

Risk communication by health professionals: an analysis of press releases drafted by Italian veterinarians

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Continuing education,
Educational methods,
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Public health,
Risk communication.

Summary

The aim of this study is to analyse and evaluate the knowledge concerning risk communication acquired by veterinarians during a national training course. The study analyses 694 press releases written during the training course. Textual variables and indexes were considered to identify the linguistic structures used by veterinarians. At first, the analysis of press releases focused on the descriptive demographic variables, then stylistic and editorial variables were considered, and finally a lexicographic analysis was performed on the textual variables. The texts were found to have a moderate level of readability due to the use of scientific and technical terms. This study shows the need to improve training activities to develop effective risk communication, especially in terms of the language used, in order to facilitate interactions among veterinarians, mass media, and citizens.

La comunicazione del rischio da parte dei veterinari italiani: analisi dei comunicati stampa

Parole chiave

Comunicazione del
rischio,
Educazione continua,
Malattie infettive,
Metodi educativi,
Salute pubblica.

Riassunto

L'obiettivo del presente studio è la valutazione delle conoscenze sulla comunicazione del rischio acquisite da medici veterinari italiani durante un corso di formazione. La valutazione è avvenuta attraverso l'analisi di 694 comunicati stampa redatti dai partecipanti sul tema di un ipotetico focolaio d'influenza aviaria. Variabili e indici testuali sono stati utilizzati per identificare le strutture linguistiche usate. Lo studio dei testi ha riguardato variabili sia stilistiche sia editoriali e l'analisi lessicografica delle variabili testuali. I comunicati stampa analizzati presentano un livello di leggibilità moderato a causa dell'uso di termini scientifici e tecnici. Emerge la necessità di implementare attività di formazione per lo sviluppo di un'efficace comunicazione del rischio, che faciliti l'interazione tra medici veterinari, mass media e cittadini.

Introduction

Public communication of science

Risk communication falls within the broader domain of science communication. Over the last few decades, science communication has increasingly

been targeted at the general public with the aim of providing socially relevant information and addressing practical and widespread issues, including global climate change, risk-benefit assessments of nanotechnologies, and new HIV/AIDS treatments.

The wide diffusion of scientific knowledge in lay

contexts emphasises its *socially accountable* nature (Gibbons *et al.* 1994). Risk communication itself becomes a form of knowledge and information production actively contributing to the construction of socially shared meanings.

However, risk communication is also part of a media-influenced dimension of communication. While the media have the ability to consolidate and accelerate information dissemination, it can also help create an image of science that promotes the development of distorted and fragmented knowledge (Bartlett *et al.* 2002, Gibbons *et al.* 1994).

In general, large-scale risk communication can be considered as a positive attempt to “educate” the general public and raise awareness about an objective problem or risk. Unlike other forms of science communication, its goal is not only to involve the public in science *governance* and *policy* decision-making (Bucchi 2002), but also to reduce society’s potential exposure to risks.

Alongside the development of a model for the public communication of science, the process behind the public’s understanding of communicated scientific content is based on the model of the public understanding of science (Bodmer 1985, Lewenstein 1992).

Although not recent, this model highlights the important role of public stakeholders in encoding and decoding the knowledge that is communicated from scientific experts to the lay man (Lewenstein 2003, Wynne 1995). The existing difficulty in transferring scientific information from experts to lay people requires further consideration by “communicators”, especially scientific institutions that are responsible for risk communication.

The nature and purpose of risk communication can be interpreted in several ways. In general, risk communication consists of explaining the uncertainty of a potentially dangerous situation while trying to establish an individually/socially acceptable threshold for a specific adverse event (Beck 1992, Covello and Allen 1988, Douglas 1992, Fischhoff *et al.* 1993, Gray *et al.* 1998, McComas 2006, Slovic 1987). However, risk communication is also defined as an interactive exchange of information and opinions among experts, public administrations, the mass media, interest groups, and citizens aimed at helping decision making on whether to accept, reduce or avoid the risk (Leiss 1996, Pietrantoni and Prati 2009).

Risk communication in public health

In the last few years, in response to increasingly more frequent environmental and public health emergencies, public bodies and international

organisations have refined risk communication techniques with the goal of raising the general public’s awareness of public health risks. Currently, in the Italian context, the primary objective of health authorities is to limit potential risky behaviours arising from the lack of effective communication.

