Malta Journal of Health Sciences
https://www.um.edu.mt/healthsciences/mjhs/
DOI: 10.14614/HEALTHCOMM/7/16

Commentary

IMPROVING SCIENCE AND HEALTH COMMUNICATION FOR THE MALTESE ISLANDS

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Abstract. Society faces many challenges worldwide. Decades of science popularisation or health campaigns have not managed to significantly increase science literacy or produce enough Science, Technology, Engineering and Mathematics (STEM) graduates with the right skills; ineffective alternative medicines are now a multi-billion dollar industry while unhealthy diets coupled with a sedentary lifestyle are leading to an increase in obesity, diabetes, cancer and other problems. This commentary gives a generic overview of science and health communication, outlining some of the latest ideas designed to introduce the concepts of dialogue, public engagement, and responsible research and innovation into these fields for more effective approaches. It also suggests that communication campaigns need to be evaluated to assess their effectiveness, and discusses how research funding applications can be improved by involving communication practitioners. In addition, it recommends that Malta needs to create a coordinated public engagement strategy to maximise resources.

Keywords: science communication, health communication, responsible research and innovation, public engagement

1 Introduction: Defining Science and Health Communication

Identifying when science communication started is difficult. The printing press was invented in 1456, launching mass communication, while in 1860, Thomas Henry Huxley gave his famous speech to the Bishop of Oxford, Samuel Wilberforce, defending the theory of evolution (Illingworth, 2015). However, to the author's knowledge, the first mention of 'science communication' in a scientific journal was by Marx in 1965 in *Science*. As used then, the term seems muddled between communication amongst scientists and the so-called "popular dissemination of science" (Marx, 1965, p. 950). Definitions have plagued the field of science communication for decades, with an attempt to restore order through Burns, O'Connor and Stocklmayer's (2003) AEIOU vowel analogy incorporating Awareness, Enjoyment, Interest, Opinion-forming and Understanding into the field. This definition has now been superseded by the concepts of public engagement and dialogue (Faulkner, 2011) and that of Responsible Research and Innovation (RRI) fronted by the European Union (EU), which sees researchers engaging with different stakeholders and involving them throughout the entire research process (New Understanding of Communication, Learning and Engagement in Universities and Scientific Institutions (NUCLEUS) Project, 2016).

How the definitions of science communication have evolved reflects the problems society faces. Worldwide, science literacy has not increased significantly, despite decades of science popularisation (Miller, 1983; Liu, 2009). The number of people still believing in creationism or homeopathy is alarming (Frass et al., 2012; Huskinson et al., 2016; Moore, 2000). Additionally, Europe and countries worldwide are still not producing enough Science, Technology, Engineering and Mathematics (STEM) graduates with the right skills (Caprile et al., 2015). In Malta, the Trends in International Mathematics and Science Study (TIMSS 2011) placed Malta 40th among 50 countries (Ministry for Education and Employment, 2013), while a recent report commissioned by the Malta Council for Science and Technology showed that over half of the Maltese public is disinterested in science (Malta Council for Science & Technology, 2015). This trend was particularly evidenced among individuals who had retired, those who were unemployed, responsible for home duties and/or had a secondary level of education or lower.

The deficit model in science communication has not worked (Miller, 2001). The model paints so-called non-scientists as being empty vessels that need to be filled by the scientific knowledge of researchers and other experts (Miller, 1983). These issues are reflected in health literacy and health communication but with more serious consequences, given that health is life. The earliest scientific reference to health communication appears to have been that by Seidenfeld in 1959, outlining how mass media could be used in health communication. Health communication has been defined

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Received: 10.11.16; Revised: 30.11.16; Accepted: 04.12.16;
Published: 16.12.16
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by the United States Department of Health and Human Services (2000) as the "art and technique of informing, influencing, and motivating individual, institutional, and public audiences about important health issues" (p. 20), with the aim of preventing disease, promoting health, influencing policy and enhancing the quality of life. More recent ideas see renewed hope in surmounting the shortcomings of the deficit model, which sees communication as a one-way model of experts talking to citizens. Multidisciplinary techniques are being encouraged, particularly by combining health communication theory and practice for effective communication processes to change human behaviour (Rimal & Lapinski, 2009). As with science communication, the field is conducting more formative evaluation to see if health communication campaigns actually achieve their goals. Additionally, it has also moved away from the deficit model towards more inclusive models, in particular those that see the social community as a vital component (Parrott, 2004; Rimal & Lapinski, 2009).

The concepts of dialogue and RRI do not seem to have fully infiltrated health communication. Updating definitions of health communication with these concepts is a key opportunity. As part of the EU project NUCLEUS, the author has met several health researchers and fund managers who are already practising some tenets of RRI, notwithstanding the fact that they are not aware of the terminology, in order to have more effective research and community engagement. The aim of this paper is to give a generic overview of science and health communication and outline their relevance for both researchers and civil society, in particular for more effective engagement and research funding applications. It will then offer recommendations to incorporate the concepts of public engagement, dialogue and RRI within research practice and communication campaigns in the Maltese Islands.

