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Appendix 2 (tables S2–S7)

The Duke minor criterion "predisposing heart condition" in native valve infective endocarditis – a systematic review

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Table S2: Patients with infective endocarditis and mitral valve prolapse.

Reference	Time	Place	Patients with (NV)IE	Cases with MVP	% with MVP	Study design
Mills[1]	1950s and 1960s		53	3	5.7%	Retrospective, single centre
Thell[2]	1960–1974	USA	42	2	4.8%	Retrospective (pathology samples), multicentre
Lowes[3]	1966–1975	UK	60	3	5.0%	Retrospective survey, single centre
Corrigall[4]	1969–1975	USA	87	10	11.5%	Retrospective, single centre
Cassel[5]	1974–1976	South Africa	40	5	12.5%	Retrospective, single centre
Grossman[6]	1951–1979	Israel	228	5	2.2%	Retrospective, single centre
Nishimura[7]	1975–1979	USA	237	3	1.3%	Prospective, single centre
Tresch[8]	Before 1979		40	4	10.0%	Single centre
Hammel[9]	1971–1980	Switzerland	31	7	22.6%	Single centre, not indicated whether prospective or retrospective
Venezio[10]	1972–1980	USA	32	3	9.4%	Retrospective, single centre
Griffin[11]	1950–1981	USA	78	13	17.0%	Retrospective, multicentre
Roucaut[12]	1970–1982	France	350	14	4.0%	Retrospective, single centre
Beton[13]	Before 1983	UK	182	8	4.4%	Prospective, single centre
Rudolph[14]	Before 1983	Germany	50	10	20.0%	Single centre, probably prospective
Duren[15]	1963–1983	Netherlands	300	24	8.0%	Prospective, single centre
Devereux[16]	1980–1983	USA	67	11	16.4%	Case-control study, single centre
MacMahon[17]	1976–1984	Australia	136	19	14.0%	Prospective matched case-control study, multicentre
Skehan[18]	1982–1984	UK	198	38	19.0%	Prospective, multicentre
Terpenning[19]	1976–1985	USA	154	14	9.1%	Retrospective review of patient charts, multicentre
Vered[20]	Before 1985	Israel	42	5	11.9%	Retrospective, single centre
Naggar[21]	Before 1986	USA	145	7	4.8%	Retrospective, single centre
Peat[22]	1976–1986	New Zealand	78	5	6.4%	Retrospective, single centre
Mansur[23]	1978–1986	Brazil	287	26	9.1%	Retrospective, single centre
Wells[24]	1979–1986	New Zealand	102	11	10.8%	Retrospective, single centre
Zuppiroli[25]	1979–1986	Italy	316	2	0.6%	Prospective observational, single centre

Reference	Time	Place	Patients with (NV)IE	Cases with MVP	% with MVP	Study design
Danchin[26]	1981–1986	France	102	9	8.8%	Retrospective case-control study, single centre
Marks[27]	1982–1986	USA	456	11	2.4%	Retrospective, single centre
Steckelberg[28]	1970–1987	USA	697	N/A	15–17%	Retrospective from prospectively collected records, multicentre (comparison of a population- based cohort vs. cohort of Mayo Clinic)
Weinberger[29]	1970–1987	Israel	135	19	14.0%	Retrospective, single centre
Cheng[30]	1979–1987	Taiwan	97	11	11.3%	Retrospective, single centre
Manford[31]	1983–1987	UK	33	1	3.0%	Retrospective, single centre
Hogevik[32]	1984–1988	Sweden	98	7	7.0%	Prospective non-randomised, single centre
Kiwan[33]	1985–1988	Kuwait	60	5	8.3%	Prospective, single centre
Van der Meer[34]	1986–1988	Netherlands	349	29	8.3%	Prospective epidemiologic study, multicentre
Nissen[35]	1980–1989	Denmark	132	0	0.0%	Retrospective, multicentre
Thamlikitkul[36]	1982–1989	Thailand	75	5	6.7%	Retrospective, single centre
Schon[37]	1980–1989	Germany	51	6	11.8%	Retrospective, single centre
Watanakunakorn[38]	1980–1990	USA	181	12	6.6%	Retrospective 1980–1985, prospective 1986–1990, single centre
Strom[39]	1988–1990	USA	279	52	18.6%	Population-based, case-control study, multicentre
Choudhury[40]	1981–1991	India	186	2	1.1%	Retrospective, single centre
Delahaye[41]	1990–1991	France	415	13	3.1%	Prospective survey, multicentre
Tornos[42]	1975–1992	Spain	194	20	10.3%	Prospective observational, single centre
Vlessis[43]	1982–1992	USA	194	22	11.4%	Retrospective, single centre
Benn[44]	1984–1993	Denmark	62	1	1.6%	Retrospective, multicentre
Sandre[45]	1985–1993	Canada	80	10	13.0%	Retrospective review, single centre
Kim[46]	1986–1993	Japan	229	1	0.4%	Prospective, single centre
Werner[47]	1989–1993	Germany	106	7	6.6%	Retrospective, single centre
Siddiq[48]	1990–1993	USA	159	5	3.1%	Prospective, single centre
Yeo[49]	1991–1993	Singapore	98	5	5.1%	Retrospective, single centre
Ferreiros[50]	1992–1993	Argentina	294	28	9.5%	Prospective registry, multicentre
Borer[51]	1980–1994	Israel	71	7	9.9%	Retrospective, single centre
Weng[52]	1984–1994	Taiwan	109	9	8.3%	Retrospective, single centre
Netzer[53]	1980–1995	Switzerland	212	11	5.0%	Retrospective, single centre
Zuppiroli[25]	1979–1996	Italy	275	1	0.4%	Prospective observational, single centre
Lamas[54]	1985–1996	UK	100	6	6.0%	Prospective, single centre
Dyson[55]	1987–1996	UK	78	9	11.5%	Retrospective, single centre
Bouza[56]	1994–1996	Spain	109	1	0.9%	Prospective observational case series, single centre
Jalal[57]	1982–1997	India	466	4	0.9%	Retrospective, single centre
Castillo[58]	1987–1997	Spain	95	8	8.0%	Prospective case series, single centre
Khanal[59]	1995–1997	India	46	2	4.3%	Prospective observational, single centre
Cetinkaya[60]	1974–1999	Turkey	228	5	2.2%	Retrospective (hospital charts) review, single centre
Ako[61]	1980–1999	Japan	194	13	6.7%	Single centre, retrospective (admission records)
Fefer[62]	1990–1999	Israel	108	9	12.0%	Retrospective (medical records), single centre
Hoen[63]	1999	France	390	35	9.0%	Retrospective population based survey, multicentre

Reference	Time	Place	Patients with (NV)IE	Cases with MVP	% with MVP	Study design
Tleyjeh[64]	1970–2000	USA	107	18	17.0%	Retrospective (population-based survey), multicentre
Alestig[65]	1984–2000	Sweden	98	7	7.0%	Prospective clinical studies carried out in Göteborg since 1984, data obtained from a Swedish national registry of IE since 1995 and existing literature
Koegelenberg[66,67]	1997–2000	South Africa	47	1	2.1%	Prospective observational study, single centre
Loupa[68]	1997–2000	Greece	101	2	2.0%	Prospective, multicentre
Di Filippo[69]	1966–2001	France	153	4	2.6%	Retrospective, single centre
Castillo[70]	1987–2001	Spain	154	20	12.7%	Prospective observational, multicentre
Tariq[71]	1988- 2001	Pakistan	159	10	6.3%	Retrospective, single centre
McKay[72]	1989–2001	New Zealand	29	3	10.3%	Retrospective, multicentre
Garg[73]	1992–2001	India	192	6	3.1%	Retrospective, single centre
Tariq[74]	1997–2001	Pakistan	66	5	8.0%	Retrospective, single centre
Cecchi[75]	2000–2001	Italy	67	25	37.3%	Prospective, multicentre
Rehman[76]	2000–2001	Pakistan	30	3	10.0%	Prospective, single centre
Chu[77]	1997–2002	New Zealand	65	4	6.1%	Retrospective, single centre
Yousuf[78]	2000–2002	Malaysia	45	2	4.4%	Retrospective analysis of case records, single centre
Ferreiros[50]	2001–2002	Argentina	390	36	9.2%	Prospective, multicentre
Heiro[79,80]	1980–2004	Finland	326	33	10.1%	Retrospective, single centre
Hill[81]	2000–2004	Belgium	203	19	9.0%	Prospective observational cohort study, single centre
Yiu[82]	1995–2005	Hong Kong	172	14	8.1%	Retrospective cohort, single centre
Correa de Sa[83]	1970–2006	USA	150	25	16.7%	Retrospective, multicentre
Knudsen[84]	2000–2006	Denmark	172	5	2.9%	Prospective, single centre
Math[85]	2004–2006	India	104	3	2.9%	Prospective observational study, single centre
Tugcu[86]	1997–2007	Turkey	28	2	7.1%	Retrospective review, single centre
Assiri[87]	2002–2007	Saudi Arabia	44	2	4.5%	Retrospective, single centre
Wong[88]	2002–2007	New Zealand	57	8	14.0%	Retrospective review, single centre
Scudeller[89]	2004–2008	Italy	254	27	10.6%	Prospective observational, multicentre
Castillo[90]	1987–2009	Spain	228	30	13.0%	Prospective, single centre
Nakagawa[91]	1990–2009	Japan	112	10	8.9%	Retrospective, single centre
Li[92]	1998–2009	China	220	40	18.2%	Retrospective, single centre
Sun[93]	2000–2009	South Korea	328	82	25.0%	Retrospective, single centre
Nakatani[94]	2007–2009	Japan	513	55	10.7%	Prospective survey, multicentre
Hajihossainlou[95]	1995–2010	Iran	286	71	24.8%	Retrospective, multicentre
Lu[96]	1998–2010	Australia	148	7	5.0%	Retrospective observational study, single centre
Poesen[97]	2003–2010	Belgium	88	1	1.1%	Retrospective, single centre
Gupta[98]	2005–2010	India	83	2	3.3%	Retrospective, single centre
Cecchi[99]	2007–2010	Italy	677	45	6.7%	Prospective, multicentre
Senthilkumar[100]	2008–2010	India	116	7	6.0%	Prospective, single centre
Sadaka[101]	2009–2010	Egypt	50	1	2.0%	Prospective, single centre
Ma[102]	2002–2011	China	115	12	10.4%	Single centre
Al Abri[103]	2006–2011	Oman	48	8	13.8%	Single centre, retrospective (computerised activity register)
Collins[104]	2008–2011	USA	N/A	N/A	7.0%	Prospective observational, single centre

Reference	Time	Place	Patients with (NV)IE	Cases with MVP	% with MVP	Study design
Collins[104]	2008–2011	USA	95	5	5.3%	Prospective observational, single centre
Turak[105]	2009–2011	Turkey	122	5	4.0%	Retrospective, single centre
Elbey[106]	2005–2012	Turkey	158	9	5.7%	Retrospective, multicentre
Watt[107]	2010–2012	Thailand	132	19	14.4%	Prospective observational, multicentre
Gupta[108]	2010–2013	India	109	8	7.3%	Retrospective, single centre
Jain[109]	2011–2013	India	75	5	6.7%	Prospective observational, single centre
IE = infective endocarditis; MVP = mitral valve prolapse; N/A = not available; NVIE = native valve infective endocarditis						

Table S3: Patients with infective endocarditis and prior infective endocarditis in their history.