Over the past 20 years, local health authorities have had to address a series of health and food emergencies of animal origin that eventually triggered epidemic outbreaks. The livestock sector was the one affected most seriously, although infectious diseases were often transmitted from animals to humans (zoonoses), such as the Bovine Spongiform Encephalopathy (BSE) ‘mad cow disease’, West Nile disease, influenza pandemics, food-borne illnesses, haemorrhagic fevers, and others. These diseases were the subject of several studies investigating the role that the media played in disseminating information to the public (Bucchi 2002, Mebane *et al.* 2003, Peters 1995, Roche and Muskavitch 2003).

Unless properly communicated, potential health risks and public health emergencies could generate distorted social perceptions and representations of reality, which in turn can lead to confused behaviour with unforeseeable consequences. As a result, the communication of food safety and animal health risks plays a key role in global public health. Subsequently, specific competencies are required to design effective and proportional communication campaigns aimed at sharing information concerning specific risks with citizens.

In this regard, health agencies and international organisations produced documents and guidelines to ensure the effective communication of messages in health risk and emergency situations, with particular attention focused on their relations with the media (European Commission 2006, Mebane *et al.* 2003, World Health Organization 2005a, World Health Organization 2005b, CDC 2002, Sly 2000). The relevant literature is extensive, especially on nuclear and environmental risks, and many other studies addressed risk strategies in relation to health issues and zoonoses (Bennett and Calman 1999, Covello 2003, Groth 1991, Powell and Leiss 1997, Sandman and Lanard 2003).

The literature on the structural aspects of sentence construction (e.g., morphosyntax, editorial guidelines, several publications on “how to write a good press release”) is also quite vast and has the goal of identifying the linguistic and stylistic structures of press releases. Press releases issued by official sources represent the product of information or communication before it becomes a news story; that is, the “first-hand” information directed at the media before it is processed and adapted for use by the public.

Studies were conducted to describe features specific to press releases (Catenaccio 2008, Lassen 2006, Lindholm 2008) as well as to address other issues on scientific reporting in the media (Bartlett *et al.* 2002, laboli *et al.* 2010, Shuchman and Wilkes 1997) and the relationship between press releases and the media (Brechman *et al.* 2009, Maat 2010, Walters and Walters 1992). However, there are no known publications on risk communication in the veterinary field, in particular with regard to the production of press releases including the documents typically prepared in collaboration with experts and issued by official sources.

The aim of this research was to assess the level of learning achieved by veterinarians on the issue of risk communication through the production of a press release during a training course. Veterinarians were provided with the methodological criteria and conceptual tools needed to prepare and write a clear and effective press release.

Tools for analysis of risk communication

The Gulpease index is used to assess the readability of press releases by calculating word length. Values range from 0 to 100, where "100" denotes the highest level of readability and "0" the lowest level of readability. In general, texts scoring less than 80 are difficult to read for people with a primary education; text with scores less than 60 are difficult to read for people with a lower secondary education, and text with scores less than 40 are difficult to read for people with an upper secondary education. The Gulpease index is based on 3 main lexicons of the Italian language (De Mauro 1980).

The Taltac software performs basic lexicometric analyses based on the data indicating size and lexical richness of a corpus of texts. Automatic text encoding permits to define a vocabulary of graphic forms: a list of recognised lexical forms (word-types) and their occurrences in a text.

Text readability for intended readers can be described as the ease with which a text can be read and understood. Readability indexes are quite easy to calculate and are designed to make information accessible to the public (Elhadad and Sutaria 2007), and can be characterised in terms of coherence or organisation (Halliday and Hasan 1976, Grosz *et al.* 1995) as measures of reading easiness, i.e., the readability prediction.

Vocabulary is a predictor for readability and a simple linguistic factor, although it leads only to rough approximations of readability. Word length or the average number of words alone calculated by readability indexes, such as Gulpease, are not enough to predict readability. Indeed, other features other than the syntactic ones appear to be crucial

for predicting readability, such as the semantic and organisational level of the text. Readability appears to be a multidimensional construct related to relevant information (Gemoets *et al.* 2004, Rosemblat *et al.* 2006). This is why no readability index can be as reliable as the public's judgement on how well a text is written and its comprehensibility.

