

Supplemental Table 2. Quality assessment scores of all co-morbidities incidence and prevalence studies

Study (Year)	Q1: Target population described?	Q2: Cases from entire population or probability sampling?	Q3: Response rate >70%?	Q4: Non-responders clearly described?	Q5: Sample representative of population?	Q6: Data collection methods standardized?	Q7A: Validated criteria or approach to assess MS?	Q7B: Validated criteria or approach to assess disease?	Q8: Were estimates given with confidence intervals?	Total Score	Q9: Are standardized estimated reported?
Achiron (2005)	no	no	yes	NA	yes	yes	yes	yes	no	5/8	no
Allen (2008)	yes	no	yes	NA	yes	yes	no	no	no	4/8	no
Allen (2013)	yes	yes	yes	NA	NR	yes	no	no	no	4/8	no
Alschuler (2012)	yes	no	no	yes	NR	yes	no	yes	no	4/9	no
Amato (2001)	yes	no	NR	no	no	yes	yes	yes	no	4/9	no
Annunziata (2011)	yes	no	NR	no	NR	yes	yes	yes	no	4/9	no
Auger (2005)	yes	no	NR	no	NR	yes	no	yes	no	3/9	no
Avasarala (2003)	no	no	NR	no	NR	yes	NR	yes	no	2/9	no
Bahmanyar (2009)	yes	yes	yes	NA	yes	yes	yes	yes	no	7/8	no
Baker (1972)	no	no	yes	NA	NR	NR	no	no	no	1/8	no
Bamer (2008)	yes	no	no	no	no	yes	no	yes	no	3/9	no
Barcellos (2006)	yes	no	yes	no	NR	yes	yes	no	no	4/9	no

Basiri (2009)	no	no	yes	NA	NR	NR	yes	yes	no	3/8	no
Baumstarek-Barrau (2011)	yes	no	NR	no	no	yes	yes	yes	no	4/9	no
Bazelier (2012)	yes	yes	yes	NA	NR	yes	yes	yes	yes	8/8	yes
Beiske (2008)	yes	yes	no	yes	yes	yes	yes	yes	yes	8/9	no
Bergamaschi (2009)	yes	no	yes	NA	NR	yes	yes	yes	no	5/8	no
Bloomgren (2012)	yes	no	yes	NA	NR	yes	no	no	no	3/8	no
Bodini (2008)	yes	no	NR	no	no	yes	yes	yes	no	4/8	no
Bombardier* (alcohol) (2004)	yes	no	no	no	no	yes	no	yes	no	4/9	no
Bombardier* (drug misuse) (2004)	yes	no	no	no	no	yes	no	yes	no	4/9	no
Borhani Haghghi (2007)	yes	no	NR	no	yes	yes	yes	yes	no	5/9	no
Brajkovic (2009)	no	no	no	no	yes	yes	yes	yes	no	4/9	no
Braley (2012)	yes	no	yes	NA	yes	yes	NR	yes	no	5/9	no
Brichetto (2003)	yes	yes	no	yes	yes	yes	yes	no	no	6/9	no
Brown (2009)	yes	no	yes	no	NR	yes	yes	yes	no	5/9	no

Buchanan (2003)	yes	no	yes	NA	yes	yes	no	yes	no	5/8	no
Buchanan (2006)	yes	no	no	no	no	yes	no	no	no	2/9	no
Buchanan (2011)	yes	no	no	no	yes	yes	no	no	yes	4/9	no
Burns (2013)	yes	no	NR	no	yes	yes	yes	yes	no	5/9	no
Carta (2014)	yes	no	NR	no	yes	yes	yes	yes	no	5/9	no
Catenoix (2011)	yes	no	yes	NA	yes	yes	yes	no	no	5/8	no
Cendrowski (1972)	yes	no	NR	NR	NR	no	no	no	no	1/9	no
Cendrowski (1989)	no	no	NR	no	NR	NR	no	no	no	0/9	no
Cetin (2007)	yes	no	no	no	no	yes	no	yes	no	3/9	no
Cheng (2012)	yes	no	yes	NA	NR	yes	yes	yes	no	5/8	no
Christiansen (2010)	yes	yes	yes	NA	yes	yes	yes ^a	no	no	6/8	no
Chwastiak (2002)	yes	no	no	no	no	yes	no	yes	no	3/9	no
da Silva (2011)	yes	no	yes	NA	NR	yes	yes	yes	no	5/8	no
Dahl (2009)	yes	yes	yes	no	yes	yes	yes	yes	no	7/9	no

