

Media and Internet Influences on Parental Decision Making related to Vaccination

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Abstract

Vaccinations have been one of the greatest public health achievements of all time and have dramatically lowered rates of communicable diseases around the world. The lower prevalence of previously common infectious diseases is due to vaccinations. Perhaps a victim of their own success, vaccines have seen a drop in uptake as the public's view of risk versus benefit has altered. The rise of the informed health consumer has grown alongside the evolution of the internet and parents are now able to carry out extensive research before committing to getting their child vaccinated. However, the readily available information on vaccine risks or side effects, including the rare but serious ones, may cause parents to choose not to vaccinate their child. With the increase of Web 2.0, the interactive and user generated websites, has come an increase of vocal anti-vaccination groups. An exploratory study completed in this dissertation found that New Zealand parents researching online for vaccine information found mostly websites discussing the pros and cons of the vaccine. These websites often gave honest information on both the disease and vaccine. While encouraging there needs to be further research completed into the online methods of New Zealand parents when researching vaccine information. A matrix of common online tactics of anti-vaccination groups has been included as a tool for nurses to use when discussing vaccine research with parents.

Keywords: vaccines, parental decision making, media, internet

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CHAPTER ONE: SOCIO-POLITICAL CONTEXT

“Immunisations, one of the greatest public health achievements, are at times hindered by a powerful biological, social, and cultural reactions from the public” (Wade, 2014, p. 351).

Vaccinations are perhaps the greatest public health achievement of all time. They have dramatically reduced the rates of communicable diseases all over the world and even completely eradicated small pox. It is estimated that vaccinations currently prevent about 2 to 3 million deaths across the world (World Health Organization, 2015b). Despite this and perhaps a victim of their own success, vaccines have seen a drop in uptake as some of the public’s view of risk versus benefit ratio has become skewed. This dissertation will look at the parental decision making process and what influences this with a focus on the role of the media and the internet. A short exploratory study into what New Zealand parents may be exposed to when researching the measles vaccine online will also be outlined and the results discussed.

Immunisation is the process of protecting people from infectious diseases through a vaccine. Vaccinations stimulate a person’s immune system, producing antibodies to protect against future infections by that disease (World Health Organization, 2015a). This stops the person from both contracting and spreading these serious diseases in their community. This has resulted in vaccines being labelled as one of the most cost-effective ways of preventing disease and improving health (Ministry of Health, 2015a). The community not only benefits in fewer illnesses or deaths from these diseases, but this also means fewer days off work, doctor visits, hospitalisation and sequela (Blendell & Fehr, 2012). In addition, high levels of vaccinations in the community create a ‘herd immunity’ effect. This protects those that cannot get vaccinated, such as infants or those with medical contraindications (Halsey & Salmon, 2015). If the majority

(95%) of a community is vaccinated it allows the entire community to be protected as the disease cannot spread or even get a foothold in it, thus protecting the vulnerable.

Evolution and Growth of Vaccination Programs

The modern vaccination process was introduced in the 1790's by an English country doctor, Edward Jenner. He noted that milkmaids were immune to smallpox, a highly contagious and deadly disease, due to contracting cowpox, a milder disease with few symptoms (Pratt, 1999). He proved that by infecting a person with a small amount of the cowpox virus they could become immune to smallpox, after which he began strongly advocating and promoting the use of this type of vaccine. The word vaccine originates from the Latin *vaccinus*, meaning 'from cows' (Best, 2014). His tireless advocating allowed the practice to spread in the early 19th century throughout Europe and 150 years later, 150 countries were free from endemic smallpox (Pratt, 1999). By 1967 smallpox was still endemic in 30 countries, infecting 10-15 million per year and killing around 2 million per year. Over the next 10 years smallpox was eradicated from the world via a dedicated programme by the World Health Organisation (WHO). This saw 2,400 million doses administered over 10 years by 200,000 workers from 70 countries trained by 700 doctors and healthcare workers (Pratt, 1999). The last case of smallpox was in 1977 and in 1979 the world was declared free of smallpox. This is an example of a public health initiative that was extremely successful in its outcome despite many obstacles. The Director-General of WHO said this was "a triumph of management, not of medicine" (Hopkins, 1989, p. 125) as there were many problems for the programme, such as bureaucratic resistance, but these were overcome by persistence and the motivated people working within it.

The successful smallpox campaign was later followed by an attempt to eradicate the debilitating polio disease with a goal of the year 2000. This didn't happen, as currently 10

countries are still listed as being ‘infected’ or endemic with polio (Ministry of Health, 2014a). Polio cases worldwide did drop 99% from the year 1988 to 2001 but the last 1% has been difficult to eradicate. The programme has been plagued by problems with logistics, areas in conflict, challenges with management and funding, wavering political support and persistent anti-vaccine rumours (Aylward & Heymann, 2005). The biggest threat to this campaign came in the form of rumours from one state in Nigeria which led to the suspension of the polio vaccine in that area, which caused a nationwide epidemic and reinfection of surrounding polio-free countries (Aylward & Heymann, 2005). This was perhaps the first example of the terrifying effects that misunderstandings and rumours could have on vaccination programmes.

The initiative to eradicate polio is not the only vaccine plagued by rumours and distrust in the population. The measles, mumps and rubella (MMR) vaccine is perhaps the most talked about in Western countries related to vaccine distrust. Measles, a highly contagious viral disease, has been dramatically lowered in Western countries due to successful vaccine programmes. So much so that the public no longer know much of the disease and its complications. A study published in 1998 implied a link between the MMR vaccine and autism which gained huge media attention. This study has been found false by many other studies and the original was retracted 12 years later (Eggertson, 2010) but the damage was already done. Many parents began questioning this vaccine’s safety and chose not to vaccinate their children. The result is pockets of unimmunised children that are susceptible to measles outbreaks like those that occurred in Europe during 2011 (Toure et al., 2014) and in the US during 2014 (CDC, 2015).

New Zealand vaccine schedule.

The smallpox vaccine started a revolution in public health and many more vaccines such as those for polio and measles followed. Currently 28 diseases are vaccine preventable. The

Ministry of Health in New Zealand has deemed 13 of these to be vital in protecting New Zealand children from various viral and bacterial infections and provides immunisations free of charge.

The vaccination schedule for New Zealand is available in Appendix A. The schedule details the vaccines and age at which they should be administered. The vaccination schedule protects against some highly contagious and deadly diseases such as diphtheria, a bacterial throat infection with a 5-10% mortality rate; poliomyelitis, a virus with 5% rate of mortality and paralysis of 1 in 100; and measles morbilli, a highly contagious virus with 30% of those infected developing complications including blindness and pneumonia (Ministry of Health, 2014a). The majority of the other vaccines are available in New Zealand but at a charge from a general practitioner (GP). Vaccine schedules have become a normal part of GP practices for most children but some parents remain wary of them.

Information Gathering on Vaccines

Due to the success of these vaccines, many communicable diseases are no longer seen or experienced by people in western countries. As a country, New Zealand is at a point where health professionals may have never had first-hand encounters with these diseases. This success has become vaccinations' downfall, as the risk these diseases pose are now being perceived as less than the risk of the vaccine itself. Media and the ever-evolving web have contributed to the spread of false and highly damaging myths around vaccines that are impacting on parents' decision-making processes when it comes to vaccinating their children. The internet has contributed greatly to spreading knowledge worldwide, but with the evolving format of the internet it has become difficult to determine which information is true. Web 2.0, which enables two- or more-way communication such as social media, has moved on from the original static format that typically only allowed information as given by the creator (Betsch et al., 2012). This

new format makes it difficult to determine the accuracy of the available information. Today people are more likely to Google an answer than use traditional sources, including health information. Does this pose a problem for parents seeking vaccine information?

Not just Public Health but Political

Vaccines that are an important part of public health campaigns have become more and more prominent in political discussions. Vaccinations often become part of nationwide health targets in which each district health board is ranked against each other in a bid for improvement.

Australia recently made noises of extreme measures to combat low immunisation rates by stopping childcare benefit payments to parents who choose not to vaccinate their children ("Australia to stop welfare cash of anti-vaccine parents," 2015). Australia currently reports that 91% of their 2 year olds were fully immunised in 2014 (Department of Health, 2015) and if this law is introduced, it will be interesting to see what, if any effect, it has on their immunisation rates. New Zealand (NZ) currently reports that 93% of 2 years olds were fully immunised by the end of 2014 (Ministry of Health, 2014b). This is below NZ's 95% goal, so New Zealand may follow in the footsteps of Australia, depending on their success.