Reference	Time	Place	Cases of (NV)IE	Cases with prior IE	% with prior IE	Study design
Pelletier[110]	1963–1972	USA	125	20	16.0%	Retrospective review of patient charts, multicentre
Pedersen[111]	1944–1973	Denmark	80	3	3.8%	Retrospective, single centre
Garvey[112]	1968–1974	USA	154	12	7.8%	Retrospective analysis of patient records, autopsy files, and files of the infectious diseases department
Lowes[3]	1966–1975	UK	60	1	1.7%	Retrospective survey, single centre
Welton[113]	1967–1976	USA	96	18	18.8%	Retrospective, single centre
Haddy[114]	1964–1979	USA	66	4	6.1%	Retrospective, single centre
Hammel[9]	1971–1980	Switzerland	31	9	29.0%	Single centre, not indicated whether prospective or retrospective
Venezio[10]	1972–1980	USA	32	2	6.3%	Retrospective, single centre
Bayliss[115]	1981–1982	UK	541	34	6.3%	Retrospective, multicentre (British Isles)
Terpenning[19]	1976–1985	USA	154	6	3.9%	Retrospective review of patient charts, multicentre
King[116]	1985–1986	USA	75	8	10.7%	Prospective, multicentre
Steckelberg[28]	1970–1987	USA	697	105	15.0%	Retrospective from prospectively collected records, multicentre (comparison of a population- based cohort vs. cohort of Mayo Clinic)
Kim[117]	1975–1987	USA	56	2	3.6%	Retrospective, single centre
Varstela[118]	1976–1987	Finland	58	3	5.2%	Retrospective, single centre
Jaffe[119]	1983–1988	USA	70	9	12.9%	Retrospective review, single centre
Hogevik[32]	1984–1988	Sweden	98	14	14.0%	Prospective non-randomised, single centre
Van der Meer[34]	1986–1988	Netherlands	349	30	8.6%	Prospective epidemiologic study, multicentre
Nissen[35]	1980–1989	Denmark	132	5	3.8%	Retrospective, multicentre
Schon[37]	1980–1989	Germany	51	7	13.7%	Retrospective, single centre
Gentry[120]	1983–1989	USA	54	15	28.0%	Retrospective review, single centre
Watanakunakorn[38]	1980–1990	USA	181	13	7.2%	Retrospective 1980–1985, prospective 1986–1990, single centre
Strom[39]	1988–1990	USA	279	17	6.1%	Population-based, case-control study, multicentre
Roberts[121]	1954–1991	USA	104	4	3.8%	Retrospective, multicentre
Delahaye[41]	1990–1991	France	415	46	11.0%	Prospective survey, multicentre
Selton-Suty[122]	1990–1991	France	297	19	6.4%	Prospective, multicentre
Tornos[42]	1975–1992	Spain	194	12	6.2%	Prospective observational, single centre
Rognon[123]	1983–1993	Switzerland	179	19	10.6%	Retrospective, multicentre
Sandre[45]	1985–1993	Canada	80	4	5.0%	Retrospective review, single centre
Werner[47]	1989–1993	Germany	106	2	1.6%	Retrospective, single centre
Ferreiros[50]	1992–1993	Argentina	294	30	10.2%	Prospective registry, multicentre
Weng[52]	1984–1994	Taiwan	109	2	1.8%	Retrospective, single centre
Lamas[54]	1985–1996	UK	100	4	4.0%	Prospective, single centre
Bouza[56]	1994–1996	Spain	109	17	15.6%	Prospective observational case series, single centre
Castillo[58]	1987–1997	Spain	95	2	2.0%	Prospective case series, single centre
Mouly[124]	1997–1998	France	90	8	9.0%	Retrospective observational, single centre

Reference	Time	Place	Cases of (NV)IE	Cases with prior IE	% with prior IE	Study design
Abramczuk[125]	1988–1998	Poland	152	7	4.9%	Retrospective, single centre
Cetinkaya[60]	1974–1999	Turkey	228	5	2.2%	Retrospective (hospital charts) review, single centre
Fefer[62]	1990–1999	Israel	108	7	9.0%	Retrospective (medical records), single centre
Pachirat[126]	1990–1999	Thailand	203	4	2.0%	Single centre, combined retrospective and prospective data collection
Tleyjeh[64]	1970–2000	USA	107	8	7.0%	Retrospective (population-based survey), multicentre
Netzer[127]	1980–2000	Switzerland	212	9	4.2%	Retrospective review of clinical records, single centre
Alestig[65]	1984–2000	Sweden	98	14	14.0%	Prospective clinical studies carried out in Göteborg since 1984, data obtained from a Swedish national registry of IE since 1995 and existing literature
Gotsman[128]	1991–2000	Israel	100	22	22.0%	Retrospective, single centre
Koegelenberg[66,67]	1997–2000	South Africa	47	1	2.1%	Prospective observational study, single centre
Castillo[70]	1987–2001	Spain	154	3	2.0%	Prospective observational, multicentre
Moura[129]	1989–2001	Portugal	69	6	8.0%	Retrospective, single centre
Yoshinaga[130]	1997–2001	Japan	239	15	6.3%	Retrospective observational cohort study, multicentre (66 institutes)
Chu[77]	1997–2002	New Zealand	65	5	7.7%	Retrospective, single centre
Yousuf[78]	2000–2002	Malaysia	45	10	22.2%	Retrospective analysis of case records, single centre
Ferreiros[50]	2001–2002	Argentina	470	53	11.3%	Prospective, multicentre
Cicalini[131]	1980–2003	Italy	267	38	13.4%	Retrospective (patient records), single centre
Nashmi[132]	1993–2003	Saudi Arabia	47	3	6.4%	Retrospective, single centre
Hsu[133]	1995–2003	Taiwan	315	22	7.0%	Retrospective review, single centre
Jain[134]	1996–2003	USA	247	42	17.0%	Retrospective, single centre
Hill[81]	2000–2004	Belgium	203	24	12.0%	Prospective observational cohort study, single centre
Giannitsioti[135]	2000–2004	Greece	195	19	9.7%	Prospective cohort study, multicentre
Benito[136]	2000–2005	ICE cohort	1622	58	3.6%	Prospective cohort study, multicentre (data from the ICE-PCS)
Murdoch[137]	2000–2005	ICE cohort	2781	222	8.0%	Prospective cohort study, multicentre (ICE-PCS)
Walls[138]	2000–2005	ICE cohort	336	34	10.1%	Prospective cohort, multicentre
Correa de Sa[83]	1970–2006	USA	150	14	9.3%	Retrospective, multicentre
Galvez-Acebal[139]	1984–2006	Spain	705	57	8.0%	Observational multicentre study
Pazdernik[140]	1998–2006	Czech Republic	106	5	4.7%	Retrospective, single centre
Alagna[141]	2000–2006	ICE cohort	1783	135	7.4%	Prospective, multicentre
Tugcu[86]	1997–2007	Turkey	28	2	7.1%	Retrospective review, single centre
Mokhles[142]	1998–2007	Netherlands	138	18	13.0%	Retrospective observational cohort study, single centre
Baskerville[143]	2002–2007	Australia	89	13	14.6%	Retrospective review (medical records), multicentre
Wong[88]	2002–2007	New Zealand	57	5	9.0%	Retrospective review, single centre
Khaled[144]	2006–2007	Yemen	72	1	1.4%	Prospective, single centre

Reference	Time	Place	Cases of (NV)IE	Cases with prior IE	% with prior IE	Study design
Mokhles[145]	2001–2008	Netherlands	191	27	14.1%	Retrospective observational cohort study, single centre
Nunes[146]	2001–2008	Brazil	62	14	23.0%	Prospective, single centre
Erbay[147]	2004–2008	Turkey	107	10	9.3%	Retrospective, single centre
Dzupova[148]	2007–2008	Czech Republic	134	8	6.0%	Prospective, multicentre
Selton-Suty[149]	2008	France	497	32	6.4%	Prospective population-based observational study, multicentre
Nomura[150]	1996–2009	Japan	62	3	5.0%	Retrospective, single centre
Fernandez-Hidalgo[151]	2000–2009	Spain	337	17	5.0%	Prospective observational cohort study, single centre
Leone[152]	2004–2009	Italy	753	33	4.4%	Prospective, multicentre
Wu[153]	2004–2009	Taiwan	205	5	2.4%	Retrospective, single centre
Knudsen[154]	2007–2009	Denmark	147	8	5.4%	Prospective, single centre
Knudsen[155]	2007–2009	Denmark	149	9	6.0%	Prospective, single centre
Ferraris[156]	2003–2010	Italy	111	12	10.8%	Retrospective, single centre
Poesen[97]	2003–2010	Belgium	88	8	9.1%	Retrospective, single centre
Gupta[98]	2005–2010	India	83	5	8.2%	Retrospective, single centre
Mirabel[157]	2005–2010	New Caledonia	51	4	7.8%	Retrospective, single centre
Koeda[158]	1997–2011	Japan	119	7	5.9%	Retrospective, single centre
Fernandez-Hidalgo[159]	2000–2011	Spain	438	7	2.9%	Prospective observational cohort study, single centre
Ferreira[160]	2000–2011	Portugal	147	5	3.4%	Retrospective, multicentre (2 hospitals)
Rizzi[161]	2004–2011	Italy	1056	55	5.2%	Retrospective analysis of a multicentre, prospective observational cohort study
Korem[162]	2009–2011	Israel	37	2	5.4%	Prospective observational study, single centre
Turak[105]	2009–2011	Turkey	122	11	9.0%	Retrospective, single centre
Chu[163]	2008–2012	ICE-PLUS cohort	1296	100	7.8%	Prospective cohort study, multicentre (ICE-PLUS cohort)
Olmos[164]	1996–2013	Spain	1122	88	7.8%	Prospective, multicentre
Simsek-Yavuz[165]	2000–2013	Turkey	325	18	5.5%	Prospective 102 cases (first 5 years) and retrospective 223 cases thereafter, single centre
Fukuchi[166]	2008–2013	Japan	82	2	2.4%	Prospective, multicentre
Gupta[108]	2010–2013	India	109	8	7.3%	Retrospective, single centre

ICE = International Collaboration on Endocarditis; *ICE-PCS* = International Collaboration on Endocarditis-Prospective Cohort Study = IE: infective endocarditis; NVIE = native valve infective endocarditis

Table S4: Patients with infective endocarditis and a bicuspid aortic valve.

Reference	Time	Place	Patients with (NV)IE	Cases with BAV	% cases with BAV	Study design
Mills[167]	1950		41	3	7.3%	Prospective, single centre
Fenoglio[168]	1940–1970	USA	152	60	39.5%	Retrospective, single centre
Garvey[112]	1968–1973	USA	101	3	3.0%	Retrospective analysis of patient records, autopsy files, and files of the infectious diseases department
Thell[2]	1960–1974	USA	42	5	11.9%	Retrospective (pathology samples), multicentre
Welton[113]	1967–1976	USA	96	3	3.1%	Retrospective, single centre
Cassel[5]	1974–1976	South Africa	40	2	5.0%	Retrospective, single centre
Auger[169]	1969–1977	Canada	50	7	14.0%	Retrospective, single centre
Griffin[11]	1950–1981	USA	78	6	7.7%	Retrospective, multicentre
Rudolph[14]	Before 1983	Germany	50	4	8.0%	Single centre, probably prospective
Terpenning[19]	1976–1985	USA	154	6	3.9%	Retrospective review of patient charts, multicentre
Woo[170]	1971–1986	Hong Kong	176	1	0.6%	Mixed retrospective and prospective, single centre
Steckelberg[28]	1970–1987	USA	629	N/A	10–12%	Retrospective from prospectively collected records, multicentre (comparison of a population- based cohort vs. cohort of Mayo Clinic)
Varstela[118]	1976–1987	Finland	58	29	50.0%	Retrospective, single centre
Cheng[30]	1979–1987	Taiwan	97	2	2.1%	Retrospective, single centre
Borger[171]	1979–1993	Canada	201	12	6.0%	Retrospective, single centre
Hogevik[32]	1984–1988	Sweden	98	7	7.0%	Prospective non-randomised, single centre
Kiwan[33]	1985–1988	Kuwait	60	3	5.0%	Prospective, single centre
Van der Meer[34]	1986–1988	Netherlands	349	5	1.4%	Prospective epidemiologic study, multicentre
Agarwal[172]	1987–1988	India	28	3	10.7%	Single centre, probably prospective, but not clearly stated
Strom[39]	1988–1990	USA	279	5	1.8%	Population-based, case-control study, multicentre
Choudhury[40]	1981–1991	India	186	25	13.4%	Retrospective, single centre
Delahaye[41]	1990–1991	France	415	2	0.5%	Prospective survey, multicentre
Vlessis[43]	1982–1992	USA	194	10	5.0%	Retrospective, single centre
Rognon[123]	1983–1993	Switzerland	179	12	6.7%	Retrospective, multicentre
Sandre[45]	1985–1993	Canada	80	12	15.0%	Retrospective review, single centre
Lamas[54]	1985–1996	UK	100	26	26.0%	Prospective, single centre
Dyson[55]	1987–1996	UK	78	13	16.7%	Retrospective, single centre
Jalal[57]	1982–1997	India	466	55	11.8%	Retrospective, single centre
Lamas[173]	1970–1998	UK	408	50	12.3%	Retrospective, single centre
Michelena[174]	1980–1999	USA	212	4	1.9%	Prospective, multicentre
Michelena[175,176]	1980–1999	USA	486	9	1.9%	Retrospective cohort study, multicentre
Tleyjeh[64]	1970–2000	USA	107	8	7.0%	Retrospective (population-based survey), multicentre
Alestig[65]	1984–2000	Sweden	98	7	7.0%	Prospective clinical studies carried out in Göteborg since 1984, data obtained from a Swedish national registry of IE since 1995 and existing literature
Tran[177]	1998–2000	Denmark	132	10	7.6%	Retrospective, single centre

