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# Definition of Health 2.0 and Medicine 2.0: A Systematic Review

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## ABSTRACT

**Background:** During the last decade, the Internet has become increasingly popular and is now an important part of our daily life. When new "Web 2.0" technologies are used in health care, the terms "Health 2.0" or "Medicine 2.0" may be used.

**Objective:** The objective was to identify unique definitions of Health 2.0/Medicine 2.0 and recurrent topics within the definitions.

**Methods:** A systematic literature review of electronic databases (PubMed, Scopus, CINAHL) and gray literature on the Internet using the search engines Google, Bing, and Yahoo was performed to find unique definitions of Health 2.0/Medicine 2.0. We assessed all literature, extracted unique definitions, and selected recurrent topics by using the constant comparison method.

**Results:** We found a total of 1937 articles, 533 in scientific databases and 1404 in the gray literature. We selected 46 unique definitions for further analysis and identified 7 main topics.

**Conclusions:** Health 2.0/Medicine 2.0 are still developing areas. Many articles concerning this subject were found, primarily on the Internet. However, there is still no general consensus regarding the definition of Health 2.0/Medicine 2.0. We hope that this study will contribute to building the concept of Health 2.0/Medicine 2.0 and facilitate discussion and further research.

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## KEYWORDS

Health 2.0; Medicine 2.0; eHealth; Patient Empowerment; Professional Empowerment; Web 2.0; telemedicine

## Introduction

During the last decade, the Internet has become increasingly popular and now forms an important part of our daily life [1]. In the Netherlands, the Internet is even more popular than traditional media like television, radio, and newspapers [2]. Furthermore, the impact of the Internet and other technological developments on health care is expected to increase [3,4]. Patients are using search engines like Google and Bing to find health related information. In Google, five percent of all searches are health related [5]. Patients can express their feelings on weblogs and online forums [3], and patients and professionals can use the Internet to improve communication and the sharing of information on websites such as Curetogether [6] and the Dutch website, Artsennet [7] for medical professionals. The use of Internet or Web technology in health care is called eHealth [1,8].

In 2004 the term "Web 2.0" was introduced. O'Reilly defined Web 2.0 as "a set of economic, social, and technology trends that collectively form the basis for the next generation of the Internet, a more mature, distinctive medium characterized by user participation, openness, and network effects" [9]. Although there are different definitions, most have several aspects in common. Hansen defined Web 2.0 as "a term which refers to improved communication and collaboration between people via social networking" [10]. According to both definitions, the main difference between Web 1.0 (the first generation of the Internet) and Web 2.0 is interaction [11]. Web 1.0 was mostly unidirectional, whereas Web 2.0 allows the user to add information or content to the Web, thus creating interaction. This is why the amount of "user-generated content" has increased enormously [12]. Practical examples of user-generated content are online communities where users can participate and share content. Examples are YouTube, Flickr, Facebook, and microblogging such as Twitter. Twitter, for example, improves communication and the sharing of information among health care professionals [13].

According to some critics, Web 2.0 is not a new generation of the Internet because it is still based on old technologies such as HTML, the predominant markup language. Therefore, the term Web 2.0 simply describes renewal or evolution of these older technologies or of the Internet itself [14,15]. Nonetheless, the term Web 2.0 seems to be widely used and accepted. The search engine Google recently found over 85,000,000 results for the search string "Web 2.0 or Web2.0."

When Web 2.0 technologies are applied in health care, the term Health 2.0 may be used. [16,17]. Other authors use the term Medicine 2.0, which combines medicine and Web 2.0 [18]. There are many examples of Health 2.0/Medicine 2.0, such as the websites Patientslikeme [19] and Hello Health [20]. Recently, the Dutch minister of health awarded a grant to the website MijnZorgNet, which offers 23 virtual networks in which patients and their caregivers communicate. The networks are organized around specific patient categories. Successful examples that preceded the project are a digital in vitro fertilization (IVF) outpatient clinic [21,22] for couples receiving IVF treatment, and the website Parkinson Net [23] for people suffering from Parkinson's disease. Both initiatives were started to enhance collaborative health care. Expected beneficial aspects of these projects were improved quality and efficiency of care [24]. Another concept that appears in the Health 2.0/Medicine 2.0 literature is "patient empowerment 2.0." This has been described as "the active participation of the citizen in his or her health and care pathway with the use of information and communication technologies" [25]. It is assumed that Health 2.0/Medicine 2.0 leads to empowerment of the patient, as patients have easier access to health-related information and thereby have better understanding of choices that can be made.