2 Health Communication for Better Health

Predicting health behaviour from communication campaigns is highly challenging. Studies need to be conducted for an understanding of the needs of the different audiences within society, so that health campaigns can be tailored accordingly. Belief systems, religious and cultural values, life experiences and group identity are all important considerations that affect how individuals uptake information (Thomas, Fine & Ibrahim, 2004). Health campaigns need to be coupled with formative evaluation to assess their effectiveness, and should involve a multidisciplinary team that can include communication specialists, behavioural scientists, statisticians, health practitioners and public health specialists (Parrott, 2004). Many communication interventions are difficult to randomise, with many challenges for such campaigns, hence the need for a variety of messages developed using a multidisciplinary approach (Rimal & Lapinski, 2009). While demanding, this approach is essential due to the importance of the challenges.

The Maltese Islands, like the rest of the world, are facing many health epidemics, such as obesity, dementia, diabetes and cancer, coupled with longer lifespans, high-calorie diets and a sedentary lifestyle (Commonwealth Health Online, 2016). Misinformation is rife due to the strong financial and emotional campaigns of disproven alternative medicines, such as homeopathy and many Chinese medicines (Australian Government Department of Health, 2015; Ernst, 2002a, b; Ernst, 2006; Hunt et al., 2010; Tang, Zhan & Ernst, 1999, Vogler, Pittler & Ernst, 1999). In addition, health communication is essential in making known the genetic susceptibility to diseases such as cancer and heart attacks, addressing fears on designer babies, genetically modified organisms (GMOs) and new technology like robot-guided surgery, while also providing the right advice to reduce public health issues such as sexual health infections, antibiotic resistance and the abuse of prescription medicines (Buhagiar, 2015; Schwartz & Woloshin, 2013). Health communication can also address misconceptions such as the incorrect link between autism and vaccination (Godlee, Smith & Marcovitch, 2011). Incorporating the concepts of public engagement, dialogue and RRI will result in better research and more effective health campaigns that address cultural sensitivities.

3 Health Communication and the Perception of Risk

The fields of science and health communication are characterised by the use of jargon related to abstract scientific phenomena as well as precise medical terms. The use of jargon by experts results in unnecessary second guessing by citizens (Fischhoff, 2013). Using excessive amounts of scientific terminology can result in more misunderstandings. The opposite is true as well: an absence of scientific content results in no effective communication.

Behavioural science has shown the unreliable nature of intuition. People can exaggerate how widely their own beliefs are shared. This belief, known as the common knowledge effect, is closely linked to the false consensus effect, which involves many people accepting incorrect facts because others hold them (Nickerson, 1999). These compounding factors led to people only partially evacuating the World Trade Centre during 9/11 (Wessely, 2005). In addition, there is the concept of confirmation bias which is observed when new evidence, no matter what it is, is taken as confirmation of one's pre-existing beliefs. This phenomenon is starkly seen in both politics and climate change denial (Whitmarsh, 2011). Intuition cannot be trusted with public health messages. Communicators need to work with cognitive scientists and other research disciplines to evaluate campaigns and assess their impact to establish if messages are working as desired.

Risk communication is very important in health communication (Rimal & Lapinski, 2009). Communication campaigns need to regularly and clearly convey health risks, be they cancer risks due to lifestyle and food items, or sexual health risks over a prolonged period of time. Human Immunodeficiency Virus (HIV) transmission rates,

for example, are only between 0.060% and 0.015% per sexual encounter, depending on the type of unprotected sex, but with repeated exposure the cumulative risk is almost a certainty (Varghese et al., 2002). Whatever the method of communication (or public engagement), the message needs to be simplified and clarified. Numbers may be replaced with simpler phrases (Budescu, Broomell & Por, 2009; Politi, Han & Col, 2007). A method preferred by the author is the use of natural frequencies. In 2005, several tabloids in the United Kingdom (UK) reported "British research revealed that patients taking ibuprofen to treat arthritis face a 24% increased risk of suffering a heart attack". The headlines caused a stir, selling papers. Natural frequencies use numbers instead of probabilities. In this case, the natural frequency was one extra heart attack in 1,005 individuals on ibuprofen - definitely not a cause for alarm (Goldacre, 2005). Use of natural frequencies by experts would deliver a clearer message and build trust with citizens. Sensationalist headlines about food items causing or protecting against cancer have resulted in disillusionment in society about nutritional guidelines, a greater push for alternative medicines and fad diets, together with a spread of misinformation.