American politics are well known for their lengthy and tactical runs for President every four years. Businessman Donald Trump is currently running as a Republican candidate for the election and during a recent debate, he suggested there was a link between autism and the MMR vaccine. Despite the fact this argument has repeatedly been proven as inaccurate, the debate was broadcast live to millions of people (Salzberg, 2015). This could either be his own personal ideas at play, or a strategic move to gain the vote of the increasing numbers of Americans who have lost confidence in vaccines. Vaccines are a hot topic in America as it is mandatory to receive immunisations as a child before that child enters a public school. However, children may be

exempt for medical reasons, religious beliefs (48 states) and for parents' personal beliefs in some states (20 states) (Luthy, Beckstrand, Callister, & Cahoon, 2012). This type of political drama can make it difficult for parents to trust the government in regards to vaccines.

Postmodern Paradigm

“In postmodern medicine, risks and adverse effects will receive a much higher priority” (Gray, 1999, p. 1551).

The medical paradigm at present is described as a postmodern one, which has new priorities when it comes to an individual's healthcare. These new priorities place importance on values and evidence, are very focussed on risk over the benefit of interventions, and encourages the growth of the informed patient (Kata, 2012). Patients are now being called clients or consumers and their access to information no longer means the health professionals are the 'experts' but that all people have the ability to become an expert in their own healthcare (Kata, 2012). The vastness of the internet and the wealth of information available contributes to the model that places importance on informed choice (Witteman & Zikmund-Fisher, 2012). However, the difficulty with this is that some of the information may not be complete or true and this can alter an individual's perception of the possible risks.

Medicine is always a balance between the risk of the condition and the risk of the intervention. There are side effects for many medical interventions and these must always be considered before any treatment is undertaken. Side effects of vaccines range from common effects such as red injection sites, to severe effects such as anaphylaxis. The rare side effects can be very serious but the frequency of these and the risk associated with the disease the vaccine is protecting against must be taken into account. For example, the diphtheria vaccine can cause anaphylaxis in extremely rare cases, but diphtheria itself causes death in 5-10% of those infected

(Ministry of Health, 2014a). Due to the high effectiveness of vaccines since their inception, the threat of such diseases seem far less daunting to parents than the potential threat of the side effects of the vaccine on their children. It is therefore vital in this postmodern paradigm that the parents are fully informed and understand not only the risks of the vaccine but also the risks of the diseases.

CHAPTER TWO: LITERATURE REVIEW

This literature review will look at vaccinations, the parental decision making process and the effect the media and internet have on parents' decisions. Search strategies included databases such as Ovid Medline, Cinahl, and Google Scholar. Key words used were New Zealand, immunization/immunisation programs or mass vaccination, measles-mumps-rubella vaccines, poliovirus vaccines, diphtheria-tetanus-pertussis vaccine, infant (1 to 23 months), health knowledge or attitudes or practice, patient acceptance of health care or treatment refusal, uptake, refuse or refusal, perception, attitude, and myth. The full search strategy used in Ovid Medline is included in Appendix B. Articles were limited to English and those published after 1995. Articles were then manually deleted if deemed not on topic on childhood immunisations or focused on non-western countries as these would be less applicable to New Zealand. The articles were then read and a thematic colour coding was undertaken. Groups of vaccine information, internet/media, parental decision making, and myths were found. Various articles fitted multiple groups and another sub group of public health was found. The following literature review will look at these articles.

Public Health

Any public health initiative is a balance between free will and the good of the population. However, there comes a point during public health initiatives that it must be asked if the free will of individuals is in conflict with the health of the population. A great example of this is the vaccination initiatives and the ability of parents to decline to vaccinate their children (Flaskerud, 2014). A phenomenon called 'tragedy of the commons' relates to how the actions of one person can have an unnoticeable effect on the collective, allowing that individual a free ride at no cost to him or her. If enough people think this way, then what is needed for the collective good can be

lost entirely, even for those that do comply (May, 2005). This phenomenon is prevalent amongst vaccination programmes. Western countries value free will and individuality, so enforced compliance would be difficult and seem totalitarian. In America, one paper has shown that it could be possible to hold parents that choose not to vaccinate their children, through personal beliefs, legally liable for the consequences and any harm that may come to others (Caplan, Hoke, Diamond, & Karshenboyem, 2012). The question is, has the Western world come to the point where people not complying with health initiatives that affect the whole population can and will be prosecuted?

Public decisions towards vaccines have been related to not just the scientific or economic evidence but also a mix of psychological, sociocultural and political aspects (Larson, Cooper, Eskola, Katz, & Patzan, 2011). With this complexity, scientific reasoning is not enough to gain total public trust and increase vaccine levels. The scientific research that goes into proving efficacy and safety results of vaccines should be only one part of this, and research should also look into the social, psychological and political factors related to public trust of vaccines. It would be true also to say that each population would be different, even groups within each population, and this would relate to their specific concerns, historical events, religious or even political views and the socioeconomic levels of that community (Larson et al., 2011). With this in mind, health professionals and policy makers within the Ministry of Health will need to tailor their information towards different populations within New Zealand.

Personal experiences and beliefs are extremely important to people. So important that they should become a part of public health initiatives to maintain and increase this public confidence through personal stories (Leask, Chapman, Hawe, & Burgess, 2006). Personal and emotive stories of children affected by vaccines are often used by anti-vaccine groups (Davies,

Chapman, & Leask, 2002) and it would therefore be useful for public health officials to counterbalance these stories with opposing stories of children affected by preventable disease. This has already been done with the Ministry of Health measles web page where it differs from the other vaccine preventable diseases in its layout. It includes stories of people affected by the Measles outbreaks in New Zealand (Ministry of Health, 2015b).

A study by Manchester (2008) looked at a new primary healthcare model of a mobile practice nurse in New Zealand. The interviewed nurse demonstrated that being mobile was an effective way to bring health services to those people who have difficulty accessing it. Over her first year she did 248 home visits, which included immunising 99 children. Her efforts contributed to the 12% increase in fully immunised 2 year old children enrolled in that area (Manchester, 2008). Of the children seen, 31% were Pacifica, 21% Maori, and 48% European which showed that a broad range of families used this service (Manchester, 2008). This study showed the importance of local government initiatives increasing the ease and availability of immunisation programmes throughout areas in need.

Common Myths and Misconceptions of Vaccines

Due to the success of vaccines, some of the public now look less at the risk of the disease and more at the risk of the vaccine. Alongside this are the arguments against vaccines that are based on fiction rather than fact. Many of these ‘myths’ about vaccines are to do with them causing a range of conditions that affect children and whose cause is unknown or not understood completely.

The most commonly voiced myth is that MMR vaccine may lead to autism. A study led by Wakefield in 1993 linked measles to inflammatory bowel disease (IBD) and in 1998 he linked IBD to developmental disorders, which included autism. He suggested the MMR vaccine may be

causing IBD, through decreased absorption of required vitamins and minerals, leading to developmental disorders (MacIntyre & Leask, 2003). His studies have been found by experts to be severely flawed and biased. A Cochrane review of the studies into the MMR vaccine found no significant association between the MMR vaccine and a host of conditions including autism (Demicheli, Rivetti, Debalini, & Di Pietrantonj, 2012). One study focussing on adverse effects after the MMR vaccine followed 1.8 million children until they were 14 and found no cases where IBD or autism was a consequence of the vaccine (MacIntyre & Leask, 2003). Any association noted by parents would appear to be a timing issue, as the disease becomes apparent in children around the age of the first MMR vaccines. Other myths linked vaccines to asthma, allergies, sudden infant death syndrome, and multiple sclerosis. These have all been investigated and many are linked only in timing, while other studies have found rates of these disorders occurring in both vaccinated and unvaccinated populations to not be significantly different (MacIntyre & Leask, 2003).