Reference	Time	Place	Patients with (NV)IE	Cases with BAV	% cases with BAV	Study design
Di Filippo[69]	1966–2001	France	153	4	2.6%	Retrospective, single centre
Tariq[71]	1988–2001	Pakistan	159	4	2.5%	Retrospective, single centre
McKay[72]	1989–2001	New Zealand	29	7	24.1%	Retrospective, multicentre
Garg[73]	1992–2001	India	192	18	9.3%	Retrospective, single centre
Tzemos[178]	1994–2001	Canada	642	13	2.0%	Retrospective, single centre
Tariq[74]	1997–2001	Pakistan	66	2	3.0%	Retrospective, single centre
Cecchi[75]	2000–2001	Italy	67	8	11.9%	Prospective, multicentre
Chu[77]	1997–2002	New Zealand	65	5	7.7%	Retrospective, single centre
Ferreiros[50]	2001–2002	Argentina	390	10	2.6%	Prospective, multicentre
Nashmi[132]	1993–2003	Saudi Arabia	47	1	2.1%	Retrospective, single centre
Hsu[133]	1995–2003	Taiwan	315	4	1.3%	Retrospective review, single centre
Heiro[79,80]	1980–2004	Finland	326	38	11.7%	Retrospective, single centre
Hill[81]	2000–2004	Belgium	203	11	5.0%	Prospective observational cohort study, single centre
Suzuki[179]	1988–2005	Japan	27	1	3.7%	Retrospective, single centre
Collins[180]	2002–2005	Canada	327	5	1.5%	Retrospective, single centre
Correa de Sa[83]	1970–2006	USA	150	8	5.3%	Retrospective, multicentre
Pazdernik[140]	1998–2006	Czech Republic	106	14	13.2%	Retrospective, single centre
Kahveci[181]	2002–2006	Turkey	51	22	43.0%	Retrospective, single centre
Mokhles[145]	2001–2008	Netherlands	191	8	4.2%	Retrospective observational cohort study, single centre
Erbay[147]	2004–2008	Turkey	107	3	2.8%	Retrospective, single centre
Dzupova[148]	2007–2008	Czech Republic	134	7	5.2%	Prospective, multicentre
Li[92]	1998–2009	China	220	40	18.2%	Retrospective, single centre
Fernandez-Hidalgo[151]	2000–2009	Spain	337	19	5.6%	Prospective observational cohort study, single centre
Tribouilloy[182]	2005–2009	France	148	4	2.7%	Prospective, observational, multicentre
Tribouilloy[182]	2005–2009	France	310	50	16.2%	Prospective, observational, multicentre
Nakatani[94]	2007–2009	Japan	513	24	4.7%	Prospective survey, multicentre
Lu[96]	1998–2010	Australia	148	18	12.0%	Retrospective observational study, single centre
Marks[183]	1998–2010	UK	336	36	10.7%	Retrospective observational cohort study, single centre
Gupta[98]	2005–2010	India	83	10	16.4%	Retrospective, single centre
Senthilkumar[100]	2008–2010	India	116	5	4.3%	Prospective, single centre
Sadaka[101]	2009–2010	Egypt	50	1	2.0%	Prospective, single centre
Ma[102]	2002–2011	China	115	9	7.8%	Single centre
Collins[104]	2008–2011	USA	95	18	19.0%	Prospective observational, single centre
Collins[104]	2008–2011	USA	95	11	11.6%	Prospective observational, single centre
Turak[105]	2009–2011	Turkey	122	4	3.0%	Retrospective, single centre
Verheugt[184]	Before 2011	Netherlands	551	31	5.6%	Prospective cohort study, multicentre
Baek[185]	1987–2012	South Korea	325	1	0.3%	Retrospective, single centre
Elbey[106]	2005–2012	Turkey	158	5	3.2%	Retrospective, multicentre

Reference	Time	Place	Patients with (NV)IE	Cases with BAV	% cases with BAV	Study design
Simsek-Yavuz[165]	2000–2013	Turkey	325	18	5.5%	Prospective 102 (first 5 years) and retrospective 223 thereafter, single centre
Gupta[108]	2010–2013	India	109	11	10.1%	Retrospective, single centre
Jain[109]	2011–2013	India	75	4	5.3%	Prospective observational, single centre
BAV = bicuspid aortic valve; IE = infective endocarditis; N/A = not available; NVIE = native valve infective endocarditis.						

Table S5: Patients with infective endocarditis and aortic valve stenosis.

Reference	Time	Place	Patients with (NV)IE	Cases with AS	% with AS	Study design
Keane[186]	1958–1965	USA	462.0	14	3.0%	Prospective cohort study, multicentre
Pelletier[110]	1963–1972	USA	125.0	25	20.0%	Retrospective review of patient charts, multicentre
Thell[2]	1960–1974	USA	42.0	6	14.3%	Retrospective (pathology samples), multicentre
Lowes[3]	1966–1975	UK	60.0	4	6.7%	Retrospective survey, single centre
Robbins[187]	1970–1977	USA	56.0	7	12.5%	Retrospective, single centre
Grossman[6]	1951–1979	Israel	228.0	21	9.2%	Retrospective, single centre
Venezio[10]	1972–1980	USA	32.0	3	9.4%	Retrospective, single centre
Rudolph[14]	Before 1983	Germany	50.0	11	22.0%	Single centre, probably prospective
Terpenning[19]	1976–1985	USA	154.0	1	0.6%	Retrospective review of patient charts, multicentre
Hodes[188]	1977–1985	Ethiopia	51.0	1	2.0%	Retrospective, single centre
Mansur[23]	1978–1986	Brazil	287.0	6	2.1%	Retrospective, single centre
Van der Meer[34]	1986–1988	Netherlands	349.0	9	3.5%	Prospective epidemiologic study, multicentre
Nissen[35]	1980–1989	Denmark	132.0	8	6.1%	Retrospective, multicentre
Thamlikitkul[36]	1982–1989	Thailand	75.0	14	13.3%	Retrospective, single centre
Roberts[121]	1954–1991	USA	96.0	25	26.0%	Retrospective, multicentre
Choudhury[40]	1981–1991	India	186.0	2	1.1%	Retrospective, single centre
Delahaye[41]	1990–1991	France	415.0	14	3.4%	Prospective survey, multicentre
Benn[44]	1984–1993	Denmark	62.0	6	9.7%	Retrospective, multicentre
Sandre[45]	1985–1993	Canada	80.0	2	2.5%	Retrospective review, single centre
Werner[47]	1989–1993	Germany	106.0	8	7.5%	Retrospective, single centre
Netzer[53]	1980–1995	Switzerland	212.0	28	13.0%	Retrospective, single centre
Lamas[54]	1985–1996	UK	100.0	7	7.0%	Prospective, single centre
Dyson[55]	1987–1996	UK	78.0	2	2.6%	Retrospective, single centre
Castillo[58]	1987–1997	Spain	95.0	8	8.0%	Prospective case series, single centre
Cheng[189]	1994–1999	Australia	40.0	1	2.5%	Retrospective, multicentre
Di Filippo[69]	1966–2001	France	153.0	1	0.6%	Retrospective, single centre
Castillo[70]	1987–2001	Spain	154.0	18	11.5%	Prospective observational, multicentre
Tariq[71]	1988–2001	Pakistan	159.0	2	1.3%	Retrospective, single centre
McKay[72]	1989–2001	New Zealand	29.0	2	6.9%	Retrospective, multicentre
Tariq[74]	1997–2001	Pakistan	66.0	2	3.0%	Retrospective, single centre
Cecchi[75]	2000–2001	Italy	67.0	5	7.5%	Prospective, multicentre
Chu[77]	1997–2002	New Zealand	65.0	8	12.3%	Retrospective, single centre
Durante-Mangoni[190]	2000–2005	ICE cohort	2759.0	N/A	10%–28%	Prospective, multicentre (ICE cohort)
Assiri[87]	2002–2007	Saudi Arabia	44.0	2	4.5%	Retrospective, single centre
Wong[88]	2002–2007	New Zealand	57.0	5	9.0%	Retrospective review, single centre
Mokhles[145]	2001–2008	Netherlands	191.0	2	1.0%	Retrospective observational cohort study, single centre
Dzupova[148]	2007–2008	Czech Republic	134.0	4	3.0%	Prospective, multicentre
Leone[152]	2004–2009	Italy	753.0	20	2.7%	Prospective, multicentre
Nakatani[94]	2007–2009	Japan	513.0	37	7.2%	Prospective survey, multicentre
Marks[183]	1998–2010	UK	336.0	3	0.9%	Retrospective observational cohort study, single centre
Cecchi[99]	2007–2010	Italy	677.0	26	3.8%	Prospective, multicentre

Reference	Time	Place	Patients with (NV)IE	Cases with AS	% with AS	Study design
Ma[102]	2002–2011	China	115.0	8	7.0%	Single centre
Begezsan[191]	2007–2011	Romania	45.0	5	11.1%	Retrospective, single centre
Collins[104]	2008–2011	USA	95.0	5	5.3%	Prospective observational, single centre
Verheugt[184]	Before 2011	The Netherlands	922.0	26	2.6%	Prospective cohort study, multicentre
AS = aortic valve stenosis; ICE = International Collaboration on Endocarditis; N/A = not available; NVIE = Native valve infective endocarditis						

Table S6: Patients with infective endocarditis and mitral valve insufficiency.

Reference	Time	Place	Patients with (NV)IE	Cases with MI	% with MI	Study design
Falase[192]	1961–1970	Nigeria	90	17	18.9%	Retrospective, single centre
Bailey[193]	1962–1971	Australia	210	22	10.5%	Retrospective, single centre
Lowes[3]	1966–1975	UK	60	18	30.0%	Retrospective survey, single centre
Corrigall[4]	1969–1975	USA	87	18	20.7%	Retrospective, single centre
Singham[194]	1968–1977	Malaysia	101	16	15.8%	Retrospective, single centre
Robbins[187]	1970–1977	USA	56	16	28.6%	Retrospective, single centre
Hodes[188]	1977–1985	Ethiopia	51	4	7.8%	Retrospective, single centre
Mansur[23]	1978–1986	Brazil	287	56	16.0%	Retrospective, single centre
Blackett[195]	1984–1986	Cameroon	20	7	35.0%	Prospective, single centre
Cheng[30]	1979–1987	Taiwan	97	16	16.5%	Retrospective, single centre
Van der Meer[34]	1986–1988	Netherlands	349	89	25.5%	Prospective epidemiologic study, multicentre
Agarwal[172]	1987–1988	India	28	2	7.1%	Single centre, probably prospective, but not clearly stated
Iga[196]	1980–1989	Japan	32	11	34.4%	Retrospective, single centre
Nissen[35]	1980–1989	Denmark	132	0	0.0%	Retrospective, multicentre
Thamlikitkul[36]	1982–1989	Thailand	75	35	46.7%	Retrospective, single centre
Manford[31]	1983–1989	UK	33	5	15.2%	Retrospective, single centre
Strom[39]	1988–1990	USA	279	3	1.1%	Population-based, case-control study, multicentre
Choudhury[40]	1981–1991	India	186	9	4.8%	Retrospective, single centre
Delahaye[41]	1990–1991	France	415	51	12.3%	Prospective survey, multicentre
Rognon[123]	1983–1993	Switzerland	179	47	26.3%	Retrospective, multicentre
Werner[47]	1989–1993	Germany	106	5	4.7%	Retrospective, single centre
Netzer[53]	1980–1995	Switzerland	212	38	18.0%	Retrospective, single centre
Lamas[54]	1985–1996	UK	100	5	5.0%	Prospective, single centre
Cheng[189]	1994–1999	Australia	40	7	17.5%	Retrospective, multicentre
Di Filippo[69]	1966–2001	France	153	8	5.2%	Retrospective, single centre
McKay[72]	1989–2001	New Zealand	29	1	3.4%	Retrospective, multicentre
Garg[73]	1992–2001	India	192	3	1.6%	Retrospective, single centre
Tariq[74]	1997–2001	Pakistan	66	2	3.0%	Retrospective, single centre
Cecchi[75]	2000–2001	Italy	67	3	4.5%	Prospective, multicentre
Rehman[76]	2000–2001	Pakistan	30	5	16.7%	Prospective, single centre
Durante-Mangoni[190]	2000–2005	ICE cohort	2759	N/A	38%–57%	Prospective, multicentre (ICE cohort)
Murdoch[137]	2000–2005	ICE cohort	2781	1196	43.0%	Prospective cohort study, multicentre (ICE-PCS)
Math[85]	2004–2006	India	104	10	9.6%	Prospective observational study, single centre
Assiri[87]	2002–2007	Saudi Arabia	44	18	40.9%	Retrospective, single centre
Dzupova[148]	2007–2008	Czech Republic	134	5	3.7%	Prospective, multicentre
Leone[152]	2004–2009	Italy	753	80	10.6%	Prospective, multicentre
Nakatani[94]	2007–2009	Japan	513	145	28.3%	Prospective survey, multicentre
Cecchi[99]	2007–2010	Italy	677	60	8.9%	Prospective, multicentre
Begezsan[191]	2007–2011	Romania	45	17	37.8%	Retrospective, single centre

Reference	Time	Place	Patients with (NV)IE	Cases with MI	% with MI	Study design
Elbey[106]	2005–2012	Turkey	148	142	95.9%	Retrospective, multicentre
Jain[109]	2011–2013	India	75	28	37.3%	Prospective observational, single centre
ICE = International Collaboration on Endocarditis; ICE-PCS = International Collaboration on Endocarditis-Prospective Cohort Study; MI = mitral valve insufficiency/regurgitation; N/A = not available; NVIE = native valve infective endocarditis						

Table S7: Patients with infective endocarditis and aortic valve insufficiency.

