

Bibliometric Analysis of the Top 100 Cited Cardiovascular Articles



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The number of citations an article receives is an important indication of its impact and contribution to the clinical world. There is a paucity of literature concerning top article citations in cardiology. The main objective of this investigation was to bridge this gap and to provide readers a practical guide in evaluating the cardiovascular literature. Scopus Library database was searched to determine the citations of all published cardiovascular articles. One hundred two journals were included in our investigation under the Institute of Science Information Web of Science subject category “cardiology, cardiovascular, and heart.” We did not apply any time or study-type restriction in our search. The top 100 cited articles were selected and analyzed by 2 independent investigators. The journal with the highest number of top 100 cited articles was *Circulation* with 36, followed by 28 in the *European Heart Journal*. A statistically significant association was found between the journal impact factor and the number of top 100 cited articles ($p < 0.005$). United States had the highest number of articles (49). Contrary to bibliometric analyses published in other medical fields, the largest subset of the cardiology articles ($n = 42$) was published in the 5-year period from 2006 to 2010. General medical journals such as *The Lancet* ($n = 4$) and *The New England Journal of Medicine* ($n = 1$) contributed only 5 articles to the list despite their extremely high impact factors. In conclusion, our analysis provides an insight on the citation frequency of top cited articles published in cardiovascular medicine to help recognize the quality of the works, discoveries, and the trends steering cardiology. © 2015 Elsevier Inc. All rights reserved. (Am J Cardiol 2015;115:972–981)

Academic institutions, public and private funding sectors, are now more interested in assessing the quality and productivity of individual scholarly work as a parameter for measuring the academic excellence to prioritize resources and reorient support. Bibliometric techniques are a powerful tool in performing citation analysis, one of the markers of the impact of an individual’s scholarly work within the scientific community.¹ Although the value of citation rates has been debated,² analysis of citation frequency can be valuable in identifying important issues and discoveries within the medical realm. Cardiology has evolved substantially in the last few decades. However, there is a paucity of literature concerning top article citations in cardiology. The main objective of our investigation is to bridge this gap and provide for the readers a practical guide to evaluate impact within the cardiovascular literature.

Methods

In September 2014, we searched the Scopus Library database (www.scopus.com) for citations of published

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See page 981 for disclosure information.

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cardiovascular articles. One hundred seven journals were included in our investigation under the Institute of Science Information Web of Science subject category “cardiology, cardiovascular, and heart.” In this list, *Stroke*, *Statistics in Medicine*, *Diabetes Care*, *Autoimmunity Reviews*, and *Anesthesia and Analgesia* were not consistent with the focus of our investigation and, hence, excluded. No time limitations were implemented on the investigation. Also, we did not impose any restriction on the basis of study types, availability of an abstract, and human versus nonhuman research subjects.

The remaining 102 journals were searched using both electronic and print International Standard Serial Numbers. The list of journals identified was exported into a spreadsheet. All identified journals were collected in a single search in Web of Science. Our search yielded a list of all indexed published articles in each of the journals. The results were arranged using the option “Times cited” that provided us a list of the all the articles published in a specific journal ranked by citation counts. The results were then evaluated by 2 independent investigators to conclude the 100 top cited articles. Later we also individually cataloged the articles in a database for further categorization.

Using the modified approach of the methods by Lim et al,³ 2 authors reviewed the 100 articles and the following data were compiled: number of authors, publication year, journal name, impact factor, country of origin, where the investigation was conducted, and article type (original and review articles). We also reviewed the association between journal impact factor and the number of articles included in