Another evident belief is that of chemical additives in the vaccines ‘poisoning’ those receiving them (Blendell & Fehr, 2012). Groups against vaccines list the ingredients such as mercury, aluminium, formaldehyde, and antifreeze, which sound harmful if their uses or amounts aren’t explained. Thimerosal, and not mercury, has been used since 1930s as a preservative in vaccines and in the body it is broken down to ethylmercury before being excreted (MacIntyre & Leask, 2003). It has been studied due to claims it causes toxicity in children, and even though no link has been found the majority of vaccines no longer contain thimerosal due to parental concerns (MacIntyre & Leask, 2003). Aluminium salts are in vaccines to increase their effectiveness as they help increase the body’s response to the vaccine (Blendell & Fehr, 2012). Humans are exposed to aluminium salts through food and water and the amount in a vaccine is

about the same as 1L of infant formula (Blendell & Fehr, 2012). Formaldehyde is used to deactivate the virus and detoxify both diphtheria and tetanus, but the amount actually left in the vaccine is smaller than the amount already found naturally in the human bloodstream (Blendell & Fehr, 2012). Antifreeze is ethylene glycol, and the compound in vaccines is actually polyethylene glycol which is in cosmetics and used as a purifier (Blendell & Fehr, 2012). It is perfectly safe.

Another safety concern that parents have about the vaccines is the amount given and if their child's immune system can handle them. The number of vaccinations given to a child and the frequency has increased, which has some parents concerned. The combination of vaccines that are now used helps improve the coverage rates of vaccinations and means the child actually needs fewer injections (Marshall et al., 2007). There is no evidence that children struggle to respond to these combined vaccines and now vaccines contain even less antigens than in previous years (Immunisation Advisory Centre, 2013). Just 30 years ago vaccinations contained 3,041 antigens and now they only contain 50, so children are actually exposed to far fewer antigens over the whole immunisation schedule, which parents may not be aware of (Immunisation Advisory Centre, 2013).

New Zealand Studies

The majority of recent studies in New Zealand surrounding immunisation coverage looks at the public health initiative of vaccinating against group b meningococcal disease during the New Zealand epidemic (2004 – 2008) and the ongoing project of immunising against influenza. There were however, a few articles around immunisation that dealt with those on the immunisation schedule and parents' decisions related to them.

Studies in New Zealand looked at primary health care and professional factors associated with immunisation coverage. Grant et al. (2011) showed that socioeconomic deprivation has a strong negative effect on immunisation coverage rates. Better coverage is achieved by general practices that have an early/ongoing relationship with the family; are not short staffed; and have vaccine confident staff. Grant et al. (2011) demonstrated that most decision-making is done by the parents in the antenatal period. Practice nurses have been shown to give 95% of vaccines in New Zealand practices with high practice coverage rates and timeliness being associated with lower nurse to child ratio, nurses being comfortable with their vaccine knowledge and acknowledging that parental apathy or fear is a barrier to vaccinations (Desmond, Grant, Smith, Turner, & Petousis-Harris, 2011). Alongside this it has been shown that ‘small talk’ from the nurse is important in aligning with the parent, but also cues the parent and child as to how the process is going to play out (Plumridge, Goodyear-Smith, & Ross, 2009). A school-based survey completed in Auckland asked parents from three different socioeconomic levels of schools about immunisations. Majority of parents agreed with immunisations but 30% showed to have some concerns and the majority viewed their GP as an important source of information (Petousis-Harris, Turner, & Soe, 2004). These studies showed the impact that primary healthcare staff can have on local coverage rates.

A piece of research prepared for the Ministry of Health looked at the reasons parents delayed their children’s immunisations. It found three main themes in which the parents were compromised, considered, or conflicted (Litmus, 2013). The parents in general were either supportive of immunisations but faced barriers in immunising their child on time; were supportive but had some concerns about the immunisation schedule and immunised their child when they thought it was right; or they had concerns about immunisations and only immunised

when they felt there was a heightened risk for their child or when pressured into it (Litmus, 2013). This study also looked at messages to improve timeliness and which ones resonated better with the parents. Messages about vaccine safety, asking for support, and protection all resonated well with parents and didn't cause them to feel attacked or belittled (Litmus, 2013). The Health Select Committee wrote a report in October 2010 on how immunisation rates could be improved. It made 30 recommendations for the Ministry of Health and included suggestions such as producing annual reviews and to utilise more national/social media campaigns (Ministry of Health, 2011). Two recommendations linked well with the study by Grant et al. (2011) in that it was believed that health professionals should provide "scientifically credible immunisation information, in contexts including antenatal classes" (Ministry of Health, 2011, p. 2), showing the importance of information and how decisions can be made early for a child, even before they are born.

Parental Decision Making

Parents encounter many difficult decisions when raising their child. They are not only faced with the options but also a wide range of information supporting different options and the opinions of both close friends, professionals and strangers. How do parents make sense of all the information and how do they make their decisions? The following will look at international papers covering parents' decision making in response to childhood vaccines.

The reasons why parents decline to vaccinate their children are varied and based on many different beliefs or values. An American study showed the most common beliefs of parents that exempted their children from vaccinations to be concerns about vaccine safety, the need to reaffirm their parental right, questions about vaccine effectiveness, belief of natural healing, concerns of links with autism, and concerns of overwhelming the child's immune system (Luthy

et al., 2012). Refusal to vaccinate has also been linked to family lifestyle, ideas of what the child can cope with, vaccine side effects versus disease risk, previous bad experiences with vaccines and the parent's social environment (Harmsen et al., 2013). Also linked to refusal are low socioeconomic status and other health practices, for example complementary and alternative medicine, especially by the mother (Cassell et al., 2006; Jessop et al., 2010).

On the other hand, linked to vaccine uptake are beliefs of vaccine safety and effectiveness; beliefs of disease threat; perceived social and community benefit; satisfaction and trust in both official and unofficial vaccine information; ease of vaccinating ie appointments; and parent age and socioeconomic status (Brown et al., 2011). The article by Brown et al. (2011) notes that it is not just lower socioeconomic status that is linked with low vaccine uptake, as above, but also very high socioeconomic and other articles note this too. One American article linked unvaccinated children to white households with a college educated married mother and income exceeding \$75,000 per year, who claimed that their doctors had little influence over their decision making processes (Smith, Chu, & Barker, 2004). Another article showed that parents choosing not to vaccinate in Wales during the media hype around the MMR vaccine were more likely to be older, better educated and reported to be more influenced by newspapers, television, and the internet than health professionals (Walsh, Thomas, Mason, & Evans, 2015).

It has also been shown that the rate parents chose to vaccinate their child during vaccine media controversy is related to their education level. Those that stayed in education past the age of 18 reduced their uptake of the vaccine at a faster rate than less educated parents (Anderberg, Chevalier, & Wadsworth, 2011). Their decline in uptake happened in the first couple of years of the MMR controversy during which the media coverage was relatively low. This could therefore show the higher level of education translated into a higher awareness or the information being

perceived differently (Anderberg et al., 2011). Although this suggests that parents with higher levels of education absorb the information faster it doesn't explain their behaviour as such. Also to note that this article found those that declined the MMR vaccine also started declining other vaccines in a 'spill over' effect.

Age, education and socioeconomic status appear to affect parental decisions and associated with this is the need for more information. The messages that parents receive about vaccinations has a huge impact on their decision. Children whose parents received no information on vaccines have been shown to be significantly less likely to be vaccinated than those that did (Penn & Kiddy, 2011). Information around vaccines given to concerned mothers, especially before the first vaccine visit, helped improve their attitude towards vaccines (Vannice et al., 2011). While better information given to the parents may encourage them to vaccinate, the information needed to include both risks of vaccines and the risks of not vaccinating (Serpell & Green, 2006). It has been shown that messages to parents that include facts, myths, and the evidence that discounts the myths are effective in increasing the parents' understanding and are not counterproductive as previously thought (Cameron et al., 2013). Providing accurate information is only one part of helping parents with their decision. Establishing and maintaining trust with the person providing the information has also been shown to be extremely important (Hilton, Petticrew, & Hunt, 2007).

It isn't just what information and when the parents receive it that is important but also how the parents make sense of the information. One paper looked at how parents made sense of all the information they received in regards to MMR vaccines. The parents mentioned that media information made them worry and challenged their views but not all information was just passively accepted. 'White British mothers' were seen to extensively seek out different

information sources (Petts & Niemeyer, 2004, p. 19). The fact that the socially accepted norm of vaccinating children was being questioned scared parents but any information received was taken with some scepticism, especially if from the government. During this media scare health professionals had important roles in being up to date and as a scientific translator (Petts & Niemeyer, 2004). Parents reported dealing with uncertainty around the MMR vaccine by trusting and relying on the experts, such as their health professionals, to reduce the confusion and find clear information (Casiday, 2006). It has been shown that health professionals who are confident in skill and knowledge have increased coverage rates at their practices (Desmond et al., 2011; Leask et al., 2008; Penn & Kiddy, 2011). One study even showed the most important source of information on vaccines to the parent was their doctor or nurse (Kennedy, Basket, & Sheedy, 2011). This shows that parents often need help deciphering information and rely on traditional sources such as General Practices.