The above often assumes that individuals respond to risk information, or any information, 'rationally'. In the rational actor model, experts are there to identify the risk, be it related to the Measles, Mumps and Rubella (MMR) vaccine or sexual health, and convey it based on scientific evidence. Knowledge should be made available. If people have unprotected sex or avoid vaccinating their children, the expert needs to communicate the risks more vigorously. However, history has shown that the approach does not work. The issue is that these messages can be countered by high profile individuals or groups that are more media savvy and strike a key emotional resonance (Reilly, 1999). Citizens do actively seek out information, but can also consciously avoid it if it does not agree with their worldview. The social context in which the information is experienced also reflects the citizen's response. Additionally, trust of the source and their own personal needs are key. The 'rational' model typically does not take these into consideration, meaning that there is little evidence that such a type of communication results in the desired behavioural change that society, health-policy makers and public health experts want (Alaszewski, 2005).

Science communication faces a similar problem, whereby 'rational' models do not apply. There are many studies that show that the deficit or 'rational' model do not work in risk or science communication, be it about the health risk of GMOs to teenage pregnancy or risk of coronary heart disease in women (Coleman, 2002; Ruston & Clayton, 2002). Patients and citizens from various sectors of the public take an active role in seeking information, and not necessarily just from vetted experts, but friends, family and various online sources. Communication is a two-way process and needs to incorporate the concerns of patients. This requires time and compassion that can be difficult in stressful public health scenarios. The concept of dialogue to support a framework of public engagement and RRI is critical to more effective research and communication campaigns.

There is some good news. Citizens want to hear about science and health from experts, not journalists or politicians. There is still public trust in experts, according to the Wellcome Trust Monitor (Huskinson et al., 2016). Individuals in the UK showed the following trust ratings: doctors or nurses - 64%; university scientists - 59%; journalists - 3%. A similar trend is seen in science communication (Castell et al., 2014), with individual scientists trusted much more than politicians, journalists or even funding institutions. Citizens want university scientists and professionals to speak up, rather than industry, journalists or government officials. Professionals and researchers should communicate the messages themselves.

Health communication has an added layer of complexity as people can trust or mistrust a profession due to personal experiences. However, individual trust is vital as well. Individuals give particular credibility to sources that they know, which may include family and friends but also medical advisers. Being a doctor is not good enough; the person must be a doctor whom the individual knows and trusts (Frewer & Miles, 2003).

4 Conclusion: The Role of Health Communication in Responsible Research and Innovation (RRI) and in Winning Funding

Personal observations derived through participation in the NUCLEUS project suggest that health practitioners in the United Kingdom are already consulting the public on research, although the extent and depth to which this may be taking place is unclear. The UK National Institute for Health Research expects applicants to show evidence of public consultation in funding applications to ensure impact, which ties in with the concept of involving society to inform research questions from the very start (National Institute for Health Research, UK, 2016). This approach is shared with Horizon 2020's RRI push. RRI is also meant to engage society to inform research questions, although for the EU it also means upholding the pillars of public engagement, open access, gender, ethics and science education (European Commission, 2016). Not all communicators agree with these pillars, fearing they might just become a box-ticking exercise rather than real engagement with the public.

The good news is that the EU is pushing more funding into scientific research in relation to society, including both science and health communication. In addition, every research project is expected to disseminate its research findings. An opportunity presents itself to include professional science communicators when applying for funds (not just to disseminate results). Although not scientifically quantified, the approach of having funding application sections dedicated to public engagement and RRI would show that the project is serious about communication from its outset, therefore enhancing application success. Engagement should not be performed just at the end of a project.

In Malta we need more public engagement in science and health communication to address both socio-economic development and public health campaigns (Malta Chamber of Scientists, 2016). For this to happen, more researchers and health practitioners need to engage the public with their work. The University of Malta (UoM) could either set up some form of institute, centre or unit as a one-stop shop to empower researchers and evaluate their needs, or adopt a decentralised approach that sees communication specialists in every academic structure at UoM, or adopt a mix of both. The specialists would need to work with many other disciplines while also having a structure that combines communication theory and practice. The communication campaigns they create would need to be evaluated, ideally independently, to assess their effectiveness. Such a process would help incorporate public engagement and RRI as a pillar of Malta's higher education institution.

The Maltese Islands' small size is an opportunity for rapid and effective communication campaigns. A coordinated public engagement strategy that includes all stakeholders is feasible. Such a nationwide strategy would be very efficient in changing health behaviours in Malta, thus helping to mitigate the rising problems of diabetes and obesity, among others, that the country faces. A small competitive public engagement fund specific to Malta or, even better, tapping of EU funding, could also go a long way. A sustained public engagement effort, that addresses many different parts of society and their individual needs, could help attract more research funds to Malta while improving public health and the quality of life.

5 Funding

This research has received no specific grant from any funding agency in the public, commercial or non-profit sectors. The mentioned NUCLEUS project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 664932. The project is coordinated by Rhine-Waal University, Germany (Project Lead: Prof. Alexander Gerber).

6 Conflicts of Interest

The author reports no conflicts of interest.

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