According to Hughes [16], no relevant differences exist between Health 2.0 and Medicine 2.0. Eysenbach [18] agreed but stated, "If anything, Medicine 2.0 is the broader concept and umbrella term which includes consumer-directed 'medicine' or Health 2.0." More and also more specific definitions of Health 2.0 and Medicine 2.0 exist [16,17]. However, these definitions seem to have evolved together with the increased use of the definitions and the different parties involved in Health 2.0 and Medicine 2.0. Ricciardi stated, "Everyone is trying to grasp what Health 2.0 exactly is" [26]. Does Health 2.0 refer to patients or to professionals or both? Does it focus on health care in general, or does it address specific aspects of health care like preventive or curative care, acute or chronic illness? Several authors concluded that there is no authoritative definition of the term yet, and Health 2.0 definitions and translations in practice remain murky and fragmented [27,28].

A clear definition is important for the development of new Health 2.0 or Medicine 2.0 initiatives and also for the comparability of new developments in research. Therefore, the aim of this study was to identify definitions of Health 2.0/Medicine 2.0 and to gain insight into recurrent topics associated with these labels.

## Methods

We performed a systematic literature study to find unique definitions of Health 2.0/Medicine 2.0 and identify and recurrent topics discussed in conjunction with these terms.

### Search Strategy

First, we searched the following electronic databases: PubMed, Scopus, and CINAHL. For each database, we searched all available years through September 2009. Since there was no relevant MeSH term available for Health 2.0 or Medicine 2.0, we used the following search terms: health 2.0, health2.0, health20, medicine 2.0, medicine2.0, medicine20, Web 2.0, Web2.0, Web20 ([Table 1](#)). We scanned the reference lists for relevant articles (the snowball method), contacted individual experts in the field, and inquired after relevant publications.

Second, we searched for gray literature on the Internet using the search engines Google, Bing, Yahoo, Mednar, and Scopus. Mednar and Scopus were used because they focus on scientific literature. Google, Bing, and Yahoo were used because these are the most widely used search engines [[29,30](#)]. We used the advanced search option, selected English as the preferred language, and turned the option for regional differences off. Based on earlier research [[16](#)], we expected a large number of results. Therefore we added a more specified search string query for Google, Yahoo, Bing, and Scopus ([Table 2](#)): "what is health 2.0," "what is health2.0," and "what is health20." For Medicine 2.0 we used: "what is medicine 2.0," "what is medicine20," and "what is medicine20." We studied the first 100 results in Google, Bing, and Yahoo as these search engines display results by relevance using a link analysis system or algorithms [[31-33](#)]. All searches in the gray literature were performed in November 2009.

## **Inclusion Criteria**

Subsequently, a combination of three of the authors (TB and LE and LS or SB) independently assessed the retrieved studies and gray literature for inclusion. Sources were included if a definition of Health 2.0 or Medicine 2.0 was identified. Disagreement over inclusion between the reviewers was resolved through discussion.

## **Data Extraction**

TH and LE independently assessed the included studies and gray literature and extracted unique definitions. A predesigned table was used to ensure standardized data extraction. For each definition we noted author, source, and year ([Table 3](#)). After completing the table, we used the constant comparison method to explore possible topics of Health 2.0 and Medicine 2.0 [[34](#)]. We independently analyzed the definitions and identified recurrent topics by using "coding." Described by Strauss and Corbin, coding is an analytical process through which concepts are identified and dimensions are discovered in data [[35](#)]. The results are displayed in [Table 4](#).



The second main topic that appeared in 32 definitions from 30 articles was "Web 2.0" or "technology." Terms varied from "Web 2.0" [3,15,17,36,43,44,46,52,55,57,58,60,62,67,70], to "Web 2.0 technology" [18,27,40,41,50,66,68], "technology" [25,39,62-64], "software" [42,51], "Web (based) tools" [69,71], and "ICT (information and communication technology)" [37]. Web 2.0 was seen as the total of available technologies that stakeholders could use for communication and for sharing information. One definition mentioned "mashing" of Web 2.0 concepts and tools [43]. "Mashing" was seen as combining two or more Web 2.0 sources to create a new one. Other definitions indicated that the concept of Health 2.0 originated from a combination of the concepts "health" and "Web 2.0" [17,40].

## **Professionals**

The third topic that was identified concerns "professionals" or "caregivers," and was found in 26 definitions. Of the 46 included definitions, five mentioned increased participation or empowerment of professionals. The following terms were found: "professional empowerment" [49,52,59], "empowerment of the individual" [48], and "empowerment of the user" [3].

