

**Raising awareness about anti-microbial resistance:
a nationwide video and arts competition for Chinese university students using
social media**

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This chapter will describe a baseline investigation about antibiotic knowledge, attitudes and use among Chinese university students, and the subsequent competition, which elicited submissions of artworks to raise awareness about anti-microbial resistance. The baseline investigation was carried-out using the on-line Wen Juan Xing survey tool at six universities, representing all Chinese regions. A total of 11,915 respondents demonstrated widespread misuse of antibiotics, and an inverse correlation between knowledge and misuse. The findings led to a decision to launch a nationwide university competition for artworks, through social media networks, and a dedicated website. Expressions of interest were received from 356 teams at 71 universities, across 29 provinces. This produced 142 submissions. A long list of 66 was reduced to 32 through a dual voting system: a panel of academics and student representatives from Zhejiang University, and a public vote via a WeChat public account. Around 50,000 people voted on the shortlist of 32. The shortlisted artworks were showcased and judged at “The AMR Summit” at Zhejiang University in October 2016. Winners received monetary prizes and certificates, with dissemination of their work through social and mainstream media, and the WHO website. The artworks not only demonstrate the talent and creativity of the students, but also the potential power of art forms and social media to deliver public health messages.

1. Background

Antimicrobial resistance (AMR) is one of the greatest threats to global population health this century, and a major contributor to rising healthcare costs worldwide [1]. The 2014 Review on Antimicrobial Resistance estimated that current annual mortality attributable to AMR is 700,000, and that this will rise to 10 million by 2050, if action is not taken to reduce our use of antibiotics [2]. Predictions have been made of a "post-antibiotic era", where people die from simple infections that have been

treatable for decades, and where surgical procedures will be too dangerous to carry-out [3]. It is agreed that significant action is needed urgently.

Misuse of antibiotics, both in medicine and agriculture, is well-established as the major driver of AMR [2]. At a biological level, resistance results from mutations in bacteria and selection pressure from antibiotic use, in humans, agriculture, and aquaculture [4.] This provides a competitive advantage for mutated strains. The most important causes of AMR are the routine inappropriate use of antibiotics as growth promoters in the livestock industry, their routine inappropriate misuse for self-limiting illnesses in medicine, as well as for prophylaxis [5]. In medicine, despite awareness by doctors that antibiotics should be used with care, defensive medicine and profit motives are driving the increase in antibiotic use in many countries [4].

In China overuse of antibiotics is highly pervasive [6]. This has led to very high and increasing rates of AMR in both hospital and community-acquired infections [7]. This is exacerbated by poor practice of infection control measures in many hospitals. Spread of resistance, within and outside China, is facilitated by high population mobility, with massive rural-urban migration and increasing foreign travel [8].

The Chinese government is aware of the problem. In 2004 antibiotic sales without prescription in pharmacies were banned in China, yet the ease of access to antibiotics without a prescription has been well documented [9].

In 2011, the Ministry of Health set up a special task force on antibiotic stewardship, resulting in strict rulings covering all aspects of antibiotic use in hospitals [10]. As a result, the use of antibiotics in many hospitals, especially in tertiary settings, has reduced. However, overall use remains high. In hospitals in China, around two-thirds of in-patients and 60% of all out-patients are prescribed antibiotics [11]. This high level of prescribing is largely blamed on the reliance on drug sales for health provider income, belief in the curative powers of antibiotics for many conditions (including self-limiting ones), which leads to patient demand, and simple habit on the part of doctors [7]. Misuse in China is high compared with most developed countries where regulatory frameworks control prescribing behaviours of doctors and pharmacists. But in many countries, especially low and middle income countries, where such frameworks are absent or not enforced, doctors misuse antibiotics with

impunity, and antibiotics can be easily purchased without prescription in retail pharmacies, shops and markets [2].

2.The baseline research

2.1 Aims and Methods

Against this background we started to observe what was clearly unnecessary consumption of antibiotics at our own university. Conversations with students and staff showed that unnecessary use was very common, with many individuals taking antibiotics as “prophylaxis” for upper respiratory tract infections. This led to the plan to conduct a cross-sectional study in an attempt to quantify the use of antibiotics. The aim was to explore the knowledge, attitudes and behaviours of university students at top Chinese universities. They represent the educational elite and future opinion leaders, and are also the next generation of parents of young children, who are known to be very high users of antibiotics [10]. So the knowledge and behaviours of these young people are especially important to the future trajectory of antibiotic use in China. Specifically, we aimed to explore knowledge and healthcare seeking behaviours in relation to antibiotic use in university students from all six Chinese regions. The six participating universities were: Nankai, Zhejiang, Jilin, Lanzhou Wuhan and Guizhou. These represented the north, east, northeast, northwest, south and southwest, respectively. The survey was conducted from November 2015 to February 2016. The paper has been published [12], and we summarise it below.