Reference	Time	Place	Cases with (NV)IE	Cases with AI	% with AI	Study design
Falase[192]	1961–1970	Nigeria	90	9	10.0%	Retrospective, single centre
Bailey[193]	1962–1971	Australia	210	18	8.6%	Retrospective, single centre
Singham[194]	1968–1977	Malaysia	101	12	11.9%	Retrospective, single centre
Robbins[187]	1970–1977	USA	56	12	21.4%	Retrospective, single centre
Arbulu[197]	1968–1984	USA	417	36	26.0%	Retrospective, single centre
Hodes[188]	1977–1985	Ethiopia	51	1	2.0%	Retrospective, single centre
Blackett[195]	1984–1986	Cameroon	20	8	40.0%	Prospective, single centre
Mansur[23]	1978–1986	Brazil	287	15	5.2%	Retrospective, single centre
Van der Meer[34]	1986–1988	Netherlands	349	64	18.3%	Prospective epidemiologic study, multicentre
Agarwal[172]	1987–1988	India	28	1	3.6%	Single centre, probably prospective but not clearly stated
Iga[196]	1980–1989	Japan	32	4	12.5%	Retrospective, single centre
Nissen[35]	1980–1989	Denmark	132	5	3.8%	Retrospective, multicentre
Thamlikitkul[36]	1982–1989	Thailand	75	19	25.3%	Retrospective, single centre
Manford[31]	1983–1989	UK	33	1	3.0%	Retrospective, single centre
Strom[39]	1988–1990	USA	279	3	1.1%	Population-based, case-control study, multicentre
Choudhury[40]	1981–1991	India	186	15	8.1%	Retrospective, single centre
Delahaye[41]	1990–1991	France	415	27	6.5%	Prospective survey, multicentre
Benn[44]	1984–1993	Denmark	62	5	8.1%	Retrospective, multicentre
Sandre[45]	1985–1993	Canada	80	2	2.5%	Retrospective review, single centre
Werner[47]	1989–1993	Germany	106	6	5.7%	Retrospective, single centre
Netzer[53]	1980–1995	Switzerland	212	40	19.0%	Retrospective, single centre
Lamas[54]	1985–1996	UK	100	3	3.0%	Prospective, single centre
Castillo[58]	1987–1997	Spain	95	10	10.0%	Prospective case series, single centre
Khanal[59]	1995–1997	India	46	1	2.2%	Prospective observational, single centre
Castillo[70]	1987–2001	Spain	154	17	10.9%	Prospective observational, multicentre
McKay[72]	1989–2001	New Zealand	29	1	3.4%	Retrospective, multicentre
Garg[73]	1992–2001	India	192	8	4.2%	Retrospective, single centre
Tariq[74]	1997–2001	Pakistan	66	1	2.0%	Retrospective, single centre
Cecchi[75]	2000–2001	Italy	67	6	9.0%	Prospective, multicentre
Rehman[76]	2000–2001	Pakistan	30	1	3.3%	Prospective, single centre
Murdoch[137]	2005–2005	ICE cohort	2781	723	26.0%	Prospective cohort study, multicentre (ICE-PCS)
Assiri[87]	2002–2007	Saudi Arabia	44	14	31.8%	Retrospective, single centre
Dzupova[148]	2007–2008	Czech Republic	134	1	0.7%	Prospective, multicentre
Leone[152]	2004–2009	Italy	753	32	4.2%	Prospective, multicentre
Nakatani[94]	2007–2009	Japan	513	76	14.8%	Prospective survey, multicentre
Cecchi[99]	2007–2010	Italy	677	19	2.8%	Prospective, multicentre
Begezsan[191]	2007–2011	Romania	45	15	33.3%	Retrospective, single centre
Collins[104]	2008–2011	USA	95	1	1.1%	Prospective observational, single centre
Jain[109]	2011–2013	India	75	17	22.7%	Prospective observational, single centre

AI = aortic valve insufficiency/regurgitation; ICE = International Collaboration on Endocarditis; ICE-PCS = International Collaboration on Endocarditis-Prospective Cohort Study; NVIE = native valve infective endocarditis

References

1 Mills P, Rose J, Hollingsworth J, Amara I, Craige E. Long-term prognosis of mitral-valve prolapse. N Engl J Med. 1977;297(1):13–8. doi:https://doi.org/10.1056/NEJM197707072970103. PubMed
2 Thell R, Martin FH, Edwards JE. Bacterial endocarditis in subjects 60 years of age and older. Circulation. 1975;51(1):174–82. doi:https://doi.org/10.1161/01.CIR.51.1.174. PubMed
3 Lowes JA, Hamer J, Williams G, Houang E, Tabaqchali S, Shaw EJ, et al. 10 Years of infective endocarditis at St. Bartholomew's Hospital: analysis of clinical features and treatment in relation to prognosis and mortality. Lancet. 1980;1(8160):133–6. doi:https://doi.org/10.1016/S0140-6736(80)90614-5. PubMed
4 Corrigall D, Bolen J, Hancock EW, Popp RL. Mitral valve prolapse and infective endocarditis. Am J Med. 1977;63(2):215–22. doi:https://doi.org/10.1016/0002-9343(77)90235-2. PubMed
5. Cassel GA, Haitas B, Lakier JB, Barlow JB. Infective endocarditis at the Johannesburg Hospital. A retrospective analysis of 40 patients. South African medical journal = Suid-Afrikaanse tydskrif vir geneeskunde 1979;55:624-7.
6 Grossman E, Holtzman E, Rosenthal T, Shemesh E, Samra Y, Michaeli D. A comparative study of infective endocarditis. Isr J Med Sci. 1984;20(5):389–93. PubMed
7 Nishimura RA, McGoon MD, Shub C, Miller FA, Jr, Ilstrup DM, Tajik AJ. Echocardiographically documented mitral-valve prolapse. Long-term follow-up of 237 patients. N Engl J Med. 1985;313(21):1305–9. doi:https://doi.org/10.1056/NEJM198511213132101. PubMed
8 Tresch DD, Sigel R, Keelan MH, Jr, Gross CM, Brooks HL. Mitral valve prolapse in the elderly. J Am Geriatr Soc. 1979;27(9):421–4. doi:https://doi.org/10.1111/j.1532-5415.1979.tb01681.x. PubMed
9 Hammel T, Hirzel HO, Krayenbühl HP. [Etiology and clinical course of bacterial endocarditis, 1971-1980]. Schweiz Med Wochenschr. 1982;112(45):1592–6. PubMed
10 Venezio FR, Westenfelder GO, Cook FV, Emmerman J, Phair JP. Infective endocarditis in a community hospital. Arch Intern Med. 1982;142(4):789–92. doi:https://doi.org/10.1001/archinte.1982.00340170145023. PubMed
11 Griffin MR, Wilson WR, Edwards WD, O'Fallon WM, Kurland LT. Infective endocarditis. Olmsted County, Minnesota, 1950 through 1981. JAMA. 1985;254(9):1199–202. doi:https://doi.org/10.1001/jama.1985.03360090089026. PubMed
12. Roucaut G, Beaune J, Malquarti V, Rabatel J, Froment A. Mitral valve prolapse and infective endocarditis. European heart journal 1984;5 Suppl C:81-5.
13 Beton DC, Brear SG, Edwards JD, Leonard JC. Mitral valve prolapse: an assessment of clinical features, associated conditions and prognosis. Q J Med. 1983;52(206):150–64. PubMed
14 Rudolph W, Kraus F. [Detection and evaluation of infectious endocarditis]. Herz. 1983;8(5):241–70. PubMed
15 Düren DR, Becker AE, Dunning AJ. Long-term follow-up of idiopathic mitral valve prolapse in 300 patients: a prospective study. J Am Coll Cardiol. 1988;11(1):42–7. doi:https://doi.org/10.1016/0735-1097(88)90164-7. PubMed
16 Devereux RB, Hawkins I, Kramer-Fox R, Lutas EM, Hammond IW, Spitzer MC, et al. Complications of mitral valve prolapse. Disproportionate occurrence in men and older patients. Am J Med. 1986;81(5):751–8. doi:https://doi.org/10.1016/0002-9343(86)90339-6. PubMed
17 MacMahon SW, Hickey AJ, Wilcken DE, Wittes JT, Feneley MP, Hickie JB. Risk of infective endocarditis in mitral valve prolapse with and without precordial systolic murmurs. Am J Cardiol. 1987;59(1):105–8. doi:https://doi.org/10.1016/S0002-9149(87)80080-2. PubMed
18 Skehan JD, Murray M, Mills PG. Infective endocarditis: incidence and mortality in the North East Thames Region. Br Heart J. 1988;59(1):62–8. doi:https://doi.org/10.1136/hrt.59.1.62. PubMed
19 Terpenning MS, Buggy BP, Kauffman CA. Infective endocarditis: clinical features in young and elderly patients. Am J Med. 1987;83(4):626–34. doi:https://doi.org/10.1016/0002-9343(87)90890-4. PubMed
20 Vered Z, Oren S, Rabinowitz B, Meltzer RS, Neufeld HN. Mitral valve prolapse. Quantitative analysis and long-term follow-up. Isr J Med Sci. 1985;21(8):644–8. PubMed
21 Naggar CZ, Pearson WN, Seljan MP. Frequency of complications of mitral valve prolapse in subjects aged 60 years and older. Am J Cardiol. 1986;58(13):1209–12. doi:https://doi.org/10.1016/0002-9149(86)90383-8. PubMed
22 Peat EB, Lang SD. Infective endocarditis in a racially mixed community: a 10 year review of 78 cases. N Z Med J. 1989;102(861):33–6. PubMed
23 Mansur AJ, Grinberg M, Bellotti G, Jatene A, Pileggi F. Infective endocarditis in the 1980s: experience at a heart hospital. Clin Cardiol. 1990;13(9):623–30. doi:https://doi.org/10.1002/clc.4960130907. PubMed
24 Wells AU, Fowler CC, Ellis-Pegler RB, Luke R, Hannan S, Sharpe DN. Endocarditis in the 80s in a general hospital in Auckland, New Zealand. Q J Med. 1990;76(279):753–62. PubMed
25. Zuppiroli A, Mori F, Favilli S, et al. "Natural histories" of mitral valve prolapse. Influence of patient selection on cardiovascular event rates. Italian heart journal: official journal of the Italian Federation of Cardiology 2001;2:107-14.
26 Danchin N, Voiriot P, Briancon S, Bairati I, Mathieu P, Deschamps JP, et al. Mitral valve prolapse as a risk factor for infective endocarditis. Lancet. 1989;1(8641):743–5. doi:https://doi.org/10.1016/S0140-6736(89)92571-3. PubMed
27 Marks AR, Choong CY, Sanfilippo AJ, Ferré M, Weyman AE. Identification of high-risk and low-risk subgroups of patients with mitral-valve prolapse. N Engl J Med. 1989;320(16):1031–6. doi:https://doi.org/10.1056/NEJM198904203201602. PubMed
28 Steckelberg JM, Melton LJ, 3rd, Ilstrup DM, Rouse MS, Wilson WR. Influence of referral bias on the apparent clinical spectrum of infective endocarditis. Am J Med. 1990;88(6):582–8. doi:https://doi.org/10.1016/0002-9343(90)90521-E. PubMed
29 Weinberger I, Rotenberg Z, Zacharovitch D, Fuchs J, Davidson E, Agmon J. Native valve infective endocarditis in the 1970s versus the 1980s: underlying cardiac lesions and infecting organisms. Clin Cardiol. 1990;13(2):94–8. doi:https://doi.org/10.1002/clc.4960130206. PubMed
30 Cheng JJ, Ko YL, Chang SC, Lien WP, Tseng YZ, Lee YT, et al. Retrospective analysis of 97 patients with infective endocarditis seen over the past 8 years. Taiwan Yi Xue Hui Za Zhi. 1989;88(3):213–7. PubMed
31 Manford M, Matharu J, Farrington K. Infective endocarditis in a district general hospital. J R Soc Med. 1992;85(5):262–6. PubMed
32 Hogevik H, Olaison L, Andersson R, Lindberg J, Alestig K. Epidemiologic aspects of infective endocarditis in an urban population. A 5-year prospective study. Medicine (Baltimore). 1995;74(6):324–39. doi:https://doi.org/10.1097/00005792-199511000-00003. PubMed
33 Kiwan YA, Hayat N, Vijayaraghavan DG, Das Chugh T, Khan N, Mualla F, et al. Infective endocarditis: a prospective study of 60 consecutive cases. Mater Med Pol. 1990;22(3):173–5. PubMed
34 van der Meer JT, Thompson J, Valkenburg HA, Michel MF. Epidemiology of bacterial endocarditis in The Netherlands. I. Patient characteristics. Arch Intern Med. 1992;152(9):1863–8. doi:https://doi.org/10.1001/archinte.1992.00400210087014. PubMed
35 Nissen H, Nielsen PF, Frederiksen M, Helleberg C, Nielsen JS. Native valve infective endocarditis in the general population: a 10-year survey of the clinical picture during the 1980s. Eur Heart J. 1992;13(7):872–7. doi:https://doi.org/10.1093/oxfordjournals.eurheartj.a060285. PubMed
36. Thamlikitkul V, Praditsuwan R, Permpikul C, Jootar P. Native valve infective endocarditis at Siriraj Hospital, 1982-1989. Journal of the Medical Association of Thailand = Chotmaihet thangphaet 1991;74:313-22.
37 Schön HR, Fuchs CJ, Schömig A, Blömer H. [Changes in infectious endocarditis--analysis of a disease picture in the last decade]. Z Kardiol. 1994;83(1):31–7. PubMed
38 Watanakunakorn C, Burkert T. Infective endocarditis at a large community teaching hospital, 1980-1990. A review of 210 episodes. Medicine (Baltimore). 1993;72(2):90–102. doi:https://doi.org/10.1097/00005792-199303000-00003. PubMed
39 Strom BL, Abrutyn E, Berlin JA, Kinman JL, Feldman RS, Stolley PD, et al. Dental and cardiac risk factors for infective endocarditis. A population-based, case-control study. Ann Intern Med. 1998;129(10):761–9. doi:https://doi.org/10.7326/0003-4819-129-10-199811150-00002. PubMed
40 Choudhury R, Grover A, Varma J, Khattri HN, Anand IS, Bidwai PS, et al. Active infective endocarditis observed in an Indian hospital 1981-1991. Am J Cardiol. 1992;70(18):1453–8. doi:https://doi.org/10.1016/0002-9149(92)90299-E. PubMed
41 Delahaye F, Goulet V, Lacassin F, Ecochard R, Selton-Suty C, Hoen B, et al. Characteristics of infective endocarditis in France in 1991. A 1-year survey. Eur Heart J. 1995;16(3):394–401. doi:https://doi.org/10.1093/oxfordjournals.eurheartj.a060923. PubMed