The Significance Index (SI),

"[...] filters the segments based on their ability to absorb the occurrences of their constituting words. [It also] adds up the part-to-whole ratios of the occurrences of the L words of the segment to the frequency of the segment ($f_{segment}$ is the frequency of the segment and f_i is the frequency of the i-th word in the corpus), weighting the sum by the number P of content words" (Bolasco 2005). During segment selection by the S index, it is possible to extract the longest recurring segments in a given text. In particular, the most interesting segments can be selected using the relative SI index, which is the ratio of the SI index [...] to its maximum value (L^2) and, therefore, varies between 0 and 1" (Giuliano and La Rocca 2008).

The SI indexes work as tools for information retrieval on the basis of the semantic content of the analysed corpus of texts, insofar as the relevant information of the corpus is associated with the specialised vocabulary, which includes 'technical terms'.

Conceptual framework

The role played by veterinarians in the management, evaluation, and communication of risks has become important following public health emergencies of animal origin. Currently, many health threats exist due to emerging infectious diseases, risks associated with food consumption, the spread of pathogens to unusual latitudes, poor health and sanitary conditions in developing countries, increased trade flows, and even climate change. All these factors are investigated and are addressed by global public health authorities, and in particular, by veterinary public health services.

During the avian influenza crisis in 2005-2006, there was a high perception level of public risk because of alarmist media, so people thought it would be safer not to eat poultry. The crisis had considerable economic repercussions for the Italian food sector following the pessimistic reports circulated by the mass media. As a result, Italian consumers appeared more sensitive and concerned than consumers in other European countries about perturbing events on which the media are likely to have a significant impact, even affecting consumers' purchasing attitudes, as in the case of avian influenza (Lobb *et al.* 2006).

This crisis appeared to be different from the other health emergencies, especially food-related ones, which have occurred over the past 15 years (e.g., “mad cow” disease, dioxin in meat, melanin-contaminated milk) for 4 main reasons:

1. *uncertainty* –virulence of the avian influenza virus and pandemic potential were unknown, as the viral infection could have been transmitted from animals to humans (zoonosis) and from one person to another (in the case of H5N1, human to human transmission is limited), such as the airborne transmission of the seasonal influenza. This situation of uncertainty made accurate epidemiological predictions difficult;
2. *extent* –transmission of the avian influenza to humans could have posed a public health threat as it may have spread globally, whereas food-related crises are usually geographically limited;
3. *persistence* – the avian influenza epidemic phase in 2005-2006 was perceived as longer compared to most food-health emergencies; food-related crises are usually solved within a short period of time;
4. *urgency* – given the supposed rapid spread of such a pandemic virus, existing therapeutic and preventive tools (e.g., antivirals, vaccines) would not have been able to ensure an equally rapid and effective response.

In light of the above features, and as a result of the widespread social risk perception associated with avian influenza and the media response to the outbreak, bird flu was, and still is, regarded as an important health and communication issue.

Mass media are playing a key role in influencing the consumers’ perception of risks, and the mechanism by which the information is communicated to consumers will affect their responses, coping mechanisms, and how they react to the situation. Furthermore, today this scenario is getting more complicated as the Internet and social media have expanded communication everywhere. More people can share information globally, and language itself is evolving into new forms. At the same time, the risk of spreading misinformation has also increased. If governments do not set a science-based policy or practice strong risk communication strategies, consumers will be misled by false assumptions about what is safe and what is not safe (Benson 2011).

Health groups felt the need to improve the quality of the communication sources themselves and increase public health veterinarians’ risk communication skills, starting with linguistics.

The present study is designed to assess and evaluate linguistic skills of veterinarians with respect to risk communication and then measure the text readability of the press releases.

Methods

This study provides an analysis and evaluation of linguistic elements of risk communication acquired by veterinarians during the online training course entitled *Management of an avian influenza epidemic* (La gestione di un'emergenza epidemica di influenza aviaria), with reference to the risk communication module. In particular, this article aims to analyse a *corpus* of press releases (n = 694) produced by veterinarians about the risks associated with a hypothetical epidemic outbreak of avian influenza and to determine whether there are any linguistic differences among practitioners.

Sample and training course description

The Department of Veterinary Public Health, Nutrition and Food Safety of the Italian Ministry of Health organised an *e-learning* training course on the management of avian influenza epidemics. The course was held from February to July 2008 (5 editions), and it was targeted at veterinarians employed by the National health system [local health authorities, Regions, Istituti Zooprofilattici Sperimentali (IIZZSS)]. The course was divided into 4 learning online modules, each focused on a specific aspect of the emergency: i) disease description and diagnosis, ii) avian influenza surveillance, iii) outbreak management, iv) risk communication and was attended by 694 veterinarians.