The questionnaire comprised three sections: 1) socio-demographic information, 2) antibiotic knowledge, including indications for antibiotic use and awareness of dangers of overuse, and 3) health care-seeking behaviour focusing on self-limiting illness and the use of antibiotics.

To collect the data we used the electronic questionnaire tool, Wen Juan Xing (Chinese Survey Monkey). At the outset we set-up a dedicated WeChat account for the research project. This facilitated all communication and allowed for rapid dissemination of ideas as the project evolved. At each university we identified two local researchers who would take the lead. This was crucial to the smooth-running of the data collection. We aimed to achieve a sample size per university of around

1800 students across a range of disciplines, to include undergraduates and postgraduates. At each university students attending class on the main campus on the day of the survey were included. The investigator approached teachers, explained the aim of the survey and asked for permission to speak to students before the class began. No teacher refused. The investigator then explained the aim of the survey to the students, disseminated the printed QR code of the electronic questionnaires, and explained how to complete the electronic questionnaire. The first section of the questionnaire consisted of an information sheet and consent form which was signed-off by all participants. A gratuity of 3RMB (US\$ 0.5) was paid automatically via WeChat to all students who completed the questionnaire.

2.2 Survey results

Completed questionnaires were obtained from 11,915 students. Their mean age was 20.8, and 44% were from rural areas. The overwhelming majority were aware that overuse of antibiotics was potentially dangerous. In contrast knowledge of appropriate use was highly variable: in terms of knowledge of antibiotic use, 61% of the students thought that antibiotics are effective against viruses, 38% stated that antibiotics were effective for sore throat, 30% for the common cold and 31% for diarrhoea, with 41% thinking that antibiotics can speed up recovery from flu.

In terms of behaviours in the past month 30% of the students reported experience of a self-limiting illness. Of these 68% had common cold, 36% sore throat, 19% diarrhoea, 18% fever and 17% headache, with some obvious overlap between symptoms. Of these 27% went to see a doctor, and 66% were prescribed antibiotics, with 32% given by infusion; 23% said they specifically asked for antibiotics, because the doctor did not initially prescribe them, and in all cases the doctor did then prescribe antibiotics. Of those students who had an illness in the last month 51% treated themselves for their symptoms, of these 30% used antibiotics. In the past year 23% had taken antibiotics for prophylaxis and 56% had bought antibiotics from a pharmacy without a prescription. A stock of antibiotics was kept at home or in the dormitory by 63% of the students. Antibiotic use was higher in students from rural areas and was highest in Guizhou, the poorest province in our study. Students who scored higher on the knowledge questions were less likely to use antibiotics. While doctors are clearly inappropriately prescribing antibiotics, they are also responding

specifically to patient demand for antibiotics, and students are clearly self-medicating through purchase of antibiotics at pharmacies, although as noted purchase of antibiotics without prescription has been illegal since 2004. Enforcement is virtually non-existent.

The aggregated results were sent via WeChat to all participants, with explanations of the correct answers, both to increase the understanding of those who got questions wrong, and to generally inform the students about AMR and rational use of antibiotics.

3. The competition

3.1 Process

The results showed very high levels of misuse of antibiotics among some of the best educated individuals in the country. Consequently we started to consider ways, not only of increasing awareness of the dangers of overuse of antibiotics, but also of promoting the appropriate use of antibiotics in university students. We recognised that the key was to get students actively engaged and enthused about the topic, and hence encourage them to explore the topic for themselves. We finally came up with the idea of holding a competition, which would involve students developing works of art, which could deliver two key messages to a general audience: about the dangers of anti-microbial resistance, and about the appropriate use of antibiotics to a general audience.

Using the WeChat platform we had originally set-up to support the research, and where we had reported the aggregated results of the research, we made an announcement of a nationwide competition open to all university students. The call was for artworks of any type, for example, film, posters, fine art, cartoons, and logos. The remit was to communicate the message of anti-microbial resistance, its causes, its consequences, and its prevention to a wide, general audience. We explicitly encouraged students to work in multi-disciplinary teams, with a view to improving the quality and variety of the submissions, as well as increasing mutual learning and understanding between very different disciplines. For example, students from the the arts and humanities, fine art, media studies or information technology, would

work with medical or biological sciences students, the latter providing the scientific knowledge and expertise, and the former the creative elements.

A dedicated website was set-up. Here we uploaded all the background information necessary to inform the accurate content of any submissions. This included: key academic papers on the importance of AMR from the human, animal and environmental perspectives, the biological mechanisms of resistance, the epidemiology of AMR with a focus on China, the results of our university survey, selected recent global and national reports, and the official regulations about antibiotic use in China. We offered generous cash prizes to the six winners, one first prize, two second and three third prizes.