Table 1
List of 100 most cited cardiovascular articles

Rank	Article	Citations
1.	Mancia G, De Backer G, Dominiczak A, Cifkova R, Fagard R, Germano G, Grassi G, Heagerty AM, Kjeldsen SE, Laurent S, Narkiewicz K, Ruilope L, Rynkiewicz A, Schmieder RE, Boudier HA, Zanchetti A, Vahanian A, Camm J, De Caterina R, Dean V, Dickstein K, Filippatos G, Funck-Brentano C, Hellemans I, Kristensen SD, McGregor K, Sechem U, Silber S, Tendera M, Widimsky P, Zamorano JL, Erdine S, Kiowski W, Agabiti-Rosei E, Ambrosioni E, Lindholm LH, Viigimaa M, Adamopoulos S, Agabiti-Rosei E, Ambrosioni E, Bertomeu V, Clement D, Erdine S, Farsang C, Gaita D, Lip G, Mallion JM, Manolis AJ, Nilsson PM, O'Brien E, Ponikowski P, Redon J, Ruschitzka F, Tamargo J, van Zweiten P, Waerber B, Williams B. 2007 Guidelines for the Management of Arterial Hypertension: The Task Force for the Management of Arterial Hypertension of the European Society of Hypertension (ESH) and of the European Society of Cardiology (ESC). <i>J Hypertens</i> 2007;25:1105-1187.	3484
2.	Zanchetti A. 2003 European Society of Hypertension-European Society of Cardiology guidelines for the management of arterial hypertension. <i>J Hypertens</i> 2003;21:1011-1053.	3043
3.	Conroy RM, Pyörälä K, Fitzgerald AP, Sans S, Menotti A, De Backer G, De Bacquer D, Ducimetiere P, Jousilahti P, Keil U, Njolstad I, Oganov RG, Thomsen T, Tunstall-Pedoe H, Tverdal A, Wedel H, Whincup P, Wilhelmsen L, Graham IM. Estimation of ten-year risk of fatal cardiovascular disease in Europe: The SCORE project. <i>Eur Heart J</i> 2003;24:987-1003.	2046
4.	Malliani A, Pagani M, Lombardi F, Cerutti S. Cardiovascular neural regulation explored in the frequency domain. <i>Circulation</i> 1991;84:482-492.	1956
5.	Dickstein K, Cohen-Solal A, Filippatos G, McMurray JJV, Ponikowski P, Poole-Wilson PA, Stromberg A, van Veldhuisen DJ, Atar D, Hoes AW, Keren A, Mebazaa A, Nieminen M, Priori SG, Swedberg K. ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure 2008. <i>Eur Heart J</i> 2008;29:2388-2442.	1903
6.	Camm AJ, Kirchhof P, Lip GYH, Schotten U, Savelieva I, Ernst S, Van Gelder IC, Al-Attar N, Hindricks G, Prendergast B, Heidbuchel H, Alfieri O, Angelini A, Atar D, Colonna P, De Caterina R, De Sutter J, Goette A, Gorenek B, Heldal M, Hohloser SH, Kolh P, Le Heuzey JY, Ponikowski P, Rutten FH. Guidelines for the management of atrial fibrillation. <i>Eur Heart J</i> 2010;31:2369-2429.	1874
7.	Van De Werf F, Bax J, Betriu A, Blomstrom-Lundqvist C, Crea F, Falk V, Filippatos G, Fox K, Huber K, Kastrati A, Rosengren A, Steg PG, Tubaro M, Verheugt F. Management of acute myocardial infarction in patients presenting with persistent ST-segment elevation. <i>Eur Heart J</i> . 2008;29:2909-2945.	1673
8.	Sarnak MJ, Levey AS, Schoolwerth AC, Coresh J, Culleton B, Hamm LL, McCullough PA, Kasiske BL, Kelepouris E, Klag MJ, Parfrey P, Pfeffer M, Raij L, Spinosa DJ, Wilson PW. Kidney Disease as a Risk Factor for Development of Cardiovascular Disease: A Statement From the American Heart Association Councils on Kidney in Cardiovascular Disease, High Blood Pressure Research, Clinical Cardiology, and Epidemiology and Prevention. <i>Circulation</i> 2003;108:2154-2169.	1618