The modules were designed by veterinarians and science communicators of the Istituto Zooprofilattico Sperimentale delle Venezie (IZSve), who provided the content on the basis of verified technical and scientific expertise. The IZSve houses the national/OIE/FAO reference laboratory for avian influenza and Newcastle disease.

As part of their end-of-course test, participants were asked to produce a press release about a suspected outbreak of avian influenza, which:

- would be at least 15-lines long (approximately 200 words);
- could be related to the participants’ respective areas of activity;
- would apply the rule of the 5 Ws: who? what? where? when? why?

A sample press release in which all standard features (fixed elements: headline, date, place, paragraph

division) and the 5 Ws had been highlighted was provided as a guide to all participants.

Other variables were included and considered in the evaluation, such as title, subtitles, bold, technical terms (to be explained), quotations, useful information (crucial for citizens, e.g., toll-free numbers or websites they can call or visit to receive instructions on what to do in case of emergency).

For the purpose of the study, the veterinarians were divided into 2 categories:

- *Official Public Health veterinarians*: they work for Local Health Authorities (Azienda sanitaria locale/ASL), regional Departments for Disease Prevention, the Ministry of Health, Border Inspection Posts (BIP) or Veterinary Offices for Compliance with European Union Obligations (UVAC). These practitioners mainly work in zoonotic disease control and prevention, livestock diseases, and the control of food with an animal origin; their main tasks include official field checks and inspections;
- *Veterinarian scientists*: they work at laboratories (IIZZSS) mainly in biomedical research and diagnostics. They are also employed in the national health system.

Why a press release?

Press releases were selected as a suitable and functional communication tool for the final evaluation, as they appeared to be an adequate outcome (considering both the time and effort required for its preparation) in which the qualitative analysis of the linguistic and stylistic variables could be associated with an evaluation of the expression and communication skills acquired during the course.

Press releases are informative texts, constructed according to specific editorial and stylistic criteria, which are meant to provide all the necessary information about a given event in a complete, clear, and exhaustive manner to ensure that the content is effectively understood by a specific audience. Press releases are typically sent by public or private organisations to the news media with the aim of informing the general public. They can serve institutional or commercial purposes, and their goal is to reach a specific target of users.

Considering that public health operators play a leading role in animal health risk management and communication and that communication is frequently identified as a difficult issue, this outcome proved to be a suitable a communication model in which practitioners are responsible for the content to be conveyed to the citizens and, thus, they act as a link between the public and the media.

Analysis and evaluation

The overall number of press releases was 694 (Word files), and 690 were analysed as 4 were found to be damaged.

At first, the analysis of press releases focused on the descriptive demographic variables of participants, and then stylistic and editorial variables were considered. The presence/absence of a number of dichotomous variables was assessed (5 Ws, titles, subtitles, bold, technical terms, quotations, useful information) by looking for their occurrences in the text of the press releases.

A lexicographic analysis was performed on textual variables through the use of both a lexical Gulpease index and a number of tools from the Taltac software (Automated Lexical and Textual Processing for Content Analysis), including those for automatic and semi-automatic analysis of textual data and the relative SI index.

Press releases were evaluated by analysing the variables reported in Table I.

The Gulpease index and SI index were applied for analysis of textual variables and lexical indexes.

The semantic interpretation of textual variables was performed through the analysis of repeated lexical segments of the corpus, which constitute specific structures of the corpus. Semantically relevant parts were identified by using the SI index, which measures the specificity of the lexical segment relative to the graphic forms that compose it. The SI index is a measure of the overall "absorption rate" of these segments with respect to their individual components forms. When the SI index assumes its maximum value, then the occurrences of the graphic form components are totally "absorbed" by the segment and have no independent life within the *corpus*.

Results

Study participants and geographic locations

Participants were distributed across Italy's 3 main geographical areas: 43.2% North, 21.3% Centre, 33% South & island, 2.5% not identified. Official Public Health veterinarians accounted for a higher percentage of participants in this study (64.8%) compared to veterinarian scientists (35.2%). Most of the participants from the North, the South and the islands were public health veterinarians, while most of the veterinarian scientists resided in the central regions.