As well as gathering information from health professionals it has been shown that parents also believe non-traditional sources, such as parents of children claiming to have been injured by vaccines and also anti-vaccine websites with their emotionally appealing claims (Flaskerud, 2014). One study showed that mothers exposed to anti-vaccination messages, although surprised and concerned about the claims, quickly supported vaccines again by talking about authority figures, type casting the anti-vaccine groups, and discussing good parenting and social responsibility (Leask et al., 2006). However, personal experience can have a huge impact, with one study showing that parents who already have one autistic child will delay or not immunise their younger children in response to the rumoured link between autism and the MMR vaccine (Abu Kuwaik et al., 2014).

The paper by Johnson and Capdevila (2014) used focus groups to allow mothers to talk about how they made decisions in regard to the MMR vaccine. The paper notes that mothers are expected to look for advice or information about the medical care for their children and then make decisions. In other words, use a decision-making framework based on risk-assessments (Johnson & Capdevila, 2014). The mothers in this study talked more about vaccines being an activity that was expected of them and more directed by motherhood ideals, science and its role of authority, and a sense of guilt or moral obligation (Johnson & Capdevila, 2014) rather than awareness or concerns of the diseases. This showed that the medical advice can quite often be seen as the voice of power and not as knowledge by the mothers. They brought up the idea of the desire to be a good citizen but this has not been shown in all the literature as often the mothers worry more about their own child than the community's herd immunity. Mothers have been shown to see the risks of the vaccine as a personal responsibility and to find herd immunity not important to them (Cassell et al., 2006).

Media Influence on Parents Decision Making

The media plays a strong role in the perceived risk of the disease versus the risk of the vaccine. Since vaccine preventable diseases are now very uncommon in Western countries, they are not covered by the media. However, the extremely rare adverse reactions are portrayed in the media, which makes vaccines appear as more of a risk than they actually are. When looking at the media and coverage of scientific information, it becomes apparent that what is deemed worthy of making the news isn't always what the public actually needs to know. The aim of the papers aren't to offer objective information to the public, but to entertain and make money (Guillaume & Bath, 2008). A content analysis of mass media sources over a month during the height of the MMR vaccine scare in the United Kingdom showed the media to have incomplete

information about the risks, show stories of children allegedly affected by the vaccines, and other human interest stories with very little in the way of scientific backing (Guillaume & Bath, 2008). A health scare, or panic created by the media in relation to health issues, has been shown to increase people's need for information and for people to begin to question traditional sources of information as trustworthy (Guillaume & Bath, 2004). This provides a problem for parents for if they believe their health professionals aren't being honest they may turn to the media or other sources of information for truth.

May (2005) wrote a paper on public communication and risk perception in relation to vaccines. His paper mentions how the media tends to sensationalise the information but relates this partly to the failure of journalists and scientists to appreciate or understand each other's forms of communication. Also mentioned is the requirements for a story to be 'big', current or personal, and have a good or bad focus to be newsworthy. This means that the media over emphasises the risks presented by the scientists as danger sells stories and this newsworthy story then goes out to parents that, in this age, have never seen epidemics of these diseases (May, 2005). The paper ends with recommendations for the media, scientific community and public health officials to each work on presenting more accurate and accessible information. This is unlikely to be a priority for one group since traditional media is struggling to bring in revenue in 2015 against the increased usage of the internet to access information.

Internets Influence on Parents' Decision Making

When looking into the effect of the internet on the vaccine debates, it became clear very quickly that it plays a huge role. The literature talks about Web 2.0 as the new generation of the internet that allows users to interact and contribute to the information, unlike Web 1.0 which was controlled by the website providers (Kata, 2012). This new form of the internet allows people to

share their views and opinions quickly and widely without any factual basis. This combined with the new Google culture, in which people search online for health information could lead to people being inaccurately informed and base their decisions on such information.

Tactics of anti-vaccine groups

Several papers have looked at the tactics used by anti-vaccine groups which include twisting science results and emotive stories of children affected by the vaccines. One paper splits the tactics into two groups – rhetorical appeals and explicit claims (Davies et al., 2002). Explicit claims include describing the diseases as trivial, the vaccines as poisonous or harmful or ineffective, the natural immune system as far superior, and that these diseases have been reduced due to reasons other than vaccines (Davies et al., 2002). In other words, claims that have no scientific backing and are very strong in their sentiment. Rhetorical appeals fall into the three categories of scientific, emotive and conspiracy. Scientific appeals claim to be presenting both sides or present themselves as having an official status and scientific backing. Emotive appeals include personal stories and ideals of responsible parenting. Conspiracy appeals talk about doctors, drug companies and governments hiding the true facts (Davies et al., 2002). These tactics can make websites seem credible and play towards parents who are trying to do the best for their child by researching online or who already have some concerns. Personal stories and comments about vaccines not being 100% safe or science being wrong before (Kata, 2012) can begin to ring true if seen enough. After reading these two papers it can become quite easy to see the recurring themes on anti-vaccine websites. They would be useful as a guide for parents on how to differentiate false and negative sites from honest and truthful sites.

Web 2.0

The postmodern medical paradigm has seen evolved healthcare with a new set of priorities, including the informed patient (Kata, 2012). Much of the information that patients use comes via the internet. Web 2.0 allows interaction between users and has become increasingly popular and is used frequently, especially by the generation that are now becoming parents. About 80% of American internet users and 59% of American adults use the internet to seek health information (Witteman & Zikmund-Fisher, 2012).

The internet allows personal views and concerns to spread quickly and widely, known as going 'viral'. For something to go viral it has to be spread through social media. People share the information or video with friends and the number of people that view it increases exponentially. This ease of distribution without filtering by the traditional gatekeepers of information means that inaccurate information can be viewed and shared by like-minded people (Witteman & Zikmund-Fisher, 2012). In other words, concerns about vaccines can quickly be spread across the world to any person with internet access. The exemplification theory explains how personal stories add to peoples' risk perception by altering their view on incidences and eliciting emotions (Witteman & Zikmund-Fisher, 2012). Therefore the huge number of personal stories about vaccine related injuries will affect the reader and alter their personal risk versus benefit ratio as the perceived incidence rate of injuries will increase. People have been shown to react more emotionally to personal stories than statistics (Cameron & Payne, 2011) which means the anti-vaccine websites and their personal stories can create a stronger emotional response in readers than official health websites with statistical graphs on vaccines and information about the number of lives saved. On top of this the openness of Web 2.0, accessibility and ability to question or change, is very much in line with the postmodern medical paradigm of informed

consent and transparency (Witteman & Zikmund-Fisher, 2012). Web 2.0 also allows groups of like-minded people to gather together and present their voice which may result in strong polarised groups appearing far greater in number than they actually are. This is similar to how the anti-vaccine groups portray vaccine side effects as occurring more often than they actually do. It therefore makes sense for public health officials to increase their efforts in online communication by making it more accessible, personal, easy to read and share, and able to address queries with quick responses.

Twitter, social networking through short messages, is a large part of certain demographics methods of communication online. One study found that in one week, of the 2,580 tweets about vaccines about 33% were positive, 54% were neutral, and 13% were negative (Manning & Davis, 2013). The issue with this form of communication is that people can share it instantly and many people 'follow' celebrities who can hold significant influence over their fans. The positive and negative views are clustered around groups of people (Salathé & Khandelwal, 2011). This means that if a parent seeking information comes across one of these groups they will be subjected to a very biased view. Similar to searching for information on Google where the entered search term highly affects the results found. Parents that look for information on the risks of vaccines will find more websites that are anti-vaccines and include myths compared with parents seeking information about the benefits of vaccines (Ruiz, 2014). This means that parents who are concerned about the vaccinations are more likely to find websites that will confirm their fears. The next chapter will focus on the most questioned vaccine of all childhood immunisations, the measles vaccine.

CHAPTER THREE: CASE STUDY ON MEASLES VACCINE

A case study on measles (morbilli) is used to focus on parental decision making and the potential effects of the media and internet to influence vaccination or not. The MMR vaccine came under scrutiny after a since discredited scientific paper that resulted in massive media hype, which led to parents questioning whether their child needed it. The long lasting result of this false paper are current outbreaks of measles throughout the world as the population's herd immunity has been decreased.