42 Tornos MP, Olona M, Permanyer-Miralda G, Almirante B, Evangelista A, Soler-Soler J. Is the clinical spectrum and prognosis of native valve infective endocarditis in non-addicts changing? Eur Heart J. 1995;16(11):1686–91. doi:https://doi.org/10.1093/oxfordjournals.eurheartj.a060795. PubMed
43 Vlessis AA, Hovaguimian H, Jaggers J, Ahmad A, Starr A. Infective endocarditis: ten-year review of medical and surgical therapy. Ann Thorac Surg. 1996;61(4):1217–22. doi:https://doi.org/10.1016/0003-4975(96)00029-X. PubMed
44 Benn M, Hagelskjaer LH, Tvede M. Infective endocarditis, 1984 through 1993: a clinical and microbiological survey. J Intern Med. 1997;242(1):15–22. doi:https://doi.org/10.1046/j.1365-2796.1997.00153.x. PubMed
45 Sandre RM, Shafran SD. Infective endocarditis: review of 135 cases over 9 years. Clin Infect Dis. 1996;22(2):276–86. doi:https://doi.org/10.1093/clinids/22.2.276. PubMed
46 Kim S, Kuroda T, Nishinaga M, Yamasawa M, Watanabe S, Mitsuhashi T, et al. Relationship between severity of mitral regurgitation and prognosis of mitral valve prolapse: echocardiographic follow-up study. Am Heart J. 1996;132(2 Pt 1):348–55. doi:https://doi.org/10.1016/S0002-8703(96)90432-9. PubMed
47 Werner GS, Schulz R, Fuchs JB, Andreas S, Prange H, Ruschewski W, et al. Infective endocarditis in the elderly in the era of transesophageal echocardiography: clinical features and prognosis compared with younger patients. Am J Med. 1996;100(1):90–7. doi:https://doi.org/10.1016/S0002-9343(96)90017-0. PubMed
48 Siddiq S, Missri J, Silverman DI. Endocarditis in an urban hospital in the 1990s. Arch Intern Med. 1996;156(21):2454–8. doi:https://doi.org/10.1001/archinte.1996.00440200072008. PubMed
49 Yeo TC, Lim MC, Cheng KL, See Tho ML, Ng WL, Choo MH. Clinical and echocardiographic features of mitral valve prolapse patients in a local population. Singapore Med J. 1996;37(2):143–6. PubMed
50 Ferreiros E, Nacinovich F, Casabé JH, Modenesi JC, Swieszkowski S, Cortes C, et al.; EIRA-2 Investigators. Epidemiologic, clinical, and microbiologic profile of infective endocarditis in Argentina: a national survey. The Endocarditis Infecciosa en la República Argentina-2 (EIRA-2) Study. Am Heart J. 2006;151(2):545–52. doi:https://doi.org/10.1016/j.ahj.2005.04.008. PubMed
51 Borer A, Riesenberg K, Uriel N, Gilad J, Porath A, Weber G, et al. Infective endocarditis in a tertiary-care hospital in southern Israel. Public Health Rev. 1998;26(4):317–30. PubMed
52 Weng MC, Chang FY, Young TG, Ding YA. Analysis of 109 cases of infective endocarditis in a tertiary care hospital. Zhonghua yi xue za zhi = Chinese medical journal; Free China ed 1996;58:18-23.
53 Netzer RO, Zollinger E, Seiler C, Cerny A. Infective endocarditis: clinical spectrum, presentation and outcome. An analysis of 212 cases 1980-1995. Heart. 2000;84(1):25–30. doi:https://doi.org/10.1136/heart.84.1.25. PubMed
54 Lamas CC, Eykyn SJ. Suggested modifications to the Duke criteria for the clinical diagnosis of native valve and prosthetic valve endocarditis: analysis of 118 pathologically proven cases. Clin Infect Dis. 1997;25(3):713–9. doi:https://doi.org/10.1086/513765. PubMed
55 Dyson C, Barnes RA, Harrison GA. Infective endocarditis: an epidemiological review of 128 episodes. J Infect. 1999;38(2):87–93. doi:https://doi.org/10.1016/S0163-4453(99)90074-9. PubMed
56 Bouza E, Menasalvas A, Muñoz P, Vasallo FJ, del Mar Moreno M, García Fernández MA. Infective endocarditis--a prospective study at the end of the twentieth century: new predisposing conditions, new etiologic agents, and still a high mortality. Medicine (Baltimore). 2001;80(5):298–307. doi:https://doi.org/10.1097/00005792-200109000-00003. PubMed
57 Jalal S, Khan KA, Alai MS, Jan V, Iqbal K, Tramboo NA, et al. Clinical spectrum of infective endocarditis: 15 years experience. Indian Heart J. 1998;50(5):516–9. PubMed
58 Castillo JC, Anguita MP, Ramírez A, Siles JR, Torres F, Mesa D, et al. Long term outcome of infective endocarditis in patients who were not drug addicts: a 10 year study. Heart. 2000;83(5):525–30. doi:https://doi.org/10.1136/heart.83.5.525. PubMed
59 Khanal B, Harish BN, Sethuraman KR, Srinivasan S. Infective endocarditis: report of a prospective study in an Indian hospital. Trop Doct. 2002;32(2):83–5. doi:https://doi.org/10.1177/004947550203200208. PubMed
60 Cetinkaya Y, Akova M, Akalin HE, Aşçioğlu S, Hayran M, Uzuns O, et al. A retrospective review of 228 episodes of infective endocarditis where rheumatic valvular disease is still common. Int J Antimicrob Agents. 2001;18(1):1–7. doi:https://doi.org/10.1016/S0924-8579(01)00344-2. PubMed
61. Ako J, Ikari Y, Hatori M, Hara K, Ouchi Y. Changing spectrum of infective endocarditis: review of 194 episodes over 20 years. Circulation journal: official journal of the Japanese Circulation Society 2003;67:3-7.
62. Fefer P, Raveh D, Rudensky B, Schlesinger Y, Yinnon AM. Changing epidemiology of infective endocarditis: a retrospective survey of 108 cases, 1990-1999. European journal of clinical microbiology & infectious diseases: official publication of the European Society of Clinical Microbiology 2002;21:432-7.
63 Hoen B, Alla F, Selton-Suty C, Béguinot I, Bouvet A, Briançon S, et al., Association pour l'Etude et la Prévention de l'Endocardite Infectieuse (AEPEI) Study Group. Changing profile of infective endocarditis: results of a 1-year survey in France. JAMA. 2002;288(1):75–81. doi:https://doi.org/10.1001/jama.288.1.75. PubMed
64 Tleyjeh IM, Steckelberg JM, Murad HS, Anavekar NS, Ghomrawi HM, Mirzoyev Z, et al. Temporal trends in infective endocarditis: a population-based study in Olmsted County, Minnesota. JAMA. 2005;293(24):3022–8. doi:https://doi.org/10.1001/jama.293.24.3022. PubMed
65 Alestig K, Hogevik H, Olaison L; Kjell Alestig, Harriet Hogevik, Lar. Infective endocarditis: a diagnostic and therapeutic challenge for the new millennium. Scand J Infect Dis. 2000;32(4):343–56. doi:https://doi.org/10.1080/003655400750044908. PubMed
66. Koegelenberg CF, Doubell AF, Orth H, Reuter H. Infective endocarditis in the Western Cape Province of South Africa: a three-year prospective study. QJM: monthly journal of the Association of Physicians 2003;96:217-25.
67 Koegelenberg CF, Doubell AF, Orth H, Reuter H. Infective endocarditis: improving the diagnostic yield. Cardiovascular journal of South Africa: official journal for Southern Africa Cardiac Society [and]. South African Society of Cardiac Practitioners. 2004;15:14–20.
68. Loupa C, Mavroidi N, Boutsikakis I, et al. Infective endocarditis in Greece: a changing profile. Epidemiological, microbiological and therapeutic data. Clinical microbiology and infection: the official publication of the European Society of Clinical Microbiology and Infectious Diseases 2004;10:556-61.
69 Di Filippo S, Delahaye F, Semiond B, Celard M, Henaine R, Ninet J, et al. Current patterns of infective endocarditis in congenital heart disease. Heart. 2006;92(10):1490–5. doi:https://doi.org/10.1136/hrt.2005.085332. PubMed
70 Castillo JC, Anguita MP, Torres F, Mesa D, Franco M, González E, et al. Comparison of features of active infective endocarditis involving native cardiac valves in nonintravenous drug users with and without predisposing cardiac disease. Am J Cardiol. 2002;90(11):1266–9. doi:https://doi.org/10.1016/S0002-9149(02)02851-5. PubMed
71 Tariq M, Siddiqui BK, Jadoon A, et al. Clinical profile and outcome of infective endocarditis at the Aga Khan University hospital. International Journal of Collaborative Research on Internal Medicine and Public Health. 2009;1:84–99.
72 McKay G, Bunton R, Galvin I, Shaw D, Singh H. Infective endocarditis--a twelve year surgical outcome series. N Z Med J. 2002;115(1150):124–6. PubMed
73 Garg N, Kandpal B, Garg N, Tewari S, Kapoor A, Goel P, et al. Characteristics of infective endocarditis in a developing country-clinical profile and outcome in 192 Indian patients, 1992-2001. Int J Cardiol. 2005;98(2):253–60. doi:https://doi.org/10.1016/j.ijcard.2003.10.043. PubMed
74. Tariq M, Alam M, Munir G, Khan MA, Smego RA, Jr. Infective endocarditis: a five-year experience at a tertiary care hospital in Pakistan. International journal of infectious diseases: IJID: official publication of the International Society for Infectious Diseases 2004;8:163-70.
75. Cecchi E, Forno D, Imazio M, et al. New trends in the epidemiological and clinical features of infective endocarditis: results of a multicenter prospective study. Italian heart journal: official journal of the Italian Federation of Cardiology 2004;5:249-56.
76 Rehman SSG, Shahid M, Shahid M. Clinical presentation of infective endocarditis. J Postgrad Med Inst. 2002;16:55–63.
77 Chu J, Wilkins G, Williams M. Review of 65 cases of infective endocarditis in Dunedin Public Hospital. N Z Med J. 2004;117(1200):U1021. PubMed
78 Yousuf RMHS, Fauzi ARM, Shah A. Infective endocarditis in the East coast of peninsular Malaysia: a two year retrospective survey from Kuantan. JK Pract. 2006;13:5–8.
79 Heiro M, Helenius H, Mäkilä S, Hohenthal U, Savunen T, Engblom E, et al. Infective endocarditis in a Finnish teaching hospital: a study on 326 episodes treated during 1980-2004. Heart. 2006;92(10):1457–62. doi:https://doi.org/10.1136/hrt.2005.084715. PubMed
80 Heiro M, Helenius H, Hurme S, Savunen T, Metsärinne K, Engblom E, et al. Long-term outcome of infective endocarditis: a study on patients surviving over one year after the initial episode treated in a Finnish teaching hospital during 25 years. BMC Infect Dis. 2008;8(1):49. doi:https://doi.org/10.1186/1471-2334-8-49. PubMed
81 Hill EE, Herijgers P, Claus P, Vanderschueren S, Herregods MC, Peetermans WE. Infective endocarditis: changing epidemiology and predictors of 6-month mortality: a prospective cohort study. Eur Heart J. 2007;28(2):196–203. doi:https://doi.org/10.1093/eurheartj/ehl427. PubMed