Dichotomous variables

The presence/absence of a number of important

Table 1. Variables selected for veterinarians' press release analysis.

| Study participants and geographic locations | 1. Dichotomous variables (yes-no) | 2. Textual variables | 3. Indexes |
|---|-----------------------------------|----------------------|-------------------|
| Categories of veterinarians | Headline | Length (n. of words) | Gulpease index |
| Geographical area | Boldface | Technical terms | Relative IS index |
| | Useful information | Less common words | |
| | 5Ws | Words | |
| | Verbatim quotes | Sentences | |
| | Personal data | Common words | |

variables in the press releases was analysed (Figure 1). As shown in Figure 1, the most frequently occurring variables in the press releases were the 5 Ws (99.7%) and personal data (94.8%), both are important elements in risk communication, because they provide the reader with detailed information about the communicated event.

Verbatim quotes, boldface, and useful information were less frequent despite being important elements, as they help establishing the most important concepts and emphasise the most significant information and provide information that may prove crucial for citizens (e.g., toll-free numbers and websites useful to receive instructions on what to do in case of emergency).

Finally, although the majority of the veterinarians (62.6%) included headlines in their press releases, a significant number of them failed to do so (37.4%). This finding is especially important because press releases should always include headlines to identify important elements of the message. In general, no significant differences were observed between public health veterinarians and veterinarian scientists, but the former appear to pay more attention to the editorial variables than the latter.

A relevant element in risk communication is the inclusion of personal data (farmers' names, etc.) either in a news story or in the press release, as in this case. In particular, in the case of avian influenza, birds reared at poultry farms are the most affected. It is therefore important to balance the freedom of information, the right to know and the right of farms/farmers to be safeguarded (privacy). However, when writing a press release, information should be clear and transparent. Most of the analysed press releases mentioned the name of the affected farm (94.8%), while the rest did not provide this information.

Textual variables and indexes

The evaluation of the textual variables allows the application of an analysis that is more focused on word count and vocabulary in the press releases. The mean length of the analysed press releases

was 238.03 words, which is slightly more than the amount indicated in the instructions received by participants (approximately 200 words). Public health veterinarians used a higher number of words ($n = 241.40$) compared with veterinarian scientists ($n = 231.82$).

Data from the textual analysis of technical scientific terms performed with Taltac showed that despite the moderate readability of the press releases, not all of them were written using scientific language. In general, it is more effective to release clear messages that contain few technical terms to ensure their readability and understanding by the majority of the population or intended audiences.

Data show that press releases written by the veterinarians were quite difficult to read and understand for the lay public (Gulpease index: range of 31.84 to 69.87, mean 42.17). Considering the distribution of press releases, the median is 41.96, which corresponds to a moderate readability or

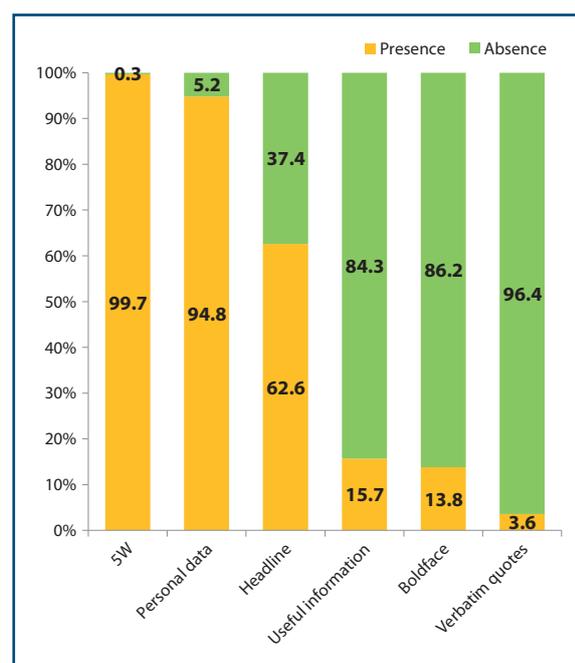


Figure 1. Percentage of presence/absence of each dichotomous variable in the veterinarians' press releases ($n = 690$).

