

Annotated Bibliography – Women and Stroke Resources

Basic Stroke Information

Persky, R.W.; Turtzo, L.C.; & McCullough, L.D. (2010). Stroke in Women: Disparities and Outcomes.

Current Cardiology Reports, 12, 6–13. doi:10.1007/s11886-009-0080-2.

This paper is a literature review of differences in stroke risk, prevention, treatment, after-care, and long-term outcome between women and men. It summarizes findings regarding the sex differences in stroke symptoms, severity, and mortality; women's knowledge of their own stroke risk; the chromosomal contribution to stroke risk; primary and secondary prevention practices and outcomes; the influence of hormones on stroke risk; sex differences in stroke treatment and care practices; and incidence of post-stroke depression and disability in men versus women.

Bushnell et al. (2014) Guidelines for the Prevention of Stroke in Women. *Journal of the American Heart Association*, 1, n.p. doi: 10.1161/01.str.0000442009.06663.48

This report details female-specific and sex-influenced stroke risk factors (e.g. – migraines with aura, pregnancy, atrial fibrillation (AF)) and recommended prevention measures that focus on these risk factors, in an attempt to decrease the gap of stroke prevention and care between men and women.

Bushnell et al. (2014) Guidelines for the Prevention of Stroke in Women. *American Heart Association & American Stroke Association*. Retrieved from

<http://stroke.ahajournals.org/lookup/doi/10.1161/01.str.0000442009.06663.48>

This resource is the powerpoint presentation from the presentation of the Guidelines for the prevention of stroke in Women, and outlines in detail the symptoms, risk factors, and prevention measures for stroke in women.

ESC Press Office (2013). GPs undertreat women with AF. *European Society of Cardiology*. Retrieved from <http://www.escardio.org/about/press/press-releases/esc13-amsterdam/Pages/GPs-undertreat-women-AF.aspx>

This article provides a summary of a presentation made by Dr Pierre Sabouret that shows that men with AF, a condition that increases stroke risk, are more likely than women to receive anticoagulation medication. This disparity exists despite the individual's stroke risk and despite the fact that women in general have a higher stroke risk than men. It found that around a third of women receive no treatment at all for their AF, and another fifth are only prescribed a daily aspirin. Overall, 48% of women, compared to the 52% of men, receive anticoagulation treatments.

Giralt, D. et al. (2012). The gender gap in stroke: a meta-analysis. *Acta Neurologica Scandinavica*, 125, 83-90. doi: 10.1111/j.1600-0404.2011.01514.x

This systematic review of studies largely conducted in North America and Europe examined the gender and geographical differences in stroke risk, subtype, severity, and treatments. The authors determined that while sexual dimorphism in the way the brain and body responds to stroke is possible, their analysis also suggested that women with stroke do not receive care that is comparably suitable to their health needs compared with men with stroke. They found that stroke severity did not differ significantly between men and women, but that the

presence of various risk factors and age at onset of first stroke did. Overall, women were found to be treated less than men, despite responding equally well to various treatments to men.

Santalucia, P. et al. (2014). Call for research on women on behalf of WSA. *European Journal of Internal Medicine*, <http://dx.doi.org/10.1016/j.ejim.2014.02.001>

The researchers summarize many of the research findings that demonstrate a disparity in stroke risk, care, and health outcomes between women and men, citing the studies that support these findings. The purpose of the article is to attempt to collaborate with other researchers on a proposed cohort study that would examine the impacts of diet, physical exercise, social interventions, and leisure activities on stroke prevalence and outcomes in women.

Unknown (2013). Stroke risk similar among men and women smokers worldwide. *American Heart Association*. Retrieved from <http://newsroom.heart.org/news/stroke-risk-similar-among-men-and-women-smokers-worldwide>

This article summarizes the results from a meta-analysis of 80 international studies on the relationship between sex, smoking, and stroke prevalence and outcomes. The results showed that while smoking elevates stroke risk by 60-80% in both male and female smokers, female smokers with stroke are more 17% likely to have hemorrhagic strokes, a more dangerous type of stroke, than male smokers. Additionally, this risk was 10% higher for women in Western countries than for women in Asian countries.

