospective cohort	pregnancy birth; preterm delivery; postmarketing safety; pneumococcal conjugate; otitis media laboratory confirmed influenza; seasonal influenza; infection; united states; recommendations

Size: the number of articles in each cluster; Silhouette: the average contour value of clustering, it is generally believed that the clustering category with $S > 0.5$ is reasonable, and $S > 0.7$ means that the clustering is convincing; LLR, log-likelihood ratio.

Table S4 Summary of emerging topics

ClusterID	Size	Silhouette	Average Year	Label (LLR)	Representative keywords
2	177	0.906	2017	Baloxavir	influenza virus; neutralizing antibody; antigenic epitope; antibody combination; antiviral drug baloxavir marboxil; neuraminidase inhibitor; comparative effectiveness research; dependent endonuclease inhibitor; medical resource use
3	175	0.871	2014	Vaccine effectiveness	vaccine effectiveness; influenza vaccines; propensity score; robust method; human influenza influenza vaccine; mucosal immunity; humoral immunity; human influenza; statistical estimation
6	126	0.972	2020	COVID-19	respiratory viruses; respiratory tract infections; cov-2 panel; vaccine hesitancy; human influenza non-pharmaceutical interventions; gastrointestinal infection; respiratory virus infection; covid-19 pandemic; children
9	79	0.942	2013	Pneumonia	respiratory syncytial virus; respiratory viruses; acute respiratory infections; emergency service; spanish immunisation schedule influenza; pneumonia; respiratory; virus; refugee
19	6	0.995	2019	Beliefs	parent; perceptions; immunization; covid-19; pandemic saudi arabia; covid-19 vaccine; parent; perceptions; immunization