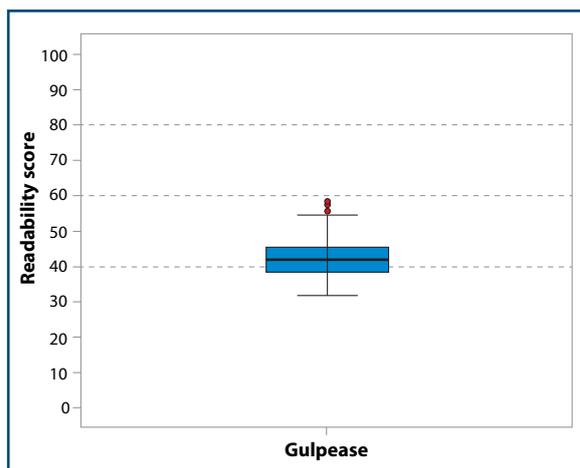


Figure 2. Graphic representation of the median distribution of press releases based on Gulpease index scores (median 41.96; interquartile range 38.5 to 45.32), which show a moderate level of readability of the texts.

press releases that can only be easily read by readers with a higher education (Figure 2).

The data are quite homogeneous, as no geographical differences were observed between the 2 types of veterinarians.

The corpus of analysed texts included 159,271 occurrences ($N = \text{corpus size}$ in terms of word-tokens) and 8,460 graphic forms ($V = \text{vocabulary size}$ in terms of word-types). Taltac was used to calculate the occurrences of all graphic forms, which made it possible to analyse the data and understand how many times each graphic form appeared in the press releases.

The distribution of graphic forms was organised in decreasing values of frequency in order to identify ranges of frequency and ranking of words in the analysed corpus. As shown in Table II, the high-frequency range usually includes words associated with the main topic of the press releases, such as *virus*, *influenza*, *avian*, *institute*, *zooprofilattico*. It also includes 'empty' grammatical words (articles, prepositions, conjunctions) such as *di*, *in*, *e*, *il*. The middle-frequency range includes more general words that are less frequently used in press releases, while the low-frequency range features rare graphic forms with very few occurrences in the analysed texts (Table II).

In the section dedicated to repeated lexical chunks, the SI index was calculated to assess their relevance in the corpus. As a result, this index permit to identify the shortest segments, which constitute the specialised vocabulary and occurred more frequently in the corpus.

As shown in Table III, the highest-ranked segments ordered by relative SI index scores include technical terms, such as *stamping out*, *free range*, *real time*,

Table II. Extract of the ranges of frequency and ranking of the graphic forms in the analysed corpus. Italian corresponding specific terms are in *italic*. Cutoffs between the three ranges are: high (> 1,000 occurrences), middle (100-1,000), low (< 100).

| Graphic form | Occurrences | Rank | Range of frequency | |
|-----------------------------|-------------|------|--------------------|--------|
| of (<i>di</i>) | 9538 | 1 | High | |
| in | 3722 | 2 | | |
| and | 3017 | 3 | | |
| the (<i>il</i>) | 2685 | 4 | | |
| ... | ... | ... | | |
| virus | 1856 | 12 | | |
| is | 1854 | 13 | | |
| influenza | 1717 | 14 | | |
| of the (<i>dell'</i>) | 1704 | 15 | | |
| of the (<i>della</i>) | 1479 | 16 | | |
| avian | 1390 | 17 | | |
| are (<i>sono</i>) | 1304 | 18 | | |
| farm | 1291 | 19 | | |
| ... | ... | ... | | |
| institute | 652 | 39 | | Middle |
| state | 632 | 40 | | |
| zooprofilattico | 615 | 41 | | |
| ... | ... | ... | | |
| service | 562 | 45 | | |
| at the (<i>all'</i>) | 562 | 46 | | |
| outbreak | 519 | 47 | | |
| from the (<i>dal</i>) | 513 | 48 | | |
| centre | 508 | 49 | | |
| have (<i>hanno</i>) | 495 | 50 | | |
| wild | 482 | 51 | Low | |
| reference | 478 | 52 | | |
| national | 454 | 53 | | |
| of the (<i>degli</i>) | 447 | 54 | | |
| in the (<i>nei</i>) | 442 | 55 | | |
| disease | 442 | 56 | | |
| presence | 442 | 57 | | |
| ... | ... | ... | | |
| domestic | 92 | 259 | | |
| anything (<i>nessuno</i>) | 91 | 260 | | |
| consumption | 90 | 261 | | |
| other (<i>altre</i>) | 90 | 262 | | |
| located | 89 | 263 | | |
| exclude | 88 | 264 | | |
| investigation | 88 | 265 | | |
| information | 88 | 266 | | |
| these (<i>questi</i>) | 87 | 267 | | |
| problem | 87 | 268 | | |
| swan | 86 | 269 | | |
| death | 86 | 270 | | |
| identified | 86 | 271 | | |
| ... | ... | ... | | |