82 Yiu KH, Siu CW, Lee KL, Fong YT, Chan HW, Lee SW, et al. Emerging trends of community acquired infective endocarditis. Int J Cardiol. 2007;121(1):119–22. doi:https://doi.org/10.1016/j.ijcard.2006.08.053. PubMed
83 Correa de Sa DD, Tleyjeh IM, Anavekar NS, Schultz JC, Thomas JM, Lahr BD, et al. Epidemiological trends of infective endocarditis: a population-based study in Olmsted County, Minnesota. Mayo Clin Proc. 2010;85(5):422–6. doi:https://doi.org/10.4065/mcp.2009.0585. PubMed
84 Knudsen JB, Fuursted K, Petersen E, Wierup P, Mølgaard H, Poulsen SH, et al. Infective endocarditis: a continuous challenge. The recent experience of a European tertiary center. J Heart Valve Dis. 2009;18(4):386–94. PubMed
85 Math RS, Sharma G, Kothari SS, Kalaivani M, Saxena A, Kumar AS, et al. Prospective study of infective endocarditis from a developing country. Am Heart J. 2011;162(4):633–8. doi:https://doi.org/10.1016/j.ahj.2011.07.014. PubMed
86. Tugcu A, Yildirimturk O, Baytaroglu C, et al. Clinical spectrum, presentation, and risk factors for mortality in infective endocarditis: a review of 68 cases at a tertiary care center in Turkey. Turk Kardiyoloji Dernegi arsivi: Turk Kardiyoloji Derneginin yayin organidir 2009;37:9-18.
87 Assiri AS. Clinical and microbiological profiles of infective endocarditis in a tertiary hospital in Aseer region, Saudi Arabia. J Saudi Heart Assoc. 2011;23(4):207–11. doi:https://doi.org/10.1016/j.jsha.2011.04.002. PubMed
88 Wong CW, Porter G, Tisch J, Young C. Outcome and prognostic factors on 57 cases of infective endocarditis in a single centre. N Z Med J. 2009;122(1304):54–62. PubMed
89 Scudeller L, Badano L, Crapis M, Pagotto A, Viale P. Population-based surveillance of infectious endocarditis in an Italian region. Arch Intern Med. 2009;169(18):1720–3. doi:https://doi.org/10.1001/archinternmed.2009.307. PubMed
90 Castillo JC, Anguita MP, Ruiz M, Peña L, Santisteban M, Puentes M, et al. [Changing epidemiology of native valve infective endocarditis]. Rev Esp Cardiol. 2011;64(7):594–8. doi:https://doi.org/10.1016/j.recesp.2011.03.011. PubMed
91 Nakagawa T, Wada H, Sakakura K, Yamada Y, Ishida K, Ibe T, et al. Clinical features of infective endocarditis: comparison between the 1990s and 2000s. J Cardiol. 2014;63(2):145–8. doi:https://doi.org/10.1016/j.jjcc.2013.06.007. PubMed
92 Li L, Wang H, Wang L, Pu J, Zhao H. Changing profile of infective endocarditis: a clinicopathologic study of 220 patients in a single medical center from 1998 through 2009. Texas Heart Institute journal / from the Texas Heart Institute of St Luke's Episcopal Hospital. Texas Children's Hospital. 2014;41:491–8.
93 Sun BJ, Choi SW, Park KH, Jang JY, Kim DH, Song JM, et al. Infective endocarditis involving apparently structurally normal valves in patients without previously recognized predisposing heart disease. J Am Coll Cardiol. 2015;65(3):307–9. doi:https://doi.org/10.1016/j.jacc.2014.10.046. PubMed
94. Nakatani S, Mitsutake K, Ohara T, Kokubo Y, Yamamoto H, Hanai S. Recent picture of infective endocarditis in Japan--lessons from Cardiac Disease Registration (CADRE-IE). Circulation journal: official journal of the Japanese Circulation Society 2013;77:1558-64.
95 Hajihossainlou B, Heidarnia MA, Sharif Kashani B. Changing pattern of infective endocarditis in Iran: A 16 years survey. Pak J Med Sci. 2013;29(1):85–90. PubMed
96 Lu KJ, Kearney LG, Ord M, Jones E, Burrell LM, Srivastava PM. Age adjusted Charlson Co-morbidity Index is an independent predictor of mortality over long-term follow-up in infective endocarditis. Int J Cardiol. 2013;168(6):5243–8. doi:https://doi.org/10.1016/j.ijcard.2013.08.023. PubMed
97 Poesen K, Pottel H, Colaert J, De Niel C. Epidemiology of infective endocarditis in a large Belgian non-referral hospital. Acta Clin Belg. 2014;69(3):183–90. doi:https://doi.org/10.1179/0001551214Z.00000000046. PubMed
98 Gupta A, Gupta A, Kaul U, Varma A. Infective endocarditis in an Indian setup: Are we entering the 'modern' era? Indian J Crit Care Med. 2013;17(3):140–7. doi:https://doi.org/10.4103/0972-5229.117041. PubMed
99 Cecchi E, Chirillo F, Castiglione A, Faggiano P, Cecconi M, Moreo A, et al. Clinical epidemiology in Italian Registry of Infective Endocarditis (RIEI): Focus on age, intravascular devices and enterococci. Int J Cardiol. 2015;190:151–6. doi:https://doi.org/10.1016/j.ijcard.2015.04.123. PubMed
100 Senthilkumar S, Menon T, Subramanian G. Epidemiology of infective endocarditis in Chennai, South India. Indian J Med Sci. 2010;64(4):187–91. doi:https://doi.org/10.4103/0019-5359.97358. PubMed
101 Sadaka M, ElSharkawy E, Soliman M, El-Din AN, El-Hay MAA. Study of infective endocarditis in Alexandria main university hospitals. Egypt Heart J. 2013;65(4):307–17. doi:https://doi.org/10.1016/j.ehj.2013.01.004.
102 Ma XZ, Li XY, Que CL, Lv Y. Underlying heart disease and microbiological spectrum of adult infective endocarditis in one Chinese university hospital: a 10-year retrospective study. Intern Med J. 2013;43(12):1303–9. doi:https://doi.org/10.1111/imj.12248. PubMed
103 Al Abri SS, Zahedi FI, Kurup PJ, Al-Jardani AK, Beeching NJ. The epidemiology and outcomes of infective endocarditis in a tertiary care hospital in Oman. J Infect Public Health. 2014;7(5):400–6. doi:https://doi.org/10.1016/j.jiph.2014.04.004. PubMed
104 Collins JA, Zhang Y, Burke AP. Pathologic findings in native infective endocarditis. Pathol Res Pract. 2014;210(12):997–1004. doi:https://doi.org/10.1016/j.prp.2014.04.024. PubMed
105 Turak O, Özcan F, Işleyen A, Başar FN, Gül M, Yilmaz S, et al. Usefulness of neutrophil-to-lymphocyte ratio to predict in-hospital outcomes in infective endocarditis. Can J Cardiol. 2013;29(12):1672–8. doi:https://doi.org/10.1016/j.cjca.2013.05.005. PubMed
106. Elbey MA, Akdag S, Kalkan ME, et al. A multicenter study on experience of 13 tertiary hospitals in Turkey in patients with infective endocarditis. Anadolu kardiyoloji dergisi: AKD = the Anatolian journal of cardiology 2013;13:523-7.
107 Watt G, Pachirat O, Baggett HC, Maloney SA, Lulitanond V, Raoult D, et al. Infective endocarditis in northeastern Thailand. Emerg Infect Dis. 2014;20(3):473–6. doi:https://doi.org/10.3201/eid2003.131059. PubMed
108 Gupta K, Jagadeesan N, Agrawal N, Bhat P, Nanjappa MC. Clinical, echocardiographic and microbiological study, and analysis of outcomes of infective endocarditis in tropical countries: a prospective analysis from India. J Heart Valve Dis. 2014;23(5):624–32. PubMed
109 Jain PJ, Sr, Phasalkar MA, Roy BH, Jayram AA, Shah SR, Singh T, et al. Clinical Spectrum of Infective Endocarditis in a Tertiary Care Centre in Western India: A Prospective Study. Int J Clin Med. 2014;5(05):177–87. doi:https://doi.org/10.4236/ijcm.2014.55031.
110 Pelletier LL, Jr, Petersdorf RG. Infective endocarditis: a review of 125 cases from the University of Washington Hospitals, 1963-72. Medicine (Baltimore). 1977;56(4):287–313. doi:https://doi.org/10.1097/00005792-197707000-00002. PubMed
111 Pedersen FK, Petersen EA. Bacterial endocarditis at Blegdamshospitalet in Copenhagen 1944-1973. Scand J Infect Dis. 1976;8(2):99–105. doi:https://doi.org/10.3109/inf.1976.8.issue-2.07. PubMed
112 Garvey GJ, Neu HC. Infective endocarditis--an evolving disease. A review of endocarditis at the Columbia-Presbyterian Medical Center, 1968-1973. Medicine (Baltimore). 1978;57(2):105–27. doi:https://doi.org/10.1097/00005792-197803000-00001. PubMed
113 Welton DE, Young JB, Gentry WO, Raizner AE, Alexander JK, Chahine RA, et al. Recurrent infective endocarditis: analysis of predisposing factors and clinical features. Am J Med. 1979;66(6):932–8. doi:https://doi.org/10.1016/0002-9343(79)90447-9. PubMed
114 Haddy RI, Westveer D, Gordon RC. Bacterial endocarditis in the community hospital. J Fam Pract. 1981;13(6):807–11. PubMed
115 Bayliss R, Clarke C, Oakley CM, Somerville W, Whitfield AG, Young SE. The microbiology and pathogenesis of infective endocarditis. Br Heart J. 1983;50(6):513–9. doi:https://doi.org/10.1136/hrt.50.6.513. PubMed
116 King JW, Nguyen VQ, Conrad SA. Results of a prospective statewide reporting system for infective endocarditis. Am J Med Sci. 1988;295(6):517–27. doi:https://doi.org/10.1097/00000441-198806000-00005. PubMed
117 Kim EL, Ching DL, Pien FD. Bacterial endocarditis at a small community hospital. Am J Med Sci. 1990;299(2):87–93. doi:https://doi.org/10.1097/00000441-199002000-00002. PubMed
118 Varstela E, Verkkala K, Pohjola-Sintonen S, Valtonen V, Maamies T. Surgical treatment of infective aortic valve endocarditis. Scand J Thorac Cardiovasc Surg. 1991;25(3):167–74. doi:https://doi.org/10.3109/14017439109099034. PubMed
119 Jaffe WM, Morgan DE, Pearlman AS, Otto CM. Infective endocarditis, 1983-1988: echocardiographic findings and factors influencing morbidity and mortality. J Am Coll Cardiol. 1990;15(6):1227–33. doi:https://doi.org/10.1016/S0735-1097(10)80005-1. PubMed
120 Gentry LO, Khoshdel A. New approaches to the diagnosis and treatment of infective endocarditis: review of 100 consecutive cases. Texas Heart Institute journal / from the Texas Heart Institute of St Luke's Episcopal Hospital. Texas Children's Hospital. 1989;16:250–7.
121 Roberts WC, Oluwole BO, Fernicola DJ. Comparison of active infective endocarditis involving a previously stenotic versus a previously nonstenotic aortic valve. Am J Cardiol. 1993;71(12):1082–8. doi:https://doi.org/10.1016/0002-9149(93)90577-Y. PubMed
122 Selton-Suty C, Hoen B, Delahaye F, Lacassin F, Goulet V, Etienne J, et al. Comparison of infective endocarditis in patients with and without previously recognized heart disease. Am J Cardiol. 1996;77(12):1134–7. doi:https://doi.org/10.1016/S0002-9149(96)00150-6. PubMed