Dallmeijer (2009)	yes	no	NR	no	NR	yes	no	no	no	2/9	no
De Keyser (1988)	no	no	yes	NA	yes	NR	yes	no	no	3/8	no
de Seze (2005)	no	no	yes	NA	NR	yes	no	yes	no	3/8	no
de Seze (2001)	yes	no	NR	no	yes	yes	yes	yes	no	5/9	no
Demakis (2009)	yes	yes	yes	NA	yes	yes	no	yes	no	6/8	no
Deretzi (2010)	yes	no	yes	yes	yes	yes	yes	no	no	6/9	no
Deriu (2009)	yes	no	NR	no	yes	yes	yes	yes	no	5/9	no
Dias (2012)	yes	no	NR	no	no	yes	no	no	no	2/9	no
Drake (1961)	no	NR	NR	NA	NR	no	no	no	no	0/9	no
Durelli (2001)	yes	no	NR	no	no	yes	yes	yes	no	4/9	no
Durmus (2013)	yes	no	yes	NA	NR	yes	yes	yes	no	5/8	no
Eaton (2007)	no	yes	yes	NA	yes	yes	no	no	no	4/8	no
Eaton (2010)	no	yes	yes	NA	yes	yes	no	no	no	4/8	no
Edwards (2004)	no	no	yes	NA	yes	NR	NR	NR	no	2/8	no

Einarsson (2003)	yes	no	NR	no	no	yes	NR	yes	no	3/9	no
Engelsen (1997)	yes	yes	yes	NA	yes	yes	yes	yes	no	7/8	no
Eriksson (2002)	yes	yes	yes	NA	yes	yes	yes	yes	no	7/8	no
Espinola-Nadurille (2010)	yes	no	NR	NA	NR	yes		yes	no	4/8	no
Etemadifar (2012)	yes	yes	yes	NA	yes	yes	yes	yes	no	7/8	no
Etemadifar (2013)	yes	yes	yes	NA	yes	yes	yes	yes	no	7/8	no
Fanouriakis (2013)	no	yes	yes	NA	yes	yes	yes	yes	no	6/8	no
Feinstein (2002)	yes	no	NR	no	yes	yes	yes	yes	no	5/9	no
Feinstein (2002) Korostil (2007)	yes	no	NR	no	yes	yes		yes	no	5/9	no
Ferini-Strambi (1994)	yes	no	NR	no	no	yes	yes	yes	no	4/9	no
Ferrando (2007)	yes	no	NR	no	NR	yes	NR	yes	no	3/9	no
Finlayson (2013)	yes	no	NR	no	NR	yes	no	no	no	2/9	no
Fisk (1998)	no	no	yes	NA	yes	yes	yes	yes	no	5/8	no
Fleming (1994)	yes	no	yes	NA	yes	yes	no	no	no	4/8	no
Forbes (2006)	yes	no	no	no	no	yes	NR	no	no	2/9	no

Foroughipour (2012)	yes	no	NR	no	no	yes	yes	yes	no	4/9	no
Fragoso (2011)	yes	no	NR	no	yes	yes	yes	yes	no	5/9	no
Fromont (2013)	yes	yes	yes	NA	yes	yes	yes	yes	no	7/8	no
Fuvesi (2010)	yes	yes	NR	no	NR	yes	yes	no	no	4/9	no
Galeazzi (2005)	yes	no	yes	no	no	yes	yes	yes	no	6/9	no
Gambardella (2003)	yes	no	yes	NA	NR	yes	yes	yes	no	5/8	no
Garfield (2012)	yes	no	no	no	no	yes	NR	yes	no	3/9	no
Ghadirian (2001)	yes	no	yes	no	NR	yes	no	no	no	3/9	no
Ghajarzadeh (2012)	yes	no	NR	no	NR	yes	yes	yes	no	4/9	no
Ghezzi (1990)	yes	no	yes	NA	yes	yes	yes	yes	no	6/8	no
Goldacre (2004)	yes	yes	yes	NA	yes	yes	no	no	no	5/8	no
Gomez-Choco (2007)	yes	no	NR	no	yes	yes	yes	yes	no	5/9	no
Gold (2003)	no	no	no	no	no	yes	yes	yes	no	3/9	no
Goodin (1999)	yes	no	no	no	yes	yes	no	no	no	3/9	no

