The number of scientific publications coming out of China is increasing rapidly, but concerns remain about the quality. **Geoff Watts** reports

The rise of science in China has been spectacular. Flick through the pages of 20 year old issues of *Nature, Science, and* other international journals and you’ll find only a scattering of research reports from the country. At that time, as data from the *Science Citation Index* show, China’s scientists published only about 6000 papers a year. Compare this with the 2008 figure of well over 270 000, or 11.5% of the year’s global output.

No wonder a Royal Society report earlier this year suggested that by 2020 China could be the world’s most prolific producer of research. And what is true of Chinese science in general finds a strong echo in biomedicine. Chinese work is now commonplace in basic research journals such as *Cell, Genetics, or Biochemistry.* And, to a lesser extent, the same is becoming true of clinically oriented publications such as the *Lancet* and the *New England Journal of Medicine.*

The only cause for disquiet about this impressive and generally laudable embrace of science is a persistent undertone of claims (or proof) that not all the published Chinese work, even in peer reviewed international journals, is of high quality and entirely to be trusted. When it comes to Chinese language journals, the index of suspicion is still higher.

A recent experience of Greg Irving from the department of health services research at Liverpool University makes the point. At the September meeting in Warsaw of WONCA, the family doctors’ organisation, he spoke about a Cochrane review on the efficacy of hepatitis A vaccination. The data scrutinised for the study were over 3700 citations in a mixture of English language and Chinese language journals. With a colleague at the University of Peking, Dr Irving assessed their quality. “In every study of Chinese origin written in the Chinese language we found that the methodological quality was low.”

In some cases, it seems, the authors had taken what Dr Irving describes as a “pragmatic” approach to their work. “For example, they might go to great lengths to vaccinate or to give a placebo in the two arms of the trial. But, in the follow-up they might adopt a more passive approach, with only those participants who came to their attention through illness being classed as having the disease. They didn’t go out and look for every participant to find out how they had fared and so trace every case.” In other words, the Chinese findings had to be treated with caution.

The burgeoning of Chinese science in recent decades has been dramatic. Spending on research and development has grown by 20% annually since 1999 and is now in excess of $100bn (£64bn; €74bn). The aim is to raise it further, to 2.5% of gross domestic product. To this end China is training more and more science and engineering graduates. Even the number of Chinese randomised controlled trials—not one of中国的 research priorities—rose from 85 in 2000 to 743 in 2009. According to Unesco, China’s current plan for national science and technology development identifies biotechnology as one if its five main areas of research. The cultivation of new genetically modified organisms, the development of important new drugs, and the prevention and treatment of various infectious diseases are all singled out for special mention.

Huiliang Li, a neurodevelopmental biologist at the Wolfson Institute for Biomedicine, trained in Tianjin University and came to the United Kingdom in 2002. He offers the most obvious explanation for the Chinese enthusiasm for science: “If you put money into biomedical research the country will benefit economically.” Rongrong Yang, of Peking University’s Institute of Population Research, sees it slightly differently. In her field—health services and the health status of migrants—she thinks the government has simply recognised that it makes sense to do research before formulating health policy.

Zhengming Chen, professor of epidemiology at Oxford, came to the UK 20 years ago but collaborates closely with colleagues in China and goes there regularly. He has seen the focus of medical research move from basic science as the country has developed scientifically. There is now a trend towards more translational research. “During the past 20 years we have done several really big randomised controlled trials in the country, and we had to raise all the funding from outside China. For some reason they haven’t seen translational research as real research. They’ve mainly been interested in cells and genetics and that sort of thing.

“Over the past five years we’ve started to see a shift, a change of mind set. They’re more exposed to what is happening outside China. With economic development there are more resources available, and there’s more emphasis on the wellbeing of the population. Also, there’s been a change in development model, with a move to high tech and to patenting inventions. Not just made in China but made by China.”
This emphasis on applying knowledge was already apparent in 2004 when the UK Department of Trade and Industry (now renamed Business, Innovation, and Skills) organised a "stem cell mission" to explore activity in the Far East. Delegates were impressed by what they saw in China: facilities that were “equipped, funded and staffed to levels at least as good—in most cases better—than equivalent centres in the UK.”  

Importantly, they noticed another big difference, which they describe as “the drive to the clinic.” As their report concludes, “We were struck by a clear imperative among Chinese stem cell scientists to make an impact on clinical practice, which tends not to be seen in the UK.”

The enthusiasm of the Chinese for work on stem cells is paying off. By transplanting cell nuclei from human skin into rabbit oocytes, which tends not to be seen in the UK.”

Professor Chen thinks that one reason why many publications are not high quality is an emphasis on quantity over excellence. The pressure to publish is intense. “But I think this is something that funding agencies like the Ministry of Science and Technology are starting to take seriously. There is a shift. The quality will improve gradually.” The more prestigious universities and research institutes have already begun to think in these terms, adds Dr Yang. Drs Xia and Li both agree. “I believe it will become better,” says Dr Li. “The Chinese government has set up schemes to recruit Chinese scientists back from abroad. A lot of Chinese scientists have already returned to become heads of departments.” This inflow, he believes, will inevitably give a boost to quality.