9.	Vahanian A, Baumgartner H, Bax J, Butchart E, Dion R, Filippatos G, Flachskampf F, Hall R, Jung B, Kasprzak J, Nataf P, Tornos P, Torracca L, Wenink A. Guidelines on the management of valvular heart disease: The task force on the management of valvular heart disease of the European society of cardiology. <i>Eur Heart J</i> 2007;28:230-268.	1433
10.	Danesh J, Collins R, Appleby P, Peto R. Association of fibrinogen, C-reactive protein, albumin, or leukocyte count with coronary heart disease: Meta-analyses of prospective studies. <i>JAMA</i> 1998;279:1477-1482.	1362
11.	Beckman JA, Creager MA, Libby P. Diabetes and atherosclerosis epidemiology, pathophysiology, and management. <i>JAMA</i> 2002;287:2570-2581.	1314
12.	Bonow RO, Carabello BA, Kanu C, De Leon AC Jr, Faxon DP, Freed MD, Gaasch WH, Lytle BW, Nishimura RA, O'Gara PT, O'Rourke RA, Otto CM, Shah PM, Shanewise JS, Smith SC Jr, Jacobs AK, Adams CD, Anderson JL, Antman EM, Faxon DP, Fuster V, Halperin JL, Hiratzka LF, Hunt SA, Lytle BW, Nishimura R, Page RL, Riegel B. ACC/AHA 2006 guidelines for the management of patients with valvular heart disease: A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to Revise the 1998 Guidelines for the Management of Patients with Valvular Heart Disease) - Developed in collaboration with the Society of Cardiovascular Anesthesiologists. <i>Circulation</i> 2006;114:e84-e231.	1226
13.	Rydén L, Standl E, Małgorzata B, Van Den Berghe G, Betteridge J, De Boer MJ, Cosentino F, Jönsson B, Laakso M, Malmberg K, Priori S, Ostergren J, Tuomilehto J, Thrainsdottir I, Vanhorebeek I, Stramba-Badiale M, Lindgren P, Qiao Q, Priori SG, Blanc JJ, Budaj A, Camm J, Dean V, Deckers J, Dickstein K, Lekakis J, McGregor K, Metra M, Morais J, Osterspey A, Tamargo J, Zamorano JL, Deckers JW, Bertrand M, Charbonnel B, Erdmann E, Ferrannini E, Flyvbjerg A, Gohlke H, Juanatey JR, Graham I, Monteiro PF, Parhofer K, Pyörälä K, Raz I, Scherthaner G, Volpe M, Wood D. Guidelines on diabetes, pre-diabetes, and cardiovascular diseases: Executive summary. The task force on diabetes and cardiovascular diseases of the European Society of Cardiology (ESC) and of the European Association for the Study of Diabetes (EASD). <i>Eur Heart J</i> 2007;28:88-136.	1095
14.	Dickstein K, Cohen-Solal A, Filippatos G, McMurray JJ, Ponikowski P, Poole-Wilson PA, Strömberg A, van Veldhuisen DJ, Atar D, Hoes AW, Keren A, Mebazaa A, Nieminen M, Priori SG, Swedberg K. ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure 2008. The Task Force for the Diagnosis and Treatment of Acute and Chronic Heart Failure 2008 of the European Society of Cardiology. Developed in collaboration with the Heart Failure Association of the ESC (HFA) and endorsed by the European Society of Intensive Care Medicine (ESICM). <i>Eur J Heart Fail</i> 2008;10:933-989.	1043
15.	Antman EM, Anbe DT, Armstrong PW, Bates ER, Green LA, Hand M, Hochman JS, Krumholz HM, Kushner FG, Lamas GA, Mullany CJ, Ornato JP, Pearle DL, Sloan MA, Smith SC Jr, Alpert JS, Anderson JL, Faxon DP, Fuster V, Gibbons RJ, Gregoratos G, Halperin JL, Hiratzka LF, Hunt SA, Jacobs AK. ACC/AHA guidelines for the management of patients with ST-elevation myocardial infarction - Executive summary: A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (writing committee to revise the 1999 guidelines for the management of patients with acute myocardial infarction). <i>Circulation</i> 2004;110:588-636.	935

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