Besides patients and professionals, other stakeholders were mentioned. However, they were mentioned less frequently and therefore not included in [Table 4](#) as individual topics. The following stakeholders were mentioned: payers or providers [36,44,52,61], medical and health science students [27,52], biomedical researchers [18,44,49,50,52,71], entrepreneurs [62,65], and government [44]. Other authors were less specific with regard to stakeholders. They included "all stakeholders" [38] or "others" [43,51,57,66].

## **Social Networking**

The fourth topic, the emergence of online communities and social networking, was reflected in 22 definitions. This was described using different terminology. Definitions referred to "online communities" [42,47,48,51,52,58,66], "social communities" [44], "networks" [71], whereas others referred to "online social networks" or "social networking" [18,26,36,43,50,59], "social interaction" [36], "interactive environments" [58], or "intelligent interaction" [63]. Other definitions focused more on technology: the terms used were "social media tools" [60], "social media," or "social software" [38,46,56,59,69].

Two authors mentioned "transparency" or "openness" [18,49]. An additional 2 definitions suggested that "sharing" or "online sharing" of medical information was part of Health 2.0 or Medicine 2.0 [45,65].

## **Change of Health Care**

Fifth, we found that change of health care was described by 15 definitions. According to the definitions, Health 2.0 means change of health care: “a whole new way of involving consumers in the health care system” [64], “next generation of health care services” [67], “new and better health system” [18], “new concept of health care” [52], “all constituent focus on health care value and on improving safety, efficiency and quality of health care” [61], “shaping health care with Web 2.0 tools” [17], and “new wave of innovation” [62]. Change was described differently: “reshaping health care” [17,42], “ever changing” [66], “continually evolving cycle” [49], “evolution of technology and medical industry” [36], “evolution of health care” [41]. Change was also described as “revolutionary” [55], while another author stated, “we should be careful not to assume that a revolution has occurred in health care” [27].

We also found one author who referred to “user generated health care” [25].

### Collaboration

The sixth topic, mentioned in 14 definitions, was collaboration. In the Health 2.0 era, patients will actively contribute to their own care process. Collaboration between professionals and patients may improve. Terms varied from “collaboration” [18,36,43,49,51,59,66,69], “collaboratively” [27], “collaborate” [52,71], “collaborative practices” [16], and “collaborate and share knowledge” [70] to “working together” [39].

There were also other aspects described with regard to the relationship among stakeholders. Patients would transform their role in health care [26] and would be on the same level of playing field as other stakeholders [38]. A role change of patients and professionals was also indicated. For example, the following phrase was used: “doctor and patient positioned together” [37]. Patients were described as “active contributors” [55], “active and responsible partners” [25], or “active partners” [42]. Another author mentioned “integration of patients and stakeholders” [45].

### Health Information or Content

Seventh and last, there was mention of health information or content in 14 definitions. Terms varied from “information,” “health information,” or “medical information” [27,36,37,42,45,48,53,63,65] to “content” [47], “data” [26,44,71], and “user owned content” [58].



**Table 3. Definitions of Health 2.0 and Medicine 2.0**

[\[view this\]](#)



[table\]](#)



Topic	Frequency
Web 2.0/technology	33
patients	28
professionals	25
social networking	18
health information/content	15
collaboration	12
change of health care	10

[\[view this table\]](#)

**Table 4.** Recurrent topics of Health 2.0 and Medicine 2.0

## Discussion

This literature search resulted in 46 unique definitions in 44 articles of Health 2.0/Medicine 2.0 in scientific databases and gray literature on the Internet. We distinguished seven recurrent topics: Web 2.0/technology, patients, professionals, social networking, health information/content, collaboration, and change of health care.

This study showed that the use of the terminology differed among the definitions mentioned in literature. The term Health 2.0 was included in 42 definitions, 10 definitions mentioned Medicine 2.0, and 6 definitions described Health 2.0 and Medicine 2.0 as equal. There were 36 definitions that only mentioned the term Health 2.0, and only 4 definitions that described Medicine 2.0. Although some authors indicated that little or no differences existed between the two terms [16,18,27,55], others saw differences, for example that Medicine 2.0 is focused on the relation between professionals and patients whereas Health 2.0 is focused on health care in general [17,52,65]. As most definitions described Health 2.0, this term may be more widely used and accepted than Medicine 2.0.