Goretti (2009)	yes	no	NR	no	no	yes	yes	yes	no	4/9	no
Goretti (2010)	yes	no	yes	NA	yes	yes	yes	yes	no	6/8	no
Gottberg (2007)	yes	yes	yes	no	yes	yes	yes	yes	no	7/9	no
Hakim (2007)	yes	yes	yes	yes	yes	yes	yes	yes	no	7/9	no
Hanrahan (1988)	no	NR	NR	NA	NR	yes	NR	yes	no	2/8	no
Harel (2007)	yes	no	yes	no	yes	yes	yes	yes	no	6/9	no
Hemminki (2011)	no	yes	yes	NA	yes	yes	no	yes	no	5/8	no
Hemminki (2012)	no	yes	yes	NA	yes	yes	no	yes	no	5/8	no
Hemminki (2012)	no	yes	yes	NA	yes	yes	no	yes	no	5/8	no
Hemminki (2012)	no	yes	yes	NA	yes	yes	no	yes	no	5/8	no
Hemminki (2012)	no	yes	yes	NA	yes	yes	no	yes	no	5/8	no
Hemminki (2013)	no	yes	yes	NA	yes	yes	no	yes	no	5/8	no
Hemminki (2013)	no	yes	yes	NA	yes	yes	no	yes	no	5/8	no
Henderson (2000)	no	yes	yes	yes	unclear	yes	no	no	no	4/9	no

Hjalgrim (2004)	yes	yes	yes	NA	yes	yes	yes	yes	no	7/8	no
Holper (2010)	yes	yes	yes	no	yes	yes	yes	no	no	6/9	no
Hopman (2007)	yes	yes	yes	yes	yes	yes	NR	no	no	6/9	no
Hoppenbrouwers (2007)	yes	yes	yes	yes	yes	yes	yes	yes	no	8/9	no
Horton (2010)	yes	no	NR	NA	yes	yes	yes	yes	no	5/8	no
Hussein (2006)	no	NR	NR	NA	NR	yes	NR	NR	no	1/8	no
Isaksson (2007)	yes	no	NR	no	no	yes	yes	yes	no	4/9	no
Jadidi (2013)	yes	yes	yes	NA	yes	yes	no	no	no	5/8	no
Janardhan (2002)	yes	no	yes	no	no	yes	yes	yes	no	4/9	no
Janssens (2003)	yes	no	yes	yes	yes	yes	yes	yes	no	7/9	no
Janssens (2006)	yes	no	no	yes	no	yes	yes	yes	no	5/9	no
Joffe (1987)	no	no	NR	no	no	yes	NR	yes	no	3/9	no
Johansson (2007)	yes	no	yes	no	NR	yes	yes	yes	no	5/9	no
Jonsson (1996)	yes	no	no	yes	no	yes	yes	yes	no	5/9	no

Julian (2009)	yes	no	no	no	no	yes	NR	yes	no	3/9	no
Kaminska (2012)	yes	no	no	no	no	yes	yes	yes	no	4/9	no
Kang (2010)	no	yes	yes	NA	yes	yes	no	no	no	4/8	no
Kanjwal (2010)	yes	no	NA	NA	NR	yes	no	yes	no	3/8	no
Karara (2013)	yes	no	NR	no	NR	yes	yes	no	no	3/9	no
Karimi (2013)	yes	no	NR	NA	NR	yes	yes	NR	no	3/8	No
Kargarfard (2012)	yes	no	yes	no	no	yes	NR	yes	no	4/9	no
Karni (1999)	yes	no	NR	no	yes	yes	yes	yes	no	5/9	no
Kehler (2009)	yes	no	NR	no	yes	yes	NR	yes	no	4/9	no
Ketelslegers (2010)	yes	no	NR	no	no	yes	yes	yes	no	4/9	no
Kingwell (2012)	yes	yes	yes	NA	yes	yes	yes	yes	no	7/8	no
Kinnunen (1986)	yes	yes	yes	NA	yes	yes	yes	yes	no	8/8	yes
Khan (2007)	yes	no	no	no	no	yes	yes	no	no	3/9	no
Klevan (2014)	yes	yes	yes	NA	yes	yes	yes	yes	no	8/9	no