123. Rognon R, Kehtari R, Francioli P. Individual value of each of the Duke criteria for the diagnosis of infective endocarditis. Clinical microbiology and infection: the official publication of the European Society of Clinical Microbiology and Infectious Diseases 1999;5:396-403.
124 Mouly S, Ruimy R, Launay O, Arnoult F, Brochet E, Trouillet JL, et al. The changing clinical aspects of infective endocarditis: descriptive review of 90 episodes in a French teaching hospital and risk factors for death. J Infect. 2002;45(4):246–56. doi:https://doi.org/10.1053/jinf.2002.1058. PubMed
125 Abramczuk E, Hryniewiecki T, Stepińska J. Influence of pathogenetic factors on prognosis in patients with native valve infective endocarditis. Kardiol Pol. 2006;64(7):675–81, discussion 682–3. PubMed
126. Pachirat O, Chetchotisakd P, Klungboonkrong V, Taweesangsuksakul P, Tantisirin C, Loapiboon M. Infective endocarditis: prevalence, characteristics and mortality in Khon Kaen, 1990-1999. Journal of the Medical Association of Thailand = Chotmaihet thangphaet 2002;85:1-10.
127 Netzer RO, Altwegg SC, Zollinger E, Täuber M, Carrel T, Seiler C. Infective endocarditis: determinants of long term outcome. Heart. 2002;88(1):61–6. doi:https://doi.org/10.1136/heart.88.1.61. PubMed
128 Gotsman I, Meirovitz A, Meizlish N, Gotsman M, Lotan C, Gilon D. Clinical and echocardiographic predictors of morbidity and mortality in infective endocarditis: the significance of vegetation size. Isr Med Assoc J. 2007;9(5):365–9. PubMed
129. Moura L, Zamorano J, Moreno R, et al. Perioperative mortality and long-term outcome of infective endocarditis. Revista portuguesa de cardiologia: orgao oficial da Sociedade Portuguesa de Cardiologia = Portuguese journal of cardiology: an official journal of the Portuguese Society of Cardiology 2002;21:989-99.
130 Yoshinaga M, Niwa K, Niwa A, Ishiwada N, Takahashi H, Echigo S, et al.; Japanese Society of Pediatric Cardiology and Cardiac Surgery. Risk factors for in-hospital mortality during infective endocarditis in patients with congenital heart disease. Am J Cardiol. 2008;101(1):114–8. doi:https://doi.org/10.1016/j.amjcard.2007.07.054. PubMed
131 Cicalini S, Puro V, Angeletti C, Chinello P, Macrì G, Petrosillo N. Profile of infective endocarditis in a referral hospital over the last 24 years. J Infect. 2006;52(2):140–6. doi:https://doi.org/10.1016/j.jinf.2005.02.025. PubMed
132. Nashmi A, Memish ZA. Infective endocarditis at a tertiary care centre in Saudi Arabia: review of 47 cases over 10 years. Eastern Mediterranean health journal = La revue de sante de la Mediterranee orientale = al-Majallah al-sihhiyah li-sharq al-mutawassit 2007;13:64-71.
133 Hsu CN, Wang JY, Tseng CD, Hwang JJ, Hsueh PR, Liau CS. Clinical features and predictors for mortality in patients with infective endocarditis at a university hospital in Taiwan from 1995 to 2003. Epidemiol Infect. 2006;134(3):589–97. doi:https://doi.org/10.1017/S0950268805005224. PubMed
134 Jain V, Yang MH, Kovacicova-Lezcano G, Juhle LS, Bolger AF, Winston LG. Infective endocarditis in an urban medical center: association of individual drugs with valvular involvement. J Infect. 2008;57(2):132–8. doi:https://doi.org/10.1016/j.jinf.2008.05.008. PubMed
135. Giannitsioti E, Skiadas I, Antoniadou A, et al. Nosocomial vs. community-acquired infective endocarditis in Greece: changing epidemiological profile and mortality risk. Clinical microbiology and infection: the official publication of the European Society of Clinical Microbiology and Infectious Diseases 2007;13:763-9.
136 Benito N, Miró JM, de Lazzari E, Cabell CH, del Río A, Altclas J, et al.; ICE-PCS (International Collaboration on Endocarditis Prospective Cohort Study) Investigators. Health care-associated native valve endocarditis: importance of non-nosocomial acquisition. Ann Intern Med. 2009;150(9):586–94. doi:https://doi.org/10.7326/0003-4819-150-9-200905050-00004. PubMed
137 Murdoch DR, Corey GR, Hoen B, Miró JM, Fowler VG, Jr, Bayer AS, et al.; International Collaboration on Endocarditis-Prospective Cohort Study (ICE-PCS) Investigators. Clinical presentation, etiology, and outcome of infective endocarditis in the 21st century: the International Collaboration on Endocarditis-Prospective Cohort Study. Arch Intern Med. 2009;169(5):463–73. doi:https://doi.org/10.1001/archinternmed.2008.603. PubMed
138 Walls G, McBride S, Raymond N, Read K, Coomarasamy C, Morris AJ, et al. Infective endocarditis in New Zealand: data from the International Collaboration on Endocarditis Prospective Cohort Study. N Z Med J. 2014;127(1391):38–51. PubMed
139 Gálvez-Acebal J, Rodríguez-Baño J, Martínez-Marcos FJ, Reguera JM, Plata A, Ruiz J, et al.; Grupo para el Estudio de las Infecciones Cardiovasculares de la Sociedad Andaluza de Enfermedades Infecciosas (SAEI). Prognostic factors in left-sided endocarditis: results from the Andalusian multicenter cohort. BMC Infect Dis. 2010;10(1):17. doi:https://doi.org/10.1186/1471-2334-10-17. PubMed
140 Pazdernik M, Baddour LM, Pelouch R. Infective endocarditis in the Czech Republic: eight years of experience at one of the country's largest medical centers. J Heart Valve Dis. 2009;18(4):395–400. PubMed
141. Alagna L, Park LP, Nicholson BP, et al. Repeat endocarditis: analysis of risk factors based on the International Collaboration on Endocarditis - Prospective Cohort Study. Clinical microbiology and infection: the official publication of the European Society of Clinical Microbiology and Infectious Diseases 2014;20:566-75.
142 Mokhles MM, Ciampichetti I, Head SJ, Takkenberg JJ, Bogers AJ. Survival of surgically treated infective endocarditis: a comparison with the general Dutch population. Ann Thorac Surg. 2011;91(5):1407–12. doi:https://doi.org/10.1016/j.athoracsur.2011.02.007. PubMed
143 Baskerville CA, Hanrahan BB, Burke AJ, Holwell AJ, Rémond MG, Maguire GP. Infective endocarditis and rheumatic heart disease in the north of Australia. Heart Lung Circ. 2012;21(1):36–41. doi:https://doi.org/10.1016/j.hlc.2011.08.010. PubMed
144. Khaled AA, Al-Noami AY, Al-Ansi M, Faiza AA. Clinical features and outcome of infective endocarditis in yemeni patients treated with empirical antibiotic therapy. Heart views: the official journal of the Gulf Heart Association 2010;11:2-9.
145 Mokhles MM, Ciampichetti I, van Domburg R, Cheng JM, Bogers AJ, Witsenburg M. Infective endocarditis in a tertiary referral hospital: long-term follow up. J Heart Valve Dis. 2012;21(1):118–24. PubMed
146. Nunes MC, Gelape CL, Ferrari TC. Profile of infective endocarditis at a tertiary care center in Brazil during a seven-year period: prognostic factors and in-hospital outcome. International journal of infectious diseases: IJID: official publication of the International Society for Infectious Diseases 2010;14:e394-8.
147 Erbay AR, Erbay A, Canga A, Keskin G, Sen N, Atak R, et al. Risk factors for in-hospital mortality in infective endocarditis: five years' experience at a tertiary care hospital in Turkey. J Heart Valve Dis. 2010;19(2):216–24. PubMed
148 Dzupova O, Machala L, Baloun R, Maly M, Benes J; Czech Infective Endocarditis Working Group. Incidence, predisposing factors, and aetiology of infective endocarditis in the Czech Republic. Scand J Infect Dis. 2012;44(4):250–5. doi:https://doi.org/10.3109/00365548.2011.632643. PubMed
149 Selton-Suty C, Célard M, Le Moing V, Doco-Lecompte T, Chirouze C, Iung B, et al.; AEPEI Study Group. Preeminence of Staphylococcus aureus in infective endocarditis: a 1-year population-based survey. Clin Infect Dis. 2012;54(9):1230–9. doi:https://doi.org/10.1093/cid/cis199. PubMed
150. Nomura A, Omata F, Furukawa K. Risk factors of mid-term mortality of patients with infective endocarditis. European journal of clinical microbiology & infectious diseases: official publication of the European Society of Clinical Microbiology 2010;29:1355-60.
151. Fernandez-Hidalgo N, Almirante B, Tornos P, et al. Prognosis of left-sided infective endocarditis in patients transferred to a tertiary-care hospital--prospective analysis of referral bias and influence of inadequate antimicrobial treatment. Clinical microbiology and infection: the official publication of the European Society of Clinical Microbiology and Infectious Diseases 2011;17:769-75.
152 Leone S, Ravasio V, Durante-Mangoni E, Crapis M, Carosi G, Scotton PG, et al. Epidemiology, characteristics, and outcome of infective endocarditis in Italy: the Italian Study on Endocarditis. Infection. 2012;40(5):527–35. doi:https://doi.org/10.1007/s15010-012-0285-y. PubMed
153 Wu KS, Lee SS, Tsai HC, Wann SR, Chen JK, Sy CL, et al. Non-nosocomial healthcare-associated infective endocarditis in Taiwan: an underrecognized disease with poor outcome. BMC Infect Dis. 2011;11(1):221. doi:https://doi.org/10.1186/1471-2334-11-221. PubMed
154 Knudsen JB, Fuursted K, Petersen E, Wierup P, Mølgaard H, Poulsen SH, et al. Procalcitonin in 759 patients clinically suspected of infective endocarditis. Am J Med. 2010;123(12):1121–7. doi:https://doi.org/10.1016/j.amjmed.2010.07.018. PubMed
155 Knudsen JB, Fuursted K, Petersen E, Wierup P, Mølgaard H, Poulsen SH, et al. Failure of clinical features of low probability endocarditis. The early echo remains essential. Scand Cardiovasc J. 2011;45(3):133–8. doi:https://doi.org/10.3109/14017431.2011.563863. PubMed
156 Ferraris L, Milazzo L, Ricaboni D, Mazzali C, Orlando G, Rizzardini G, et al. Profile of infective endocarditis observed from 2003 - 2010 in a single center in Italy. BMC Infect Dis. 2013;13(1):545. doi:https://doi.org/10.1186/1471-2334-13-545. PubMed
157 Mirabel M, André R, Barsoum Mikhaïl P, Colboc H, Lacassin F, Noël B, et al. Infective endocarditis in the Pacific: clinical characteristics, treatment and long-term outcomes. Open Heart. 2015;2(1):e000183. doi:https://doi.org/10.1136/openhrt-2014-000183. PubMed
158 Koeda C, Tashiro A, Itoh T, Okabayashi H, Nakamura M. Mild renal dysfunction on admission is an important prognostic predictor in patients with infective endocarditis: a retrospective single-center study. Intern Med. 2013;52(10):1013–8. doi:https://doi.org/10.2169/internalmedicine.52.9305. PubMed
159. Fernandez-Hidalgo N, Almirante B, Tornos P, et al. Immediate and long-term outcome of left-sided infective endocarditis. A 12-year prospective study from a contemporary cohort in a referral hospital. Clinical microbiology and infection: the official publication of the European Society of Clinical Microbiology and Infectious Diseases 2012;18:E522-30.