In universities where we had specific existing links we identified so-called AMR champions, who actively disseminated information about the competition and who encouraged and advised potential applicants. By the end of June 2016 we had Expressions of Interest from 356 teams at 71 universities, in 29 provinces, including Tibet, and as well as Hong Kong. By the deadline at the end of August we had received 142 submissions.

The process of selecting the winners involved a number of steps. First, the team of four organisers viewed all submissions and developed a long list of 66. Overall criteria for selection were a clear message, delivered in an accessible and entertaining way. Most of those who did not get through, failed because of inaccurate messaging or a style which was too didactic.

This long list comprised: 31 short films, 14 posters, 10 logos, two powerpoint presentations, one fine art painting, two electronic magazines, a decorative drug box warning, plus a set of painted manhole covers on a university campus. They came from 35 universities, with three submissions representing collaboration between two universities. A large number of films made the long list. There were several entrants from a number of universities, for example, six from Peking University, Zhongshan University and Shanxi Medical University respectively, and four from Fudan University. At these universities we had established “AMR champions” who promoted the competition on campus.

We had planned to hold the finals of the competition to be called “The AMR Summit” at Zhejiang University just after the G20 summit, which was to take place in Hangzhou. But restrictions on movement in Hangzhou around the time of the G20 made this impossible, so the so-called AMR summit was planned for the following month, on October 23. The timing around the G20 Summit was important because we knew that an announcement of a strategy to address AMR was to be made, demonstrating that the Chinese government was taking the issue seriously, and we wanted to capitalise on the interest which would be generated.

The long list of 66 needed to be reduced, to ensure the quality of the submissions which would be displayed at the AMR Summit. So we convened a panel of judges consisting of five academics from relevant disciplines at Zhejiang University, including medicine, microbiology, health promotion, and media, and five student representatives from these disciplines. The panel spent an afternoon evaluating and scoring the individual submissions, using an agreed protocol, based on artistic merit, innovation, and strength and clarity of the health education message for a general population. A final total of 32 were selected for display at the Summit.

The final 32 included fourteen videos, five cartoons, three powerpoint presentations, nine posters and the painted manhole covers. To select the winners we developed a dual voting process. This involved a public vote through the website and an expert vote which would take place at the AMR Summit.

So, first all 32 were uploaded to the dedicated website to allow the public to vote. The software was sophisticated enough to enable a fair system of voting. This allowed us to ensure that individuals could only vote once, and that they could choose their three favourites, only after all the submissions had been viewed. This was designed to stop people just voting (frequently) for themselves, or getting friends and family to vote (frequently) for them. A total of nearly 50,000 people voted and the system itself developed the ranking of all submissions. This process alone generated a lot of interest. Some of the contenders complained at the order of the submissions as they appeared on the website. Specifically, they felt that the submissions shown lower down the page would get fewer votes, so they asked for the order to be changed randomly on a daily basis. This proved harder than we expected, but we did manage to do change the order twice during the one month

voting period. However, we have no evidence about whether it changed voting patterns.

3.2 The AMR Summit

The second element of the voting came at the AMR Summit on October 23, 2016 at Zhejiang University. A panel, consisting of external experts in public health, health promotion, clinical medicine and media studies judged all the entrants, by the same criteria used in the first phase of judging. All shortlisted candidates attended the Summit. A representative of each team personally presented their submission with some background explanation about how the ideas were developed and brought to fruition. The marks of the Summit judges and the public vote were combined on a 50:50 basis to select the winners.

The Summit itself was a memorable event. It was attended by about 350 people, including the general public.

We invited Jim O' Neill, the lead author of the highly influential 2014 review on AMR "Antimicrobial resistance: tackling a crisis for the health and wealth of nations", and the China Director of WHO, Dr Bernhard Schwartlander, to provide short, supportive, and inspirational videos, which were shown at the start of the event. Local media were also present.

All winners, one first prize, two second prizes and three third prizes, received monetary prizes and certificates. All other participants received certificates stating they were on the final short-list and that they had presented at the Summit.

4. The Artworks

Before announcing the call we were genuinely concerned about the potential quantity and quality of the artworks. But we were very pleasantly surprised. The 32 shortlisted artworks demonstrated great variety, imagination and innovation, making the judging process a considerable challenge. Unfortunately, a very impressive and huge poster made from antibiotic packets, which would have come second, had to be withdrawn, having been found to be unoriginal. The films varied in length between 45 seconds and 12 minutes with most around 2-3 minutes. The main focus of the

submissions of all types can be divided into three areas: 1) the AMR apocalypse, 2) why overuse of antibiotics is harmful, and 3) the historical perspective – the discovery of penicillin through to the dangers of AMR in the future. Most focussed on human aspects of AMR, rather than animal or environmental, though a few touched on all three.