Koshiol (2011)	yes	yes	yes	NA	yes	yes	NR	NR	no	5/8	no
Krokki (2006)	yes	no	yes	NA	yes	yes	yes	yes	no	6/8	no
Landgren (2011)	yes	no	yes	NA	NR	yes	no	no	no	3/8	no
Langer-Gould (2010)	yes	no	yes	NA	yes	yes	yes	yes	no	6/8	no
Laroni (2006)	yes	no	NR	no	yes	yes	yes	yes	no	5/9	no
LaVela (2012)	yes	no	no	no	yes	yes	yes	no	no	4/8	no
Lawrenson (2001)	yes	yes	yes	NA	yes	yes	no	no	yes	6/8	no
Lebrun (2008)	yes	yes	yes	NA	yes	yes	yes	no	no	6/8	no
Lebrun (2011)	yes	yes	yes	NA	yes	yes	yes	no	no	6/8	no
Lehan (2012)	no	no	NR	no	no	yes	NR	no	no	1/9	no
Levinthal (2013)	yes	no	NR	no	yes	yes	NR	yes	no	4/9	no
Le Scanff (2008)	no	no	yes	no	yes	yes	yes	yes	no	5/9	no
Leonavicius ^o (2011)	yes	no	NR	NR	no	yes	no	yes	no	3/9	no
Leonavicius ^o (2013)	yes	NR	NR	NR	NR	yes	no	yes	no	3/9	no

Li (2012)	yes	no	yes	yes	NR	yes	yes	yes	no	6/9	no
Lindgard (1985)	no	yes	yes	NA	yes	yes	no	no	no	4/8	no
Liu (2012)	no	yes	yes	NA	yes	yes	no	yes	no	5/8	no
Lobentanz (2004)	yes	no	no	no	no	yes	no	yes	no	3/9	no
Lu (2013)	yes	yes	yes	NA	yes	yes	yes	no	no	6/8	no
Lutterotti (2011)	yes	no	NR	no	no	yes	yes	yes	no	4/9	no
Manconi (2007)	yes	no	NR	no	yes	yes	yes	yes	no	5/9	no
Manconi (2008)	yes	no	yes	no	yes	yes	yes	yes	no	6/9	no
Manconi (2008)	yes	no	yes	no	yes	yes	yes	yes	yes	7/9	no
Maor (2001)	yes	no	NR	no	NR	yes	no	yes	no	3/9	no
Marrie (2008)	yes	no	no	yes	yes	yes	no	yes	no	5/9	no
Marrie (2009)	yes	no	no	yes	yes	yes		yes	no	5/9	no
Marrie (2009)	yes	no	no	yes	yes	yes	no	yes	no	5/9	no
Marrie (2011)	yes	no	no	yes	yes	yes	no	yes	no	5/9	no

Marrie (2012)	yes	yes	yes	NA	yes	yes	yes	yes	yes	8/8	yes
Marrie (2012)	yes	yes	yes	NA	yes	yes	yes	yes	yes	8/8	yes
Marrie (2013)	yes	yes	yes	NA	yes	yes	yes	yes	yes	8/8	yes
Marrie (2013)	yes	yes	yes	NA	yes	yes	yes	yes	yes	8/8	yes
Marrie (2013)	yes	yes	yes	NA	yes	yes	yes	yes	yes	8/8	yes
Marrosu (2002)	no	no	NR	no	yes	yes	yes	yes	no	4/9	no
Marrosu (2004)	no	no	yes	no	yes	NR	yes	no	no	3/9	no
Martinez-Lapiscina (2013)	yes	no	yes	NA	NR	yes	yes	yes	no	5/8	no
Mattioli (2011)	yes	no	NR	no	NR	yes	yes	yes	no	4/9	no
McCrone (2008)	yes	no	no	no	no	yes	no	yes	no	3/9	no
McGuigan (2006)	yes	yes	no	yes	yes	yes	yes	yes	yes	8/9	no
Merlino (2009)	yes	yes	NR	no	NR	yes	yes	yes	no	5/9	no
Metz (1989)	yes	no	NR	no	yes	yes	yes	yes	no	5/9	no
Midgard (Cancer) (1996)	yes	yes	yes	NA	yes	yes	yes	yes	no	7/8	no