task force, followed by more generic terms, such as *private veterinarians*, *avian influenza*, and *istituto zooprofilattico/istituti zooprofilattici*. Particularly interesting are a number of words associated with avian influenza management strategies, such as: *guidelines*, *operational manual*, *current regulations*, *operational protocols*. Some lower-ranked segments, such as *infectious diseases*, *unjustified alarmism*, *great concern*, include words that had been listed in the course among those not to be used in risk communication because they may cause anxiety (Table III), as specified by Sandman (Sandman 2005).

The categorization proposed by Sandman, despite suffering from a certain degree of subjectivity in our view, appears to confirm that the use of “alarmist” words is not appropriate in risk contexts where the goal is to promote rational behaviours that are consistent with the provided information.

Discussion

While showing compliance with the 5 Ws rule, a significant number of press releases did not fully meet the proposed editorial guidelines provided to the veterinarians, as the veterinarians' press releases lacked headlines, words in bold, and verbatim quotes. The presence of these elements in a press release makes the message more easily identifiable by journalists and more readable considering both the nature of the conveyed information (detection of a highly pathogenic avian influenza outbreak) and tight deadlines in the field of communication.

The Gulpease index showed that the texts had a moderate level of readability, suitable for readers with a medium-high level of education (lower or upper secondary school), and therefore would not be fully understood by people with lower levels of education.

In this study, the textual analysis focused on syntactic and lexical aspects, as it was not possible to take into account other parameters that are key to ensuring the effective understanding of the message, such as the proper arrangement and presentation of information, information density, and the number of inferences needed to understand the whole text (Kate et al. 2010, Feng et al. 2010, Pitler and Nenkova 2008). A text could have a high level of readability, but information gaps. At the same time, paradoxically, an excess of poorly-organised information may make the text obscure to most readers.

Regarding the SI index, the most semantically relevant segments (words), which constitute the specialised vocabulary, are in the middle and low ranges of frequencies (Table II). Even for the relative SI index, the ‘technical terms’, which are supposed to have the most informative content, had a generally low frequency (Table III).

Table III. Extract of the table of repeated segments ordered by relative IS index scores.

| Segment ¹ | Total occurrences ² | N. of graphic forms ³ (in Italian) | Relative IS index ⁴ |
|---------------------------------------|--------------------------------|---|--------------------------------|
| guidelines | 4 | 2 | 1.000 |
| stamping out | 4 | 2 | 1.000 |
| free range | 9 | 2 | 1.000 |
| real time | 3 | 2 | 1.000 |
| task force | 5 | 2 | 1.000 |
| istituti zooprofilattici | 13 | 2 | 1.000 |
| private veterinarians | 23 | 2 | 0.979 |
| istituto zooprofilattico | 605 | 2 | 0.956 |
| avian influenza | 1,366 | 2 | 0.889 |
| forestry corps | 34 | 2 | 0.862 |
| low aggressive | 157 | 2 | 0.844 |
| molecular biology | 8 | 2 | 0.833 |
| low pathogenicity | 608 | 2 | 0.822 |
| operational manual | 20 | 2 | 0.801 |
| densely populated | 4 | 2 | 0.800 |
| anas platyrhynchos | 4 | 2 | 0.786 |
| 2005 94 | 19 | 2 | 0.772 |
| veterinary service | 480 | 2 | 0.766 |
| isola rizza | 10 | 2 | 0.763 |
| current regulations | 7 | 2 | 0.756 |
| operational protocols | 4 | 2 | 0.750 |
| torre guaceto | 6 | 2 | 0.750 |
| significant differences | 20 | 2 | 0.747 |
| veterinary services | 236 | 2 | 0.742 |
| livestock heritage | 18 | 2 | 0.737 |
| economic damage | 9 | 2 | 0.737 |
| respiratory system | 3 | 2 | 0.714 |
| zooprofilattico | 269 | 1 | 0.710 |
| layer hens | 122 | 2 | 0.698 |
| wild duck | 45 | 2 | 0.659 |
| epidemiological investigation | 66 | 2 | 0.655 |
| supply chain | 19 | 2 | 0.653 |
| forest rangers | 3 | 2 | 0.650 |
| grey heron | 4 | 2 | 0.643 |
| first instance | 19 | 2 | 0.642 |
| scientific knowledge | 3 | 2 | 0.625 |
| direct contacts | 19 | 2 | 0.608 |
| istituto zooprofilattico sperimentale | 265 | 3 | 0.601 |
| taking into account | 3 | 2 | 0.600 |
| infectious diseases | 4 | 2 | 0.600 |
| unjustified alarmism | 8 | 2 | 0.574 |
| will occur by | 3 | 3 | 0.571 |
| great concern | 5 | 2 | 0.569 |
| full ban | 6 | 2 | 0.568 |
| restrictive measures | 7 | 2 | 0.566 |
| influenza virus | 330 | 2 | 0.563 |
| small size | 3 | 2 | 0.563 |
| alarming news | 3 | 2 | 0.554 |