Unknown (2014). Moderate exercise cuts women's stroke risk, helps offset increase risk from hormone therapy: American Stroke Association Meeting Report. *American Heart Association*. Retrieved from <http://newsroom.heart.org/news/moderate-exercise-cuts-womens-stroke-risk-helps-offset-increase-risk-from-hormone-therapy>

This article summarizes a study by Bernstein et al. that found that moderate exercise was enough to reduce stroke risk and that heavier exercise did not further diminish stroke risk. Furthermore, moderate exercise was found to partially offset the increased stroke risk associated with hormone replacement therapy.

Whiteman, H. (2014). Stroke prevention in women: Guidelines set for the first time. *Medical News Today*. MediLexicon, Intl. Retrieved from <http://www.medicalnewstoday.com/articles/272351.php>

A summary of the Bushnell et al. *Guidelines*, and a description of the context of their presentation: 'Wear Red Day' and the study that provided the foundation for the *Guidelines*.

Biomedical Studies

Appelros, P.; Stegmayr, B.; Terént, A. (2009). Sex Differences in Stroke Epidemiology. *Stroke: Journal of the American Heart Association*. Retrieved from <http://stroke.ahajournals.org>

This study reviews 98 studies from 19 countries, and finds that while men are 33% more likely to have a stroke and tend to have more strokes in their lifetime, strokes in women were more severe and more likely to result in death. The researchers suggest that this might be

the result of central nervous system protection by oestrogen in women and an average higher blood pressure in men.

Drača, S. (2012). Gender and stroke lateralization: Factors of functional recovery after the first-ever unilateral stroke? *Neurorehabilitation*, 30, 247-254. doi: 10.3233/NRE-2012-0752

The authors examined the sex differences in recovery of arm motor function and mobility in right-handed first-time unilateral stroke patients. They found that although there were no sex differences in stroke severity prior to rehabilitation, men showed greater motor function and mobility recovery than women. Additional sex differences were seen in motor functional recovery depending on hemispheric location of the stroke, with women showing better recovery when the stroke occurred in their dominant left hemisphere, whereas men showed better recovery when the stroke occurred in their subdominant right hemisphere (who also showed better mobility recovery than other groups).

Pan, A. et al. (2011). Depression and Incident Stroke in Women. *American Heart Association*.

Retrieved from <http://stroke.ahajournals.org>

This article aimed to determine the impact of depression and depression medication on the incidence of stroke in female registered nurses, 98% of whom were white, with an average age of 66 years. Women with depression were found to be “younger, more likely to be single, had a higher body mass index, smoked cigarettes, and were less likely to be physically active” than women without depression. Women currently with depression and women who used SSRIs were significantly more likely to suffer from a stroke after controlling for comorbidities.

Poynter, B. et al. (2009). Sex Difference in the Prevalence of Post-Stroke Depression: A Systematic Review. *Psychosomatics*, 50, 563-569. Retrieved from <http://psy.psychiatryonline.org>

This literature review examined the incidence of depression in the 18 months after a stroke. The authors found that the post-stroke population has a higher incidence of depression than in the general population. Women were found to be more likely to be diagnosed with or to report depression than men, especially women in inpatient programs rather than in community-based living programs; however, the study did not directly examine the reasons for these differences.

Ritzel, R.M.; Capozzi, L.A.; and McCullough, L.D. (2012). Sex, stroke, and inflammation: The potential for oestrogen-mediated immunoprotection in stroke. *Hormones and Behavior*, 63, 238-253. doi:10.1016/j.yhbeh.2012.04.007

A decrease in the body's oestrogen levels has been shown to increase stroke risk, however, the fact that women's stroke incidence does not actually exceed men's until age 85 suggests that other factors impact the relationship between oestrogen and stroke. This study aimed to examine the role of oestrogen's anti-inflammatory effects on stroke [which aspects of stroke] in order to determine why sexual dimorphism in stroke varies so much with age. Elevated inflammatory reaction during stroke can result in greater injury to the brain, which may be why older females show worse stroke outcomes. The authors found that in fact, dysregulation or overation of hormonal signaling can result in long-term inflammation, leaving stroke survivors vulnerable to infection and injury post-stroke due to their immunosuppressed state.

Santalucia, P. et al. (2014). Sex differences in clinical presentation, severity, and outcome of stroke: Results from a hospital-based registry. *European Journal of Internal Medicine*. doi: <http://dx.doi.org/10.1016/j.ejim.2014.02.001>

This study reports on differences in stroke symptoms, severity, and outcomes in women versus men in Italy. Women tended to stay in hospital longer than men, had more severe strokes, and tended to have greater neurological impairments post stroke. However, the mortality rate was the same for men and women. Similar to other studies' reports, Santalucia et al. found that female patients tended to be older than male patients.