Midgard (AID) (1996)	yes	yes	yes	no	yes	yes	yes	no	no	6/9	no
Miri (2013)	yes	no	NR	no	yes	yes	yes	yes	no	5/9	no
Miro (1990)	yes	no	NR	no	no	yes	yes	yes	no	4/9	no
Mohr (2007)	yes	no	no	no	no	yes	no	yes	no	4/9	no
Moller (1991)	no	yes	yes	NA	yes	yes	yes	yes	no	6/8	no
Montel (2008)	yes	no	NR	no	yes	yes	yes	yes	no	5/9	no
Monzani (1999)	no	no	NR	no	NR	yes	yes	yes	no	3/9	no
Moreau (1998)	yes	no	NR	no	no	yes	yes	yes	no	4/9	no
Moreau (2009)	yes	no	NR	no	yes	yes	yes	yes	no	6/9	no
Moreira (2008)	yes	no	yes	no	yes	yes	NR	yes	no	5/9	no
Munteis (2007)	yes	no	NR	no	NR	yes	yes	yes	no	4/9	no
Nicholl (2001)	yes	no	yes	yes	yes	yes	no	yes	no	6/9	no
Nicoletti (2003)	yes	yes	yes	NA	yes	yes	yes	yes	yes	8/8	yes
Niederweiser (2003)	yes	no	NR	no	yes	yes	yes	yes	no	5/9	no

Patten (2010)	yes	yes	NR	no	yes	yes	no	yes	yes	6/9	no
Patten (2012)	yes	yes	yes	no	yes	yes	no	no	yes	6/9	no
Patti (2003)	yes	yes	no	yes	yes	yes	NR	yes	no	6/9	no
Patti (2007)	yes	no	yes	no	no	yes	yes	yes	no	5/9	no
Paz Soldan (2013)	yes	yes	yes	NA	NR	yes	yes	yes	no	6/8	no
Pedotti (2009)	yes	yes	yes	no	NR	yes	yes	yes	no	6/9	No
Percy (1971)	yes	yes	yes	NA	yes	yes	yes	NR	no	6/8	no
Pittion-Vouyovitch (2006)	yes	no	NR	yes	yes	yes	yes	yes	no	7/9	no
Pitzalis (2008)	no	no	NA	no	NR	yes	NR	NR	no	1/9	no
Podar (2009)	yes	yes	yes	no	yes	yes	yes	yes	no	7/9	no
Poirier (1987)	no	no	no	no	no	yes	yes	no	no	2/9	no
Ponsonby (2006)	yes	yes	yes	no	NR	yes	yes	no	no	5/9	no
Porcel (2006)	yes	no	yes	no	NR	yes	NR	yes	no	4/9	no
Ramagopalan (2007)	yes	no	no	no	yes	yes	yes	yes	no	5/9	no

Rodrigo (2011)	yes	no	yes	NR	yes	yes	NR	yes	no	5/9	no
Romberg (2007)	yes	NR	NR	no	no	yes	yes	yes	no	4/9	no
Sadovnick (1989)	no	yes	NR	NA	NR	yes	yes	yes	no	4/8	no
Sadovnick (1996)	no	no	yes	no	yes	yes	yes	yes	no	5/9	no
Sahraian (2013)	yes	no	yes	no	NR	yes	yes	no	no	4/9	No
Salter (2013)	yes	no	no	yes	yes	yes	no	yes	no	5/9	no
Salvatore (2004)	no	no	NR	no	NR	yes	NR	NR	no	1/9	no
Sandberg-Wollheim (1992)	yes	no	NR	NA	unclear	yes	yes	yes	no	4/8	no
Scott (1996)	yes	no	yes	NA	NR	yes	yes	yes	no	5/8	no
Seyed Saadat (2013)	yes	no	yes	yes	NR	yes	yes	yes	no	6/9	no
Seyfert (1990)	yes	no	yes	NA	yes	yes	yes	no	no	5/8	no
Shaygannejad (sleep) (2013)	yes	no	NR	no	yes	yes	yes	yes	no	5/9	no
Shaygannejad (epilepsy) (2013)	yes	no	yes	NA	yes	yes	yes	yes	no	6/8	no
Sheu (2013)	yes	yes	yes	NA	yes	yes	no	no	no	5/8	no

