Using a ‘value-based’ metric framework for an in-depth assessment of the impact of practice-changing articles shortlisted by the *NEJM*

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The original poster on the development of the EMPIRE Index is available in the supplementary materials.

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Objectives

- What is the impact of the *New England Journal of Medicine* (*NEJM*) notable articles, selected for their practice-changing potential by *NEJM* editors, using our **EMPIRE** (**EM**pirical **P**ublication **I**mpact and **R**each **E**valuation) Index, a novel, value-based metric framework?
- Does the EMPIRE Index provide additional insights for these *NEJM* notable articles compared with the Altmetric® Attention Score (AAS)?

Key findings

- The framework assessment confirmed that the *NEJM* notable articles had higher Total Value score than a typical phase 3 article in the *NEJM* (**Figure 1**).
- Top papers by Societal impact tended to be interventional studies, while the top Social impact papers tended to be real-world evidence (**Table 1**).
- The AAS does not capture the nuances of Societal and Scholarly impact that can be observed with the EMPIRE Index (**Figure 4**).

Methods

- *NEJM* ‘notable’ articles, selected for their practice-changing potential by *NEJM* editors, were identified for the years 2016 (n = 14), 2017 (n = 10), 2018 (n = 12) and 2019 (n = 12).[1–4]
- Article-level metrics for each publication were obtained (January 8, 2020) from Altmetric Explorer. Additional metrics (PubMed guideline citations) were obtained using PlumX.
- Metrics were analyzed using the EMPIRE Index, which provides a Total Value score and subscores for Scholarly, Social and Societal Value, as well as predictive reach metrics.[5]
- Comparisons were made with a previously analyzed benchmark data set comprising all phase 3 articles published in the *NEJM* during 2016 (n = 73).

Abstract

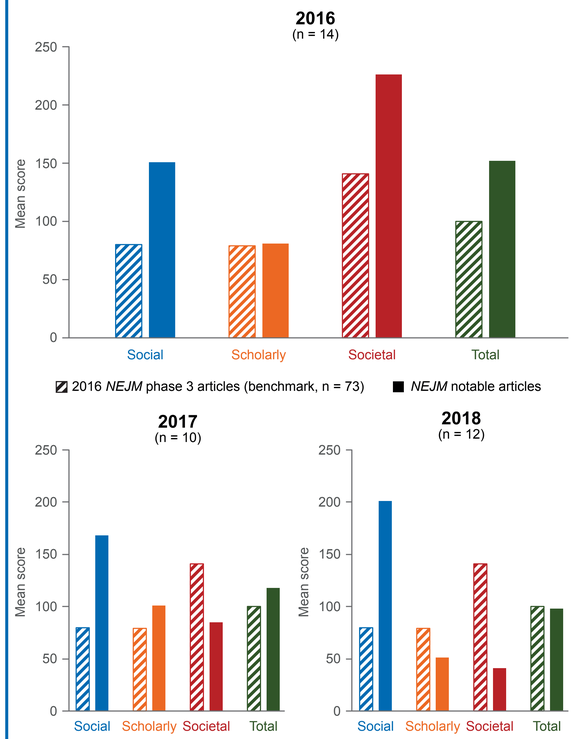
Objective: We previously presented a novel ‘value-based’ metric framework that provides a multidimensional measure of the impact of scientific publications.[5] This framework allows a detailed assessment of the type of influence impact to different stakeholders and provides richer information than other commonly used metrics, such as the Altmetric Attention Score (AAS) or the journal impact factor. Here, we analyze articles that were selected for their practice-changing potential by the *New England Journal of Medicine* (*NEJM*) editors from 2016 to 2019 and deep-dive into their measurable value using the framework.

Research design and methods: Article-level metrics for each publication were obtained from Altmetric Explorer. Additional metrics (PubMed guideline citations) were obtained using PlumX. Metrics were analyzed using the metric framework, which provides a Total Value score and Scholarly, Social and Societal Value subscores, as well as predictive reach metrics.

Results: In total, 48 notable *NEJM* articles were analyzed from the 4 years. Generally, Societal and Scholarly scores were higher for older articles, but Social scores were lower. Between-score correlations were modest (Kendall’s τ typically < 0.7). High subscale scores tended to differ by article type: high Social Value associated with observational and epidemiological; high Scholarly Value with innovative; and high Societal Value with interventional studies. Articles in 2019 and 2018 that had the highest Societal and Scholarly scores were also different to those with the highest AASs.

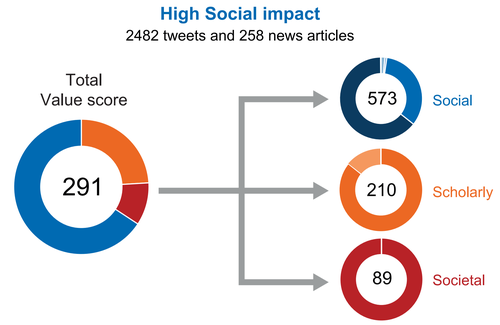
Conclusions: The value subscores within the metric framework successfully identified articles with different types of impact and potential value to different stakeholders. This will enable the assessment of publication characteristics associated with different types of standout value scores.

Figure 1. Societal and Social impact was greater for *NEJM* notable articles than for typical phase 3 articles[a]

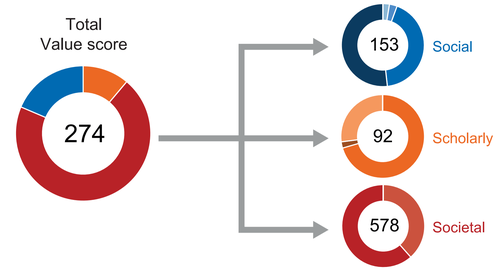


[a]2019 not shown due to space limitations.
NEJM, *New England Journal of Medicine*.