¹The segments constitute the specialised vocabulary, which more frequently occurred in the corpus. ²Occurrences of the segments in the corpus of the press releases. ³The graphic form corresponds to the number of word type which constitutes each segment. ⁴The Relative IS index is measured to assess the relevance of the segments in the corpus.

Moreover, the analysis with the Taltac software showed how often graphic forms were repeated, thus revealing nature (technical or non technical) of the used language used was technical and the presence in the text of words associated with risk. This helped to identify preferences in linguistic choices in risk communication and the typical linguistic segments of communication in the veterinary field.

An interesting finding in the perspective of risk communication could be the low frequency of the word "death," which if used, could convey an alarmist tone and cause concern. However, the use of "strong" words had not been discouraged during the course.

How information is organised is important for the understanding of the message, particularly in the case of risk communication. The link between information and semantics relies on a semiotic assumption: the correspondence between words (*graphic forms*) and concepts (*mental contents*). Furthermore, information retrieval is useful in order to predict readability and could help the reader to gain a better understanding of the message.

Terms and lexical units are often organised in regular syntactic patterns, which can convey interesting semantic relationships, useful for information retrieval. Such a pattern could offer a more precise knowledge basis for improving risk communication. From this perspective, a limitation of this study is that no "semantic" in-depth analysis was performed in order to select a set of significantly informative segments.

It should be noted that technical terms often included in specialised lexical segments are supposed to be "informative," yet they are not frequently used by the average reader because their meaning is unclear or unknown. Paradoxically, this is one of the reasons why the veterinarians' press releases were found to have a moderate level of readability.

There remain some critical points that need broader study in order to understand better the impact of risk communication on the media and lay persons, and its role in promoting correct information and behaviour. An objective measure of knowledge improvement in training courses, as well as a

follow-up for communication activities (e.g., press releases, editorial material, information campaigns, etc.) developed by veterinary departments could be an important step to evaluate risk communication strategies effectiveness in a comprehensive way. Even if veterinarians are not the ones who write press releases, their contribution in communication could be helpful. Moreover, it would be important to map and analyse to what extent they get involved in risk communication with press offices.

Further studies should be conducted, especially on the linguistic side by performing qualitative analyses in order to identify opinions, attitudes, representations of risks, and conceptual frameworks. Again, new statistical indexes and variables for content analysis could be defined, while clarification could be specified on how the media translates press releases about risks and/or veterinary research.

The development and subsequent analysis of the training course proved a useful tool to identify some of the linguistic structures used by veterinarians in risk communication with respect to an avian influenza emergency.

The information obtained from the analysis of the press releases highlighted the need to continue with training activities aimed at analysing and understanding the communication process, whether it involves press releases or other communication tools, e.g., social media.

Currently, risk communicators and public health institutions should consider the challenge posed by social media as an opportunity not only to disseminate rapid and reliable health information but also to interact and engage with interested parties.

The goal is to improve the communication skills of public health veterinarians, veterinarian scientists, and other groups, and help them to interact with both the media and citizens more effectively. In particular, the potential of risk communication for ensuring a proper exchange of information between different interest groups (policymakers, risk managers, local communities, and consumer organisations, etc.) and promoting informed and appropriate behaviours need to be further investigated.

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