160. Ferreira JP, Gomes F, Rodrigues P, et al. Left-sided infective endocarditis: analysis of in-hospital and medium-term outcome and predictors of mortality. Revista portuguesa de cardiologia: orgao oficial da Sociedade Portuguesa de Cardiologia = Portuguese journal of cardiology: an official journal of the Portuguese Society of Cardiology 2013;32:777-84.
161 Rizzi M, Ravasio V, Carobbio A, Mattucci I, Crapis M, Stellini R, et al.; Investigators of the Italian Study on Endocarditis. Predicting the occurrence of embolic events: an analysis of 1456 episodes of infective endocarditis from the Italian Study on Endocarditis (SEI). BMC Infect Dis. 2014;14(1):230. doi:https://doi.org/10.1186/1471-2334-14-230. PubMed
162 Korem M, Israel S, Gilon D, Cahan A, Moses AE, Block C, et al. Epidemiology of infective endocarditis in a tertiary-center in Jerusalem: a 3-year prospective survey. Eur J Intern Med. 2014;25(6):550–5. doi:https://doi.org/10.1016/j.ejim.2014.05.011. PubMed
163 Chu VH, Park LP, Athan E, Delahaye F, Freiberger T, Lamas C, et al.; International Collaboration on Endocarditis (ICE) Investigators*. Association between surgical indications, operative risk, and clinical outcome in infective endocarditis: a prospective study from the International Collaboration on Endocarditis. Circulation. 2015;131(2):131–40. doi:https://doi.org/10.1161/CIRCULATIONAHA.114.012461. PubMed
164 Olmos C, Vilacosta I, Sarriá C, Fernández C, López J, Ferrera C, et al. Characterization and clinical outcome of patients with possible infective endocarditis. Int J Cardiol. 2015;178:31–3. doi:https://doi.org/10.1016/j.ijcard.2014.10.171. PubMed
165. Simsek-Yavuz S, Sensoy A, Kasikcioglu H, et al. Infective endocarditis in Turkey: aetiology, clinical features, and analysis of risk factors for mortality in 325 cases. International journal of infectious diseases: IJID: official publication of the International Society for Infectious Diseases 2015;30:106-14.
166 Fukuchi T, Iwata K, Ohji G. Failure of early diagnosis of infective endocarditis in Japan--a retrospective descriptive analysis. Medicine (Baltimore). 2014;93(27):e237. doi:https://doi.org/10.1097/MD.0000000000000237. PubMed
167 Mills P, Leech G, Davies M, Leathan A. The natural history of a non-stenotic bicuspid aortic valve. Br Heart J. 1978;40(9):951–7. doi:https://doi.org/10.1136/hrt.40.9.951. PubMed
168 Fenoglio JJ, Jr, McAllister HA, Jr, DeCastro CM, Davia JE, Cheitlin MD. Congenital bicuspid aortic valve after age 20. Am J Cardiol. 1977;39(2):164–9. doi:https://doi.org/10.1016/S0002-9149(77)80186-0. PubMed
169 Auger P, Marquis G, Dyrda I, Martineau JP, Solymoss CB. Infective endocarditis update experience from a heart hospital. Acta Cardiol. 1981;36(2):105–23. PubMed
170 Woo KS, Lam YM, Kwok HT, Tse LK, Vallance-Owen J. Prognostic index in prediction of mortality from infective endocarditis. Int J Cardiol. 1989;24(1):47–54. doi:https://doi.org/10.1016/0167-5273(89)90040-5. PubMed
171 Borger MA, Preston M, Ivanov J, Fedak PW, Davierwala P, Armstrong S, et al. Should the ascending aorta be replaced more frequently in patients with bicuspid aortic valve disease? J Thorac Cardiovasc Surg. 2004;128(5):677–83. doi:https://doi.org/10.1016/j.jtcvs.2004.07.009. PubMed
172 Agarwal R, Bahl VK, Malaviya AN. Changing spectrum of clinical and laboratory profile of infective endocarditis. J Assoc Physicians India. 1992;40(11):721–3. PubMed
173 Lamas CC, Eykyn SJ. Bicuspid aortic valve--A silent danger: analysis of 50 cases of infective endocarditis. Clin Infect Dis. 2000;30(2):336–41. doi:https://doi.org/10.1086/313646. PubMed
174 Michelena HI, Desjardins VA, Avierinos JF, Russo A, Nkomo VT, Sundt TM, et al. Natural history of asymptomatic patients with normally functioning or minimally dysfunctional bicuspid aortic valve in the community. Circulation. 2008;117(21):2776–84. doi:https://doi.org/10.1161/CIRCULATIONAHA.107.740878. PubMed
175 Michelena HI, Khanna AD, Mahoney D, Margaryan E, Topilsky Y, Suri RM, et al. Incidence of aortic complications in patients with bicuspid aortic valves. JAMA. 2011;306(10):1104–12. doi:https://doi.org/10.1001/jama.2011.1286. PubMed
176 Michelena HI, Prakash SK, Della Corte A, Bissell MM, Anavekar N, Mathieu P, et al.; BAVCon Investigators. Bicuspid aortic valve: identifying knowledge gaps and rising to the challenge from the International Bicuspid Aortic Valve Consortium (BAVCon). Circulation. 2014;129(25):2691–704. doi:https://doi.org/10.1161/CIRCULATIONAHA.113.007851. PubMed
177 Tran CT, Kjeldsen K. Endocarditis at a tertiary hospital: reduced acute mortality but poor long term prognosis. Scand J Infect Dis. 2006;38(8):664–70. doi:https://doi.org/10.1080/00365540600585180. PubMed
178 Tzemos N, Therrien J, Yip J, Thanassoulis G, Tremblay S, Jamorski MT, et al. Outcomes in adults with bicuspid aortic valves. JAMA. 2008;300(11):1317–25. doi:https://doi.org/10.1001/jama.300.11.1317. PubMed
179. Suzuki Y, Daitoku K, Minakawa M, Fukui K, Fukuda I. Infective endocarditis with congenital heart disease. The Japanese journal of thoracic and cardiovascular surgery: official publication of the Japanese Association for Thoracic Surgery = Nihon Kyobu Geka Gakkai zasshi 2006;54:297-300.
180 Collins MJ, Butany J, Borger MA, Strauss BH, David TE. Implications of a congenitally abnormal valve: a study of 1025 consecutively excised aortic valves. J Clin Pathol. 2008;61(4):530–6. doi:https://doi.org/10.1136/jcp.2007.051904. PubMed
181 Kahveci G, Bayrak F, Pala S, Mutlu B. Impact of bicuspid aortic valve on complications and death in infective endocarditis of native aortic valves. Texas Heart Institute journal / from the Texas Heart Institute of St Luke's Episcopal Hospital. Texas Children's Hospital. 2009;36:111–6.
182 Tribouilloy C, Rusinaru D, Sorel C, Thuny F, Casalta JP, Riberi A, et al. Clinical characteristics and outcome of infective endocarditis in adults with bicuspid aortic valves: a multicentre observational study. Heart. 2010;96(21):1723–9. doi:https://doi.org/10.1136/hrt.2009.189050. PubMed
183. Marks DJ, Hyams C, Koo CY, et al. Clinical features, microbiology and surgical outcomes of infective endocarditis: a 13-year study from a UK tertiary cardiothoracic referral centre. QJM: monthly journal of the Association of Physicians 2015;108:219-29.
184 Verheugt CL, Uiterwaal CS, van der Velde ET, Meijboom FJ, Pieper PG, Veen G, et al. Turning 18 with congenital heart disease: prediction of infective endocarditis based on a large population. Eur Heart J. 2011;32(15):1926–34. doi:https://doi.org/10.1093/eurheartj/ehq485. PubMed
185 Baek JE, Park SJ, Woo SB, Choi JY, Jung JW, Kim NK. Changes in patient characteristics of infective endocarditis with congenital heart disease: 25 years experience in a single institution. Korean Circ J. 2014;44(1):37–41. doi:https://doi.org/10.4070/kcj.2014.44.1.37. PubMed
186 Keane JF, Driscoll DJ, Gersony WM, Hayes CJ, Kidd L, O'Fallon WM, et al. Second natural history study of congenital heart defects. Results of treatment of patients with aortic valvar stenosis. Circulation. 1993;87(2, Suppl):I16–27. PubMed
187 Robbins N, DeMaria A, Miller MH. Infective endocarditis in the elderly. South Med J. 1980;73(10):1335–8. doi:https://doi.org/10.1097/00007611-198010000-00014. PubMed
188 Hodes RM. Endocarditis in Ethiopia. Analysis of 51 cases from Addis Ababa. Trop Geogr Med. 1993;45(2):70–2. PubMed
189 Cheng A, Athan E, Appelbe A, McDonald M. The changing profile of bacterial endocarditis as seen at an australian provincial centre. Heart Lung Circ. 2002;11(1):26–31. doi:https://doi.org/10.1046/j.1444-2892.2002.00108.x. PubMed
190 Durante-Mangoni E, Bradley S, Selton-Suty C, Tripodi MF, Barsic B, Bouza E, et al.; International Collaboration on Endocarditis Prospective Cohort Study Group. Current features of infective endocarditis in elderly patients: results of the International Collaboration on Endocarditis Prospective Cohort Study. Arch Intern Med. 2008;168(19):2095–103. doi:https://doi.org/10.1001/archinte.168.19.2095. PubMed
191 Begezsán II, Dorobăţ CM. Diagnostic approaches in infective endocarditis. Rev Med Chir Soc Med Nat Iasi. 2012;116(1):108–13. PubMed
192 Falase AO, Jaiyesimi F, Iyun AO, Attah EB. Infective endocarditis-experience in Nigeria. Trop Geogr Med. 1976;28(1):9–15. PubMed
193 Bailey IK, Richards JG. Infective endocarditis in a Sydney teaching hospital--1962-1971. Aust N Z J Med. 1975;5(5):413–20. doi:https://doi.org/10.1111/j.1445-5994.1975.tb03048.x. PubMed
194 Singham KT, Anuar M, Puthucheary SD. Infective endocarditis 1968-1977: an Asian experience. Ann Acad Med Singapore. 1980;9(4):435–9. PubMed
195 Blackett K. Endocarditis in Cameroon. J R Coll Physicians Lond. 1989;23(4):260–3. PubMed
196 Iga K, Hori K, Matsumura T, Tomonaga G, Gen H, Tamamura T. Native valve infective endocarditis in adults--analysis of 32 consecutive cases over a ten-year period from 1980 to 1989. Jpn Circ J. 1991;55(5):437–42. doi:https://doi.org/10.1253/jcj.55.437. PubMed
197 Arbulu A, Asfaw I. Management of infective endocarditis: seventeen years' experience. Ann Thorac Surg. 1987;43(2):144–9. doi:https://doi.org/10.1016/S0003-4975(10)60383-9. PubMed