Shiraishi (2005)	yes	no	yes	NA	NR	yes	yes	no	no	4/8	no
Simioni (2007)	yes	no	NR	no	yes	yes	yes	yes	no	5/9	no
Sloka (2005)	yes	yes	yes	no	yes	yes	yes	yes	no	7/9	no
Smith (2000)	yes	no	NR	no	no	yes	no	yes	no	3/9	no
Soderberg (2006)	no	yes	NR	NA	NR	yes	no	no	no	2/8	no
Sokic (2001)	yes	no	yes	NA	yes	yes	yes	yes	no	6/8	no
Solomon (2013)	yes	no	NR	NA	no	yes	yes	yes	no	4/8	no
Sollom (2007)	yes	no	NR	no	no	yes	no	yes	no	3/9	no
Somer (1989)	no	yes	yes	NA	yes	yes	yes	yes	no	6/8	no
Spain (2007)	yes	no	NR	no	yes	yes	yes	yes	no	5/9	no
Stenager (1992)	yes	yes	yes	NA	yes	yes	yes	yes	no	7/8	No
Striano (2003)	yes	no	NR	NA	NR	yes	yes	yes	no	4/8	no
Sumelahti (2004)	yes	yes	yes	NA	yes	yes	yes	yes	no	7/8	no
Sun (2013)	yes	yes	yes	NA	yes	yes	no	no	no	5/8	no

Sundgren (2013)	yes	no	NR	no	no	yes	yes	yes	no	4/9	No
Sunesen (2010)	yes	yes	yes	NA	yes	yes	no	yes	no	6/8	no
Tachibana (1994)	yes	no	no	NA	no	yes	yes	no	no	3/8	no
Tanriverdi (2010)	yes	no	yes	NA	NR	yes	yes	yes	no	5/8	no
Tarrants (2011)	yes	no	yes	NA	no	yes	no	no	no	3/8	no
Thielscher (2013)	no	yes	yes	NA	NR	yes	no	no	yes	4/8	no
Till (2012)	yes	no	yes	no	NR	yes	yes	yes	no	5/9	no
Tourbah (1998)	no	no	NR	no	yes	yes	yes	no	no	3/8	no
Tremlett (2002)	yes	yes	yes	NA	yes	yes	NR	yes	no	6/8	no
Trouillas (1971)	no	no	NR	NA	NR	no	no	no	no	0/9	no
Turner (2006)	yes	no	no	yes	no	yes	no	no	yes	4/9	no
Turner (2009)	yes	no	no	yes	yes	yes	no	no	yes	5/9	no
Turpin (2007)	yes	yes	yes	no	yes	yes	no	no	no	5/9	no
Uribe San-Martin(2001)	yes	no	yes	NA	yes	yes	yes	yes	no	6/8	no

Valleroy (1984)	yes	no	no	yes	no	yes	NR	no	no	3/9	no
Vavrova (2012)	yes	no	NR	no	yes	yes	yes	yes	yes	6/9	no
Vogt (2009)	yes	no	NR	no	no	yes	yes	no	no	3/9	no
Viveiros (2010)	yes	no	NR	NA	NR	yes	yes	yes	no	4/8	no
Wertman (1992)	no	yes	yes	NA	NR	yes	yes	NR	no	4/8	no
Williams (2005)	yes	no	no	yes	no	yes	no	yes	no	4/9	no
Wood (2012)	yes	yes	yes	no	yes	yes	yes	yes	no	7/9	no
Wynn (1990)	no	yes	yes	NA	yes	yes	yes	no	no	5/8	no
Zettl (2013)	yes	no	NR	no	NR	yes	NR	yes	no	3/8	no
Zorzon (2001)	yes	no	NR	no	no	yes	yes	yes	no	4/9	no
Zorzon (2003)	yes	no	yes	no	NR	yes	yes	no	no	4/9	no

NA: not applicable, NR: not reported, a: reported positive predictive value of diagnosis of MS in hospital data, b: from electronic health records, but validity of general practitioner diagnoses not reported.