Figure 2. Examples of high-value publications with different kinds of impact



Study type: Real-world evidence on a topic of public interest.
Publication: Pulmonary illness related to e-cigarette use in Illinois and Wisconsin – preliminary report.



Study type: Interventional study.
Publication: Cholesterol lowering in intermediate-risk persons without cardiovascular disease.

Plain language summary

Why was this needed?

- Every year the editors of the *New England Journal of Medicine* (*NEJM*) select notable articles they think have the greatest practice-changing potential.
- We wanted to understand the true impact of these articles.

What was done?

- We used the EMPIRE Index to assess the Societal, Scholarly and Social impact of a publication.
- The framework for this index was presented at the European Meeting of the International Society for Medical Publication Professionals in London, January 2020.[5]

What was the result?

- The EMPIRE Index was able to show us that the articles selected by *NEJM* editors had much higher Societal and Social impact than a cross section of all phase 3 clinical trials published in the *NEJM*.

Figure 3. Societal impact takes time to accumulate

- In addition, Social impact is greater for more recent articles because of increasing activity on social media platforms.

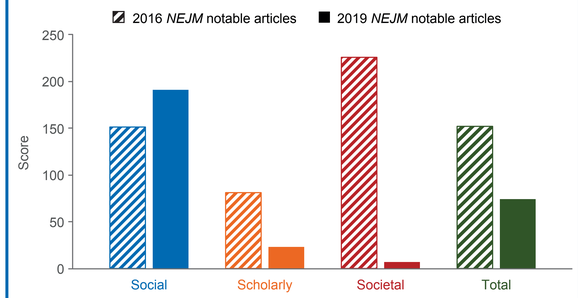
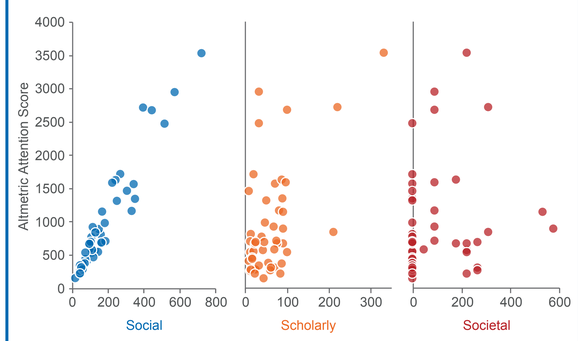


Table 1. Interventional studies tend to have higher Societal impact

Rank	Social Top 10		Scholarly Top 10		Societal Top 10	
1	2017	Health effects of overweight and obesity in 195 countries over 25 years	2017	Health effects of overweight and obesity in 195 countries over 25 years	2016	Cholesterol lowering in intermediate-risk persons without cardiovascular disease
2	2019	Pulmonary illness related to e-cigarette use in Illinois and Wisconsin – preliminary report	2016	10-year outcomes after monitoring surgery or radiotherapy for localized prostate cancer	2016	Blood-pressure lowering in intermediate-risk persons without cardiovascular disease
3	2018	Effect of aspirin on disability-free survival in the healthy elderly	2017	Osimertinib or platinum–pemetrexed in EGFR T790M–positive lung cancer	2016	10-year outcomes after monitoring surgery or radiotherapy for localized prostate cancer
4	2018	Adjuvant chemotherapy guided by a 21-gene expression assay in breast cancer	2018	Adjuvant chemotherapy guided by a 21-gene expression assay in breast cancer	2017	Osimertinib or platinum–pemetrexed in EGFR T790M–positive lung cancer
5	2016	10-year outcomes after monitoring surgery or radiotherapy for localized prostate cancer	2016	Patient-reported outcomes after monitoring surgery or radiotherapy for prostate cancer	2016	Long-term results of stenting versus endarterectomy for carotid-artery stenosis
6	2019	Canagliflozin and renal outcomes in type 2 diabetes and nephropathy	2016	Incidence of dementia over three decades in the Framingham Heart Study	2016	Randomized trial of stent versus surgery for asymptomatic carotid stenosis
7	2017	Air pollution and mortality in the Medicare population	2016	Cholesterol lowering in intermediate-risk persons without cardiovascular disease	2016	Blood-pressure and cholesterol lowering in persons without cardiovascular disease
8	2018	Adjunctive glucocorticoid therapy in patients with septic shock	2018	Alirocumab and cardiovascular outcomes after acute coronary syndrome	2017	Health effects of overweight and obesity in 195 countries over 25 years
9	2019	Large-scale assessment of a smartwatch to identify atrial fibrillation	2016	Blood-pressure lowering in intermediate-risk persons without cardiovascular disease	2016	Patient-reported outcomes after monitoring surgery or radiotherapy for prostate cancer
10	2018	AR101 oral immunotherapy for peanut allergy	2019	Canagliflozin and renal outcomes in type 2 diabetes and nephropathy	2018	Alirocumab and cardiovascular outcomes after acute coronary syndrome

In the top 10 of all categories
In the top 10 for Social Value only
In the top 10 for Societal Value only

Figure 4. Societal and Scholarly impact was different from the Altmetric Attention Score



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5. Pal A *et al.* Poster #5 presented at the European Meeting of the International Society for Medical Publication Professionals (ISMPP), January 21–22, 2020, London, UK.

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