Overall, we found that the term Web 2.0 was mentioned often: 33 authors used the term directly in the definition, which suggests that they accepted this concept. However, others state that Web 2.0 does not exist at all [72]. Authors' interpretations of the meaning of Web 2.0 influenced their definitions of Health 2.0/Medicine 2.0 profoundly. We generally distinguished two meanings of Web 2.0. The first meaning is that Web 2.0 is a set or "mashing" (ie, a combination) of technological developments [51,58]. The second meaning is that Web 2.0 is a new generation of the Internet where interaction is important, with more user-generated content that empowers people. In this interpretation, technology, or the mashing of different technologies, is only a tool, and Web 2.0 is more than technology. These meanings result in different definitions of Health 2.0/Medicine 2.0. A number of definitions referred to the technological developments embedded in health care, whereas other definitions stated that Health 2.0/Medicine 2.0 is a new generation of health care. We believe Web 2.0 is a facilitator for Health 2.0/Medicine 2.0, but not a necessity. Indeed,

patients can still access health related information without Web 2.0; for example, a patient can go to a library and become well-informed without Web 2.0 technology. However, this would be far more difficult than becoming well-informed through the use of Web 2.0 technology. Second, the topic of stakeholders reflects who the main players are in the field of Health 2.0/Medicine 2.0. The two main stakeholders we distinguished were patients or consumers, mentioned in 35 definitions, and professionals or caregivers, mentioned in 26 definitions. Interestingly, other stakeholders such as payers of health care, scientists, students, and entrepreneurs were mentioned less frequently, whereas the government was only mentioned once. This is particularly interesting as the government has great influence on health care and changes in health care. Apparently the government is not yet an active party in the development of Health 2.0/Medicine 2.0.

Also interesting was that most definitions focused on the relation between patients and professionals. With Health 2.0/Medicine 2.0, patients and professionals were seen to collaborate, with patients transforming their role in health care using social networks and access to health information. Moreover, other relationships might also change; for example, the appearance of online communities could change the relationship between health professionals and specific groups of patients. This has been termed collaborative health care [18].

Finally, it is expected that Health 2.0/Medicine 2.0 will lead to change of health care. Expectations concerning the speed of this change ranged from a "gradual shift" [27], an "ever changing" [66] or "continuous interactive process" [49] to "revolution" [55]. However, we advise caution in assuming that a revolution has taken place [27]. It may be that communication, information exchange, and patients' contribution to his or her care has improved or accelerated, but according to Engelen [8], no fundamental changes in health care have yet occurred.

Authors of a Health 2.0/Medicine 2.0 definition generally seemed to approach the definition from their own perspective. For example, patients or patient federations saw patients as the main stakeholder and focused on empowerment of the patient. That is, definitions may be influenced by different stakeholders' agendas. Therefore, it is important for future Health 2.0/Medicine 2.0 researchers to incorporate all stakeholders and thereby include all possible views and perspectives.

## **Limitations**

Our study has some limitations. First, we found 46 unique definitions, mostly in the gray literature, using the Internet. Only 9 definitions were found in peer-reviewed articles in the scientific literature. This can be explained by the fact that Health 2.0/Medicine 2.0 is a relatively new concept and is still developing. However, it is important to realize there is no evidence-based method available to determine the quality of online content yet. Consequently, proper assessment of the value of the definitions we found was not possible.

Second, it appeared that searches using Google, Bing, and Yahoo showed many results. Although these search engines displayed results by relevance using algorithms and ranking systems, we may have missed unique definitions as we only studied the first 100 results.

Finally, the exact way search engines display results remains unclear. The process can be seen as a black box. As a result, reproduction of searches is far from optimal, as the results literally change every second. Therefore, one might question the suitability of these search engines for scientific research. However, by combining the results of Google, Bing, and Yahoo and using four search queries, we believe we found the majority of all relevant definitions in the gray literature.

## Conclusion

Health 2.0/Medicine 2.0 is still a developing concept. Our study identified 46 unique definitions of Health 2.0 and Medicine 2.0 with seven recurrent topics: Web 2.0/technology, patients, professionals, social networking, health information/content, collaboration, and change of health care. There is no general consensus of the definition of Health 2.0/Medicine 2.0 yet. We hope that this study will contribute to building the concept of Health 2.0/Medicine 2.0 and facilitate future discussion and research to achieve a clear conceptual framework.

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## Conflicts of Interest

None declared




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## Abbreviations

**ICT:** information and communication technology

**IVF:** in vitro fertilization

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