The Virus and the Vaccine

The measles morbilli virus is one of the most contagious diseases known and can stay infectious in the air or on surfaces for up to two hours (Asaria & MacMahon, 2006). People with measles are infectious 5 days before and 5 days after the well-known red rash appears. Symptoms include fever, cough, runny nose and conjunctivitis (Ministry of Health, 2014a). Around 30% of cases have complications and 1 in 10 people will need hospital treatment. Complications of measles include leukopenia (low white blood cell count), bacterial super infections, otitis media (ear infections), pneumonia, croup, diarrhoea, encephalitis (swelling of the brain), blindness, and death (Kennedy, Pruitt, Smith, & Garrell, 2011). Measles is most severe in infants and adults or those with a compromised immune system.

A combination vaccine is recommended for measles that also includes mumps and rubella (German measles). The vaccine doesn't work well in infants under 12 months due to maternal measles antibodies being present. Hence this vaccine is recommended for those over 12 months. Two doses are needed to gain 99% immunity and due to the infectious nature of measles, 90-95% of the population needs to have had two doses to stop transmission of the disease (Asaria & MacMahon, 2006). Side effects of the vaccine are extremely rare and less dangerous than the

consequences of contracting measles. They include 1-3% of children developing fevers or a measles-like rash; about 1 in 3,000 children may have a febrile convulsion (versus the 1 in 200 children with measles); and fewer than 1 in a million children will develop encephalitis (versus the 1 in 1000 that have measles) (Ministry of Health, 2014a). Despite there being a cost effective and safe vaccine available measles is still the main cause of vaccine preventable deaths in the world (Asaria & MacMahon, 2006). In 2013 there were 145,700 deaths worldwide from measles but the vaccine has been estimated to have prevented 15.6 million deaths over the last 13 years (World Health Organization, 2015c).

The ‘Controversy’

The 1998 article published by Dr Andrew Wakefield with implied links between the MMR vaccine and autism caused many parents to question the use of the vaccine and they refused to let their child receive it. The original paper, now retracted, looked at 12 children with gastrointestinal disease and developmental disorders where the parents (of 8) linked their child’s loss of developed skills to their MMR vaccine. The conclusion of the paper was that “possible environmental triggers” (MMR vaccine) were linked with the beginning of both the child’s gastrointestinal and developmental problems (Eggertson, 2010). It was found that the children for the study were selected especially and the funding was partially from lawyers involved in lawsuits against vaccine manufacturers (Eggertson, 2010). Expert groups have found the suggested link to be tenuous and the study flawed, especially as it relied on parental recall, and many studies since have found no link between measles and autism (Demicheli et al., 2012; MacIntyre & Leask, 2003). The study was picked up by the media and broadcasted widely alongside speeches from Dr Wakefield who began recommending the single vaccine instead of the combination vaccine, with no evidence as to why. The media hype and the slow response

from the scientific community had a huge impact on parents' trust and views on vaccinations they were giving their children. It took the Lancet 12 years to retract the study (Eggertson, 2010). It also gave the parents of children with autism something to believe in as the aetiology of autism is poorly understood and no specific cause has yet been found (Kuwaik et al., 2008).

The majority of studies looking at parental decision making around childhood vaccinations focus on the MMR vaccine and the effect this 'health scare' had on parents. A lot of studies have been completed in the United Kingdom as the resulting measles outbreaks were a public health concern. During this media health scare, parents declined the MMR vaccine faster if they were educated past the age of 18 years (Anderberg et al., 2011) and were more likely to be older and reported to be influenced by the newspapers, internet and television (Walsh et al., 2015). Parents reported the study and media attention as increasing their need for information and that they began to view traditional sources of information as untrustworthy (Guillaume & Bath, 2004), especially the government (Hilton et al., 2007) and this has caused a distrust of the government and the MMR vaccine to linger (Cassell et al., 2006). Parents have acknowledged and blamed the media for distorting their view of risk proportion but also stated that the media coverage of the MMR vaccine challenged their previously unquestioned view on the value of vaccinations (Petts & Niemeyer, 2004).

The parents turned to new sources of information which included the media and the internet. The problem with this was that the media during the height of the MMR controversy was shown to have incomplete information about the risks, show stories of children allegedly affected by the vaccines, and other human interest stories with very little in the way of scientific backing (Guillaume & Bath, 2008). The internet also posed problems for parents as the search terms they used would greatly affect their results, with parents searching for risks being more

likely to receive anti-vaccine websites and website purporting myths than parents searching for vaccine benefits (Ruiz, 2014). Alongside this is the evolution of Web 2.0, which allows people with similar views to make and share information with no control over authenticity which results in the spread of false information. Parents are faced with tough decisions regarding their children's health and if they believe everything they read, it is an information minefield to negotiate to reach the right decision. Whether parents choose to be an 'attentive delayer' and decide when their child needs the vaccine, or decide not to vaccinate at all, it leaves children at risk of catching measles. Such decisions also contribute to the continuing transmission of the disease through communities and unfortunately onto those unable to be vaccinated due to medical reasons.

Resulting Outbreaks and At Risk Communities

Measles outbreaks have become more common in the last decade and in Europe especially. The cases of measles in Europe have increased 348% from 2007 to 2013 (32, 174 cases in 2013) to the point that measles are endemic once again and the World Health Organization European Region has committed to interrupting measles transmission and have an action plan for 2015-2020 (World Health Organization, 2015c). The problem in Europe means that tourists are catching measles and taking it back to their home countries where the pockets of unvaccinated children are ideal breeding grounds for outbreaks. The 2011 outbreak in New Zealand (Ministry of Health, 2015b) and the 2014 outbreak in the United States of America (USA) (CDC, 2015) have both been attributed to people returning from trips to Europe. In New Zealand in 2011, there were 596 cases of measles reported, compared with 48 the year before (New Zealand Public Health Observatory, 2014), and as a result the Ministry of Health changed their measles page to include personal stories of those affected during the outbreak to help

increase awareness of the dangers of this disease. The outbreak in Disneyland in the USA during 2014/2015 gained much publicity, partly due to the public place in which it began, but also because infants too young to be vaccinated and children with medical conditions meaning they couldn't be vaccinated were infected too (Halsey & Salmon, 2015). This meant the public gained a glimpse of the true problem we now have in regards to measles.

In the United Kingdom there have been various outbreaks over the last decade with most occurring in 'vaccine-rejecting communities' due to the MMR controversy in the media. The national average of measles vaccination uptake was at 91% in 1998 when the controversial study was released (Jansen et al., 2003) and by 2003 it had dropped to about 80% with Southeast London recording only 61% of 2 year olds having received one dose (Kidd, Booth, Rigden, Tong, & MacMahon, 2003). Due to this drop, there were various at-risk communities and measles cases in England and Wales ranged from 70 to 1,370 per year from 2000 to 2013 (Le Menach et al., 2014). As a result, many locally targeted vaccine campaigns had to be put in place. One in South-East England included giving the vaccines ahead of schedule and target catch up programmes for older children (Le Menach et al., 2014). In Swansea schools a high number of measles cases were seen in children aged 10 – 18 years old (infants during the height of the controversy) so school-based target catch up programmes and drop in vaccine clinics were rolled out (Wise, 2013). These targeted programmes helped increase MMR vaccine uptake following the local outbreaks.

The Future

With these pockets of unvaccinated children and the potential of each new group of parents to also decide against the measles vaccine, where does it leave health policy? The rumour that the MMR vaccine causes autism is still rampant with it being mentioned often both in the

media (frequently now followed with the statement of it not being true) and in discussions between mums-to-be and new mums. The scientific community has spent millions on studies disproving this link and now some of the autistic community has got in behind this. Autism Speaks, an autism science and advocacy organisation, continually posts the results of any new studies into the vaccines and autism link such as a recent study of over 95,000 children that showed the MMR vaccine did not increase the risk of a child becoming autistic (Autism Speaks, 2015). However, the comment thread below this article is filled with people blaming the organisation and study for being a front of the big pharmaceutical companies and covering up the truth, all while claiming Dr Wakefield to be the only one telling the truth. This vocal anti-vaccine movement could be confusing for new parents using the internet to access vaccination health information for their child. The next chapter will look at what New Zealand parents face when they do a quick Google search about vaccines for their children.

CHAPTER FOUR: GOOGLE SEARCH AND NEW ZEALAND PARENTS

This chapter will be an exploratory study into what New Zealand parents are exposed to when doing generalised Google searches about the measles vaccine. The measles vaccine has been chosen because of it being the most talked about and debated vaccine.

Aim

To determine if a general search term in Google returns positive, neutral, or negative based websites on the measles vaccine.

Methods

Search terms

The web search was conducted on 15/10/2015 using the Google search engine. The New Zealand Google site (www.google.co.nz) was selected as it is the default web search engine on most computers and may give a New Zealand perspective. Google Chrome was chosen as this is the most common browser used in New Zealand covering 39% of internet users (Young, 2015). The generic term 'measles vaccine' was chosen because it is more colloquial than 'immunisation' and more likely to be used by a parent looking for information. Alongside this, a second search term of 'pros and cons of measles vaccine' was chosen as parents have been shown to seek extra information about vaccines, including the side effects. The search history and cookies on the research computer were deleted so as to not affect the search results.

Website retrieval

Only the first page of results will be used as it has been shown that people rarely go onto the second page of web results (Eysenbach & Kohler, 2002; Malaga, 2008). A website will be excluded if it is a journal article that requires paid access, a non-English site, or a broken link.

Also the top ‘definition box’ will be excluded as if it appears to be a duplicate of the Wikipedia link below. A screen shot was taken of the search results and is available in Appendix C.

Coding and analysis of the websites

Coding will be in relation to the recommendations of the website and the discussion of myths, a development of the coding procedure for the study on search term selection bias (Ruiz, 2014). Websites will be coded as recommending vaccines, no recommendation, or recommending against vaccines. Alongside this, myths will be looked at (see common myths and misconceptions of vaccines section) and coded as either explaining the myths (countering), not addressing the myths, or perpetuating the myths. The websites will each be coded and presented in a table before being discussed.

Results

Screen shots of each search result are available in Appendix C and the individual website analysis can be found in table 1 and 2.

Table 1: Search results for "measles vaccine"

Search result	Website	Recommendations	Myths
1	http://www.kidshealth.org.nz/measles-immunisation	Recommends vaccine	Explains two myths
2	https://en.wikipedia.org/wiki/Measles_vaccine	No recommendation	Explains two myths
3	http://www.health.govt.nz/your-health/conditions-and-treatments/diseases-and-illnesses/measles	Recommends vaccine	Does not address (links to pages that do)
4	http://www.vaccines.gov/diseases/measles/	Recommends vaccine	Does not address
5	http://www.immune.org.nz/node/607	No recommendation	Does not address
6	http://www.immune.org.nz/diseases/measles	No recommendation	Does not address
7	http://www.cdc.gov/measles/vaccination.html	Recommends vaccine	Does not address

8	http://www.cdc.gov/vaccines/vpd-vac/measles/	Recommends vaccine	Explains two myths
9	http://www.webmd.com/children/vaccines/measles-mumps-and-rubella-mmr-vaccine	Recommends vaccine	Does not address
10	http://www.vaccinationcouncil.org/2014/06/24/measles-and-measles-vaccines-fourteen-things-to-consider-by-roman-bystrianyko-author-dissolving-illusions-disease-vaccines-and-the-forgotten-history/	Recommends against	Perpetuates myths

Table 2: Search results for "pros and cons of measles vaccine"

Search result	Website	Recommendations	Myths
1	http://vaccines.procon.org/	No recommendation	Presents both sides – explains and perpetuates
2	http://www.everydayhealth.com/columns/paging-dr-gupta/measles-2015-get-the-facts-get-vaccinated/	Recommends vaccine	Explains one myth
3	http://www.wisegeek.com/what-are-the-pros-and-cons-of-measles-vaccination.htm	Recommends vaccine	Explains one myth
4	https://www.bupa.co.uk/health-information/directory/m/mmr-vaccine	No recommendation	Does not address
5	http://www.nhs.uk/conditions/vaccinations/pages/mmr-charlottes-story.aspx	No recommendation	Does not address
6	http://pediatrics.answers.com/immunization/the-pros-and-cons-of-mmr-vaccination	No recommendation	Does not address
7	http://www.naturoidoc.com/library/children/immunizations.htm	No recommendation	Does not address
8	http://www.mamanatural.com/childhood-vaccines-mmr/	No recommendation	Explains one myth
9	http://www.newhealthadvisor.com/Pros-and-Cons-of-Vaccinations.html	No recommendation	Does not address
10	http://www.mumsnet.com/Talk/general_health/56651-mmrpros-and-cons	No recommendation	Several myths addressed

The neutral search term of “measles vaccine” resulted in mainly governmental sites with 6 recommending the vaccine, 3 making no recommendation but presenting the facts and 1 recommending against. Of these 6 did not address the myths of the vaccine but most had links to pages that did, 3 sites explained myths with the most common one being the vaccine’s link to

autism, and the last site perpetuated myths. In all, 4 sites were New Zealand sites with one being governmental, two were the same site but different pages of a university-funded advisory page, and the last was a kids' health website with information taken from the advisory page. Wikipedia was the second site and this online encyclopaedia is extremely popular. Just 4 sites were American and the last site was a professional-looking page claiming to be written by doctors and registered nurses against the use of vaccinations.

The search term "pros and cons of the measles vaccine" resulted in only one governmental site and produced more in the way of columns and blogs. The majority of these sites did actually state the pros and cons of the vaccine and did not make recommendations. In total, 8 made no recommendation and the other 2 recommended for the vaccine use. 5 did not address the myths, one presented both sides and did not state either to be true, and the other 4 explained at least one myth which was commonly the link to autism. The last site was a mother's discussion board and the link was a thread about the vaccine, many posts were either for or against the vaccine but with the majority just stating facts.

Discussion

The results of this exploratory study are promising as very little in the way of inaccurate information came up on the first page of these two simple searches. The results were either governmental or advisory sites that gave accurate and full information which would help the parents with their decision making. Many gave either no direct recommendation or recommended for the vaccine. Those that gave no recommendation instead gave all the facts including those of the disease and the vaccine which would allow an informed decision. The one site that recommended against the vaccine was full of extreme statements, personal emotive

stories, claims of conspiracy and cover ups. All which fall straight into the tactics categories explained by a study on anti-vaccination websites (Davies et al., 2002).

Myths surround vaccines and the measles vaccine in particular are common and widespread. There were however, not as many present or discussed on the search result pages as expected. Often these were not discussed but there were links available to pages that did, such as frequently asked questions pages. If mentioned, it was nearly always the link with autism and mentioned Dr Wakefield or his study and this link was refuted every time.

Literature discussing the internet talks of two versions of the web, a Web 1.0 and a Web 2.0, with the newer generation (Web 2.0) allowing internet users to interact and contribute information while the older generation is controlled by the providers of the website (Kata, 2012). The “measles vaccine” search resulted in more websites that could be classed as Web 1.0 with their information being controlled by the provider such as the governmental sites. The “pros and cons of the measles vaccine” search results in a greater number of Web 2.0 sites with many having comments sections available or consisting of columns or blogs written by people on the sites. One was a discussion board that was purely people contributing to a question posed by an individual. This shows a definite variation in the types of websites found for the two differently asked questions, meaning the way the question is asked is very important.

This exploratory study shows that anybody searching these terms were exposed to very little in the way anti-vaccination material. To find this material, more direct search terms such as “I don’t want to vaccinate” or “why not vaccinate” need to be entered. As already mentioned, the search term affects the results, especially when looking at benefits or risks of something (Ruiz, 2014). For the true extent of what New Zealand parents are finding when searching online for

vaccine information, a study into their search term use and methods of searching would need to be undertaken.

Conclusion

This exploratory study is promising for New Zealand parents searching for measles vaccine information on the web. Little in the way of false information was retrieved and the majority of web sites provided honest and clear information about both the vaccine and the disease. Sites mainly either recommended the vaccine or gave no direct recommendation but contained compelling evidence towards vaccination. The study is limited in its generalisation and further research would need to be done on New Zealand parents internet search strategies and methods to gain insight into what they are actually being exposed to.

CHAPTER FIVE: DISCUSSION

This paper has looked at vaccinations and the current climate of parental decision making against the influence of the media and internet. Vaccinations have been hailed as the greatest public health achievement of all time, yet recent public perception has put the advancements through vaccinations at risk. Despite the fact that millions of lives have been saved every year due to vaccines, there still remains parents that are sceptical about the safety or need for vaccines, especially in regards to their own children.

Any medical procedure or health intervention is measured in regards to the risk of the intervention and the risk of the disease or problem. Public health officials have decided that the risks of the disease far out way the risk of the vaccines and actively promote the vaccine schedules to protect children and the wider community. The current problem is that the vaccines have worked so well that the diseases they protect against are rarely seen in New Zealand or other Western Countries, so much so that many medical professionals have not seen any cases themselves. This alters the perceived risk of the disease for many members of the public, as not growing up with the diseases mean their severity can be underrated. The other side is that the perceived risk of the vaccine has also been altered for many parents. The sensationalising media, rise of the interactive internet and the informed patient mean that parents have access to vast amounts of information which isn't always true and can often overstate the rare, yet serious, side effects of the vaccines. The prevalence of these side effects and stories of them in the media or internet can alter a person's perceived idea of how prevalent they will actually be in practice. With the lowered perception of disease risk and increased perception of vaccine risk, many parents may decide not to vaccinate their children.

Fuelling the vaccine debate between cautious parents and health professionals are the persistent myths and misconceptions about vaccines. Myths and misconceptions about vaccines have been around since the birth of the common day vaccine, but with advancements in science and vaccine studies, there is now a wealth of scientific evidence to back up statements of safety. There are many anti-vaccine groups within Western societies that are active on the internet and social media that constantly perpetuate myths about vaccines and use tactics such as emotive stories and conspiracy theories regarding pharmaceutical companies to sway parents. Web 2.0 allows fast and interactive access to groups with strong views and currently the public health pages are not keeping up.

An exploratory study completed in this paper looked at the Google search results for a generalised search on the measles vaccine. The aim was to determine the types of websites New Zealand parents would be exposed to when doing a Google search on the measles vaccine. The results were encouraging with the majority of pages being professional sites with the facts stated clearly both about the disease and the vaccines. These results are limited in their ability to be generalised as another study would have to be completed looking into New Zealand parents online research methods, including search terms used.

The Impact on Nurses in New Zealand

Nurses in New Zealand have been shown to give the majority of vaccinations in general practices and therefore have an important role in increasing and maintaining high vaccine coverage rates. Points covered in this dissertation would be useful to learn about to both understand what the parents are talking about and to help guide the conversation in a beneficial direction. This includes the common myths and misconceptions that parents may hear about or have worries about; common tactics used by anti-vaccine websites to discuss with parents quoting

these sites; and information about both the diseases and their vaccines. The encouraging news is that parents using the New Zealand Google search with generic search terms are being exposed to good quality sites that discuss the diseases and the vaccines, especially the side effects of the vaccines which parents have been shown to seek out.

There are many official websites with information on the diseases and their vaccines and on the common myths and misconceptions. These websites, such as those from the Ministry of Health and the Immunisation Advisory Centre, are useful for parents to read as they facilitate informed decisions by the provision of accurate information. There is currently no easy-to-read or accessible matrix for health professionals, including nurses, to share with parents about the common tactics used by the anti-vaccine websites. Information from two of the articles used in the above literature review have been condensed and reworded to produce an easy-to-read and understandable matrix exposing these common tactics (see Table 3 p. 43). This resource may help parents with their research by increasing their awareness of the tactics used to present material on anti-vaccination websites.

The postmodern medical paradigm and the rise of the informed patient means a change for the nursing role. Patients now come in having often done research online and can become 'experts' in the area affecting them. This means that health professionals are no longer the expert voice but the guiding voice (L. H. Kennedy et al., 2011). They must help the patient make sense of the information and translate it so that it is understandable and relatable. Nurses arguably spend the most amount of time with patients of all the health professionals and therefore have a big role in helping with these discussions.

Table 3: Matrix of common tactics used anti-vaccination websites

Anti-vaccination website tactics to scare parents
<p>Stop and think. Does the website you are reading have highly emotive content such as stories of a bubbly child dying not long after their vaccinations? Does the website have claims of conspiracies to do with governments and drug companies? Does the website use all their own research or studies that you can't find elsewhere? Does this website use explicit statements like "vaccines are toxic"? If so this website may not be telling you the truth. Stick to websites that show both sides such as information on the diseases and the vaccinations. Also websites well informed by scientific research such as http://www.immune.org.nz/ and those recommended by your GP. Below are some tips on what to look out for with anti-vaccination websites.</p> <p>An air of authority</p> <ul style="list-style-type: none"> • Skewing science – rejecting studies that don't support their position and endorsing those that do. Often they won't cite where their 'damning research' has come from or their research will be nearly all self-published works. • Officially named websites – their name implies a position of authority or official status such as "International medical council on vaccinations". • Shifting theories – proposing new reasons for vaccine harm every time a reason is found to be untrue. <p>Emotive appeals</p> <ul style="list-style-type: none"> • Personal testimonies – personalised accounts of children being hurt by vaccines. • Responsible parenting – stating that responsible parents know all the facts and those not vaccinating must be the parents that truly love their children. • Us vs them – claims that they are just looking out for parents against the government and doctors. <p>Conspiracy stories</p> <ul style="list-style-type: none"> • Cover ups and fact revealing – claiming the truth is being covered and withheld from the public. That they are presenting the actual facts and all parents should be informed by them. • Doctors are misinformed – claiming doctors to have outdated information, have vested interests in vaccines, too scared to acknowledge the truth. • Profit – claims that vaccines are for monetary gain amongst doctors, pharmaceutical companies, governments and not for public good. <p>Explicit claims</p> <ul style="list-style-type: none"> • Trivial disease – saying these disease are normal parts of childhood. • Poisons and harmful – "vaccines are toxic" or saying they cause other diseases • Natural is better – saying "vaccine are unnatural" or "natural immunity is better". Also that vaccines weaken our immune system. • Disease decline not due to vaccines – "vaccines didn't save us". • Science is wrong – "science was wrong before" "Galileo was persecuted too" <p>Information all gathered from Kata, A. (2012). Anti-vaccine activists, web 2.0, and the postmodern paradigm - An overview of tactics and tropes used online by the anti-vaccination movement. <i>Vaccine</i>, 30(25), 3778-3789.</p> <p>Davies, P., Chapman, S., & Leask, J. (2002). Antivaccination activists on the world wide web. <i>Archives of disease in childhood</i>, 87(1), 22-25</p>

Parents must navigate the extensive amounts of information and advice when it comes to doing what is right for their children. Vaccinations are an important part of maintaining a healthy community but it can be difficult for parents to subject their child to pain to protect against something that they may or may not get in the future. Nurses therefore have a role in helping parents navigate the wealth of information there is available and to understand the risks involved so that they feel comfortable in making an informed choice to have their children vaccinated.

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Appendix A

Age	Disease protected against
6 weeks	<ul style="list-style-type: none"> • Rotavirus • Diphtheria/Tetanus/Pertussis/Polio/Hepatitis B/Haemophilus influenza type b • Pneumococcal
3 months	<ul style="list-style-type: none"> • Rotavirus • Diphtheria/Tetanus/Pertussis/Polio/Hepatitis B/Haemophilus influenza type b • Pneumococcal
5 months	<ul style="list-style-type: none"> • Rotavirus • Diphtheria/Tetanus/Pertussis/Polio/Hepatitis B/Haemophilus influenza type b • Pneumococcal
15 months	<ul style="list-style-type: none"> • Haemophilus influenza type b • Measles/Mumps/Rubella • Pneumococcal
4 years	<ul style="list-style-type: none"> • Diphtheria/Tetanus/Pertussis/Polio • Measles/Mumps/Rubella
11 years	<ul style="list-style-type: none"> • Tetanus/Diphtheria/Pertussis
12 years (girls only)	<ul style="list-style-type: none"> • Human papillomavirus (3 does over 6 months)
45 years	<ul style="list-style-type: none"> • Diphtheria/Tetanus
65 years	<ul style="list-style-type: none"> • Diphtheria/Tetanus • Influenza (annually)

The above information is from the Ministry of Health (2015a) and covers the free immunisation schedule for New Zealanders.

Appendix B

Search number	Query	Number of results
1	immunization programs/ or mass vaccination/	10313
2	measles vaccine/ or mumps vaccine/ or measles- mumps-rubella vaccine/ or exp poliovirus vaccines/ or rubella vaccine/	16251
3	diphtheria-tetanus-pertussis vaccine/ or diphtheria-tetanus vaccine/ or pertussis vaccine/	6896
4	1 or 2 or 3	30213
5	limit 4 to ("infant (1 to 23 months)" or "preschool child (2 to 5 years)")	13215
6	*attitude to health/ or *health knowledge, attitudes, practice/	78477
7	"patient acceptance of health care"/ or treatment refusal/	44063
8	uptake.ti.	59479
9	(refuse or refusal).ti.	3023
10	perception.ti.	30845
11	attitude.ti.	7644
12	myth*.tw.	10843
13	6 or 7 or 8 or 9 or 10 or 11 or 12	224183
14	5 and 13	432
15	limit 14 to yr="1995 -Current"	373

The above shows the search strategy used in Ovid Medline for the literature review section of this paper.

Appendix C

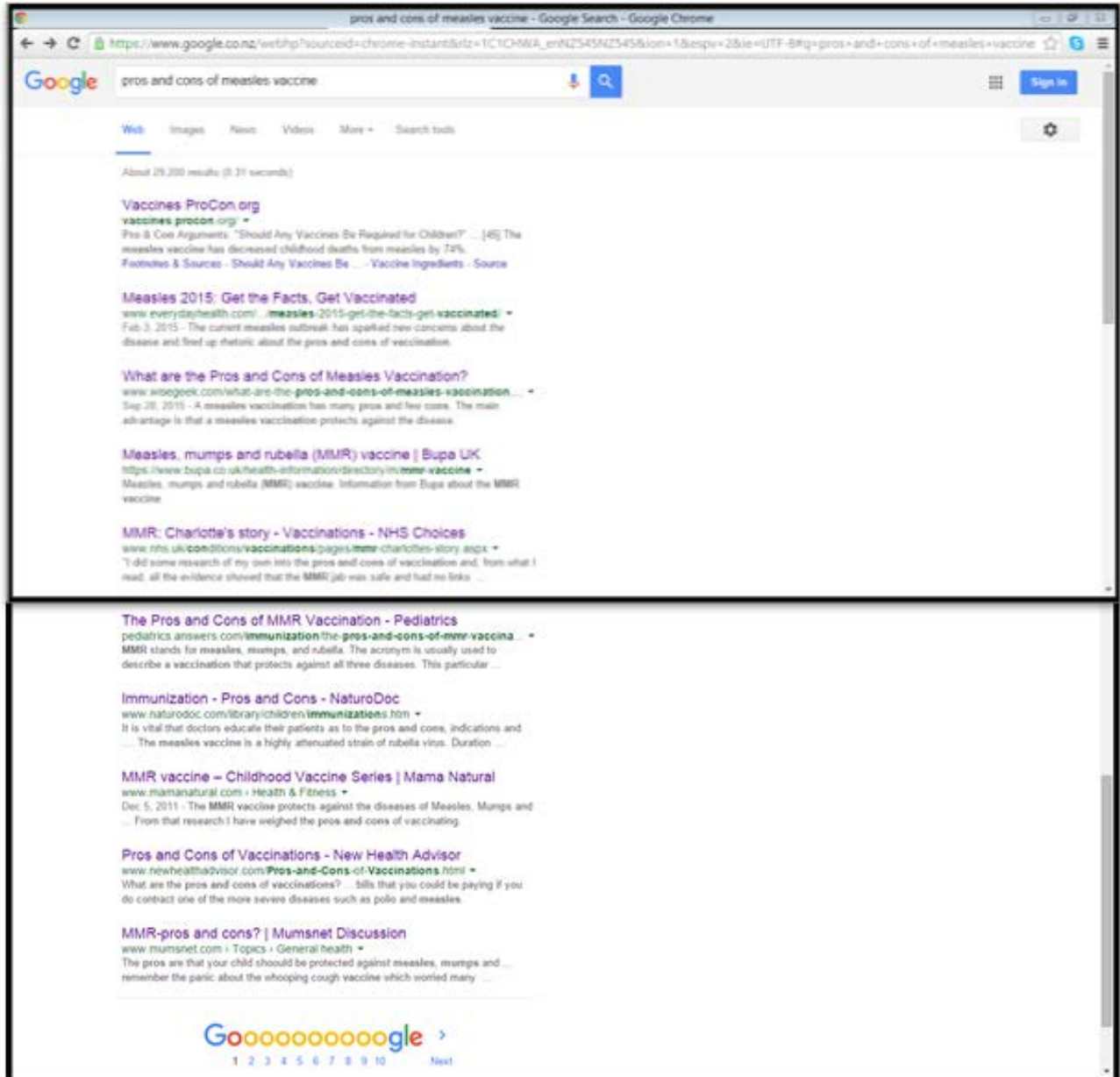
The screenshot shows a Google search for "measles vaccine" on a New Zealand domain. The search results are as follows:

- rubella vaccine**: Measles is seldom given as individual vaccine nowadays and is often given in combination with mumps and rubella. Two types of measles vaccines are currently available. Measles mumps **rubella vaccine** (MMR-II). MMR vaccine is a live attenuated viral vaccine used to induce immunity against measles, mumps and rubella. Source: [Measles vaccine - Wikipedia, the free encyclopedia](https://en.wikipedia.org/wiki/Measles_vaccine).
- Measles vaccine**: Measles vaccine is a vaccine that is very effective at preventing measles. After one dose 85% of children one month of age and 95% over twelve months of age are immune. Source: Wikipedia.
- Measles immunisation | kidshealth**: www.kidshealth.org.nz/measles-immunisation. The combined measles, mumps, rubella vaccine (MMR) is the only available vaccine to prevent measles in New Zealand.
- Measles vaccine - Wikipedia, the free encyclopedia**: https://en.wikipedia.org/wiki/Measles_vaccine. Measles is seldom given as individual vaccine nowadays and is often given in combination with mumps and rubella. Two types of measles vaccines are currently available. Measles mumps rubella vaccine (MMR-II). MMR vaccine is a live attenuated viral vaccine used to induce immunity against measles, mumps and rubella.
- Measles | Ministry of Health NZ**: www.health.govt.nz. Conditions & treatments > Diseases and illnesses. Aug 18, 2015 - Measles is a highly contagious disease that can be life threatening. 2 doses of the measles vaccine is all you need to protect yourself, your...
- Measles | Vaccines.gov**: www.vaccines.gov. Diseases > Measles. MMRV vaccine is licensed for children 12 months to 12 years of age and may be used in place of MMR vaccine if varicella vaccination is also needed.
- M-M-R® II | Immunisation Advisory Centre**: www.immune.org.nz. Vaccines and Vaccination > Vaccines. Sep 7, 2015 - M-M-R® II is used for primary vaccination and re-vaccination of children and adults to protect against measles, mumps and rubella. Who should...
- Measles | Immunisation Advisory Centre**: www.immune.org.nz. Vaccine Preventable Diseases. It is also known by the names English measles, morbilli and rubella. Measles is now the third most common vaccine-preventable cause of death among children.
- Measles | Vaccination | CDC**: www.cdc.gov/measles/vaccination.html. Jul 1, 2015 - Measles can be prevented with the MMR (measles, mumps, and rubella) vaccine. One dose of MMR vaccine is about 93% effective at...
- Vaccines: VPD-VAC/Measles/main page**: www.cdc.gov/vaccines/vpd-vac/measles. Measles vaccine info for parents, public, and healthcare professionals.
- Measles, Mumps, and Rubella (MMR) Vaccine - WebMD**: www.webmd.com/vaccines/measles-mumps-and-rubella-mmr-vaccine. The measles, mumps, and rubella (MMR) vaccine is recommended for all children. It protects against three potentially serious illnesses. It is a two-part...
- Vaccines: VPD-VAC/Measles/main page**: www.cdc.gov/vaccines/vpd-vac/measles. Measles vaccine info for parents, public, and healthcare professionals.
- Measles, Mumps, and Rubella (MMR) Vaccine - WebMD**: www.webmd.com/vaccines/measles-mumps-and-rubella-mmr-vaccine. The measles, mumps, and rubella (MMR) vaccine is recommended for all children. It protects against three potentially serious illnesses. It is a two-part...
- Measles and measles vaccines: fourteen things to consider ...**: www.vaccinationcouncil.org/measles-and-measles-vaccines-fourteen-things-to-consider. Jun 24, 2014 - After all, a vaccine was developed 50 years ago that "defeated" the problem. [1] But wait... despite a measles vaccine being around for half a...

Searches related to measles vaccine:

- measles vaccine for adults
- measles vaccine efficacy
- measles vaccine side effects
- how long does measles vaccine last
- measles vaccine active
- measles vaccine history
- measles vaccine schedule
- measles vaccine ingredients

At the bottom of the page, there is a Google logo with a search bar and navigation links for "Help", "Send feedback", "Privacy", and "Terms".



The above are screen shots of the two google searches undertaken on the 15/10/2015 with the search terms “measles vaccine” and “pros and cons of the measles vaccine”.