Very noticeably the videos used striking imagery (for example the world being taken over by superbugs), interesting voices (for example of young children, and the creation of compelling characters. In most, attention was paid to ensuring the background music was particularly suitable and effective at strengthening the message.

The winning submission came from Fudan University. This was an impressive and highly original piece of film-making. Shot in black and white with captions in English and Chinese it was a hybrid of modern dance and silent cinema. It portrays a dream in which the protagonist takes over the world as the “King” of the superbugs. It manages to combine simplicity - it was all filmed in a gymnasium, with students acting the roles of bacteria and antibiotics - with a highly imaginative use of music, dance and symbolism. The credits included a choreographer and music director, demonstrating the very professional approach of the film. There was some critique from the judges: it was thought too long to be useful for education of the general public (it was over 12 minutes long, more than twice as long as any other film), it could have been easily edited in places (especially the dance sequences) without loss of impact, and the story, which was about acquiring resistance through exposure to antibiotics, could have been a bit simpler for a general audience. But this was overall a very impressive piece of cinematography.

Hand painting from Nanjing Medical University is an animation film, illustrating the story of bacteria and antibiotic resistance, distinguished not only by the vivid colours and expressiveness of the animations, but also by showing us the hand at work, so that we see the ingenuity of the hand painting technique.

Paperman History, also came from Nanjing Medical University. It uses animated paper figures and cut-outs to enliven a short lecture. The narrator’s voice is gravelly and deadpan, which is an intriguing choice, and lends a unique quality to a film which delivers a very clear, but simple message about AMR.

One entrant was singled- out for particular originality. This came from Shanxi Medical University where all the manhole covers on the campus were painted with messages about AMR, and successfully created a talking point for everyone working and living on the campus.

5. Reflections

The competition demonstrates the potential of the combination of a competitive element, social media and creative artworks, to be successful at delivering public health messages. The artworks were viewed by a large audience, which should of course increase awareness of AMR. The fact that 50,000 people voted is a success in itself, irrespective of the fact that many of them are simply family, friends and classmates of the competitors.

From feedback we know that this was a very positive experience for the competitors. The majority were from medical and biological backgrounds, so nearly all had never taken part in an art competition. Nearly all worked in teams (with up to 10 members). Fifteen of the short-listed teams which included students from both the sciences (mostly medicine) and the arts and humanities (mostly information technology and media studies). Many talked of the benefits of working in multidisciplinary teams. For example, one of the medical students said that she had learnt how to present messages about health education in an engaging and entertaining way, which she had never considered before. One group talked about how they had spent a lot of time brainstorming, both how to approach the topic, and how to explain the biological background to the general public in an understandable and accessible way. They had approached the challenge from different angles, and had learnt a lot about each other's disciplines, simply through the process of brain-storming. A few groups talked about how they had learnt to respect the knowledge and skills of students from disciplines they had previously regarded as somewhat inferior.

This was our first foray into attempting a nationwide competition, so there were challenges at every step. The main problems arose with our desire to judge fairly. While the steps of the process we believe were both fair and meticulous, it is very difficult to compare, for example, a poster with a film. We did consider judging groups separately with a prize in each category, but the group sizes were very

unbalanced, and the publicity for the competition was very specific about prizes, so we were unable to change it.

In terms of actual awareness-raising about AMR, we know that the artworks have been widely viewed, first by the 50,000 “judges”, and through dissemination by local media who attended the Summit. Nearly all the artworks have been shown on the participating universities’ websites, and even more widely through sharing on WeChat and on the dedicated website. Finally, the World Health Organisation displayed the winning films on its website during their global AMR week in November 2017. Clearly the total exposure is unquantifiable, but nonetheless considerable.

6. Conclusion

The use of various forms of artwork, and especially film, is a potentially effective way of conveying the message of the dangers of AMR to the general public. The ubiquity of Smartphones in China means that the films are easily downloadable and accessible to a potentially very wide population. But the most important question is whether increased awareness translates into behaviour change, that is, less misuse of antibiotics, and this is not clear. Two of the participating universities conducted small studies suggesting that knowledge of AMR had increased, and use of antibiotics decreased, compared with the original survey. But this is self-reported and actual use of antibiotics could not be measured. This approach, that is the encouraging of students to be creative and competitive, with the production of artworks of a very high standard, serves as one small contribution to the fight against antibiotic misuse and AMR.

Examples of seven of the shortlisted videos, including the winning film are shown at.....

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