Dr Li, like many Chinese postdoctoral students who come to the West, came to the UK to acquire further training and experience. At one time he might well have had an eye on the possibility of remaining here. But circumstances have changed. He hopes to go back to China next year. There are push and pull factors operating, he says. “It’s getting harder to find funding here. In China I can easily get the funding to set up my own lab.” He thinks he can build a successful research career in China in a way he might not have been able to do 20 years ago. Dr Xia agrees. “Fifteen or even ten years ago people wouldn’t feel they could go back to China to do high quality research. Now they do.”

Dr Irving, his experience notwithstanding, shares their confidence about the future of science in China. “I think communication through organisations such as WHO will exert pressure to improve quality,” he says. And when do they reach that quality threshold? “I think we’ll see Chinese research produced on an almost industrial scale.”

In short, from the East, expect stiff competition.

**Quantity over quality**

The quantity of Chinese research is undeniable. But what of its quality? And honesty? Does Dr Irving’s experience represent an exceptional lapse or one instance of something more common? The answer seems to be the latter—and the claim comes from within China itself. Although Dr Irving found no evidence of impropriety in the work he was looking at, fraud has been a recurrent problem within the country. On 12 February 2011 China’s Xinhua press agency revealed that the country’s Ministry of Science and Technology had revoked a state scientific award given in 2005 to Professor Li Liansheng, formerly of Xi’an Jiaotong University. He had been found guilty of plagiarism and fabricating data.

We shouldn’t be too pious; fraud is hardly unknown in the West. But in China it does seem to be more pervasive. “The scandal highlights that academic fraud is alive and well in China,” the Xinhua press release continues. “A survey conducted among 30 078 respondents in 2009 by the China Association for Science and Technology (CAST) showed that nearly half of the science related workers in China’s research institutes, universities, medical institutes, and hospitals think academic cheating is ‘common.’”

Less dramatic than fraud but more insidious is the problem of poor quality. Zhidao Xia came to the UK in 1998 and now works on stem cells and regenerative medicine at the school of medicine in Swansea. “In comparison with the UK or the US the quality is relatively low,” he says. “Especially in how to design research and to analyse the data. These are two major problems.”

The best Chinese research, according to Dr Yang, is published in peer reviewed international journals because these are rated more highly by the country’s research performance evaluation system. The lesser quality material is more likely to go into Chinese language journals.

**Provenance and peer review**

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Ghostwriting in medical publishing on behalf of big drug companies has a long history, finds Rachel Hendrick, and oversight of the practice has its problems.

The medical writing industry is the subject of much heated debate. Some consider medical writers to be skilled communicators of knowledge; others argue that they are merely marketing puppets working at the behest of drug company masters.

Industry documents released during litigation show that some drug companies have hired medical writers to anonymously develop articles that portray their product favourably and have then paid academic physicians or scientists to be named as authors. This practice has been termed “ghostwriting.”

Lisa Bero, professor of health policy and clinical pharmacy at the University of California, explains: “The main problem with ghostwriting is that you don’t know who is accountable for the research reported in the article. Knowing who will stand up for the integrity of the data is critical to trusting a scientific publication.”

Others suggest that the employment of professional medical writers gives the drug industry greater control over what is written about its products. “Ghostwriting is pernicious because it takes marketing and disguises it as science,” says Paul Thacker, a former investigator for Charles Grassley (senior US senator for Iowa) who researches medical conflicts of interest. “This completely undermines the foundation of science, meaning that any attempt at understanding is skewed in a marketing direction.”

Examples of ghostwriting include GlaxoSmithKline (GSK), then known as SmithKline Beecham, who employed a medical writing agency to produce articles promoting their drug paroxetine (UK brand name Seroxat; US brand name Paxil), a selective serotonin reuptake inhibitor antidepressant drug, in a publication programme named Case Study Publications for Peer Review (or, aptly, CASPPER, for short).

Company documents show that medical writers were hired to assist in preparing material that highlighted the benefits of paroxetine, and to respond to “unbalanced information from competitors.” The articles they produced were intended to “benefit the sales force by expanding the database of published data to support PAXIL [Seroxat],” and were “authored” by physicians identified by SmithKline Beecham.

This is an extreme form of ghostwriting, but any unacknowledged involvement of a sponsor on a manuscript is a matter of concern because of the potential influence on the content and the conclusions reached by readers.

Filling a gap
Those involved in medical communications have responded to criticism by forming organisations and developing qualifications that aim to promote ethical practice. How successful these efforts are is open to debate, and many remain concerned about the independence of those hired by the drug industry to write up their trials.

Alastair Matheson, an academic and