Cultural and Psychosocial Studies

Andersson, Å. & Hansebo, G. (2009). Elderly peoples' experience of nursing care after a stroke: from a gender perspective. *Journal of Advanced Nursing*, 65, 2038-2045. doi: 10.1111/j.1365-2648.2009.05060.x

This study interviews five male and five female stroke patients to determine sex differences in post-stroke experiences. They found that 'women often need more assistance at home and receive institutional care more frequently' after stroke, and tend to have different goals, expectations, and experience of nursing care-giving than men do. They also found that men and women tend to have different attitudes toward participation in their own treatment, different recovery end goals, and different preferences as to the gender of nursing care staff.

Appelros, P.; Stegmayr, B.; Terént, A. (2009). A review on sex differences in stroke treatment and outcome. *Acta Neurologica Scandinavica*, 121, 359-369. doi: 10.1111/j.1600-0404.2009.01258.x

This study reports that despite the discrepancy in stroke outcomes between male and female stroke survivors, there is no explicit sexism present in treatment of individuals. They instead attribute these differences to women having a higher age at onset of first stroke and greater severity of stroke.

de Ridder, I. et al. (2013). Unequal Access to treatment with intravenous alteplase for women with acute ischemic stroke. *Pubmed*, 44, 2610-12. doi: 10.1161/STROKEAHA.113.002263

This study aims to determine why women with acute ischemic stroke are less likely to be treated with intravenous alteplase. It found that women with stroke tend to be older on average than men with stroke, and seek treatment greater than the three-hour window when it is possible to treat with intravenous alteplase. The authors therefore suggested that the inequality was due to the greater age of women, as older persons being more likely to live alone. Only the abstract of this study can be viewed for free, however, it is informative nonetheless.

Maselko, J. et al. (2009). The Intersection of Sex, Marital Status, and Cardiovascular Risk Factors in Shaping Stroke Incidence: Results from the Health and Retirement Study. *The American Geriatrics Society*, 57, 2293-2299. doi: 10.1111/j.1532-5415.2009.02555.x

The Maselko et al. study found that marriage is a protective factor in stroke risk, largely as a

result of the financial protection/higher income of married couples. They also found that men had higher stroke incidence even when controlled for risk factors. Women and men who had never been married or who were separated showed a greater stroke risk than married men and women, with never-married men showing the greatest stroke risk.

Roding, J. et al. (2009). Perceived impaired physical and cognitive functions after stroke in men and women between 18 and 55 years of age – a national survey. *Disability and Rehabilitation*, 31, 1092-1099. doi: 10.1080/09638280802510965

This study examined young stroke survivors' perceptions of their own cognitive and physical functioning. It found that women tend to rate themselves as having experienced a greater decline in both cognitive and most physical function compared to men. Additionally, nearly three out of four patients reported that they did not know how much they could physically exercise, with women being significantly more likely (77%) to report this than men (70%), although around 80% of patients did report that they considered exercise an important part of recovery. The authors recommended that emphasis on physical activity and physical activity education become a greater part of the recovery process for stroke survivors, as low physical activity is a stroke risk factor and a predictor of second strokes, in addition to contributing to the deteriorated abilities and increased fear of physical exertion in post-stroke patients.

Wu, S.H.; Woo, J.; and Zhang, X. (2013). Worldwide socioeconomic status and stroke mortality: An ecological study. *International Journal for Equity in Health*, 12, n. pag. Retrieved from <http://www.equityhealthj.com/content/12/1/42>

This study consisted of a global study of health records and socioeconomic status (SES) as determined by GDP, under-5 mortality rate, literacy rate, school enrollment ratios, and life expectancy at birth to identify any relationships between SES and stroke mortality. They found that SES and stroke mortality are inversely related, i.e. – lower SES countries tended to display higher stroke mortality rates and vice versa. They also found another trend that in low-SES countries, regions of higher SES (usually urban areas) had a higher stroke mortality rate than regions of lower SES (usually rural areas). Although the data was categorized by sex, the authors did not comment on trends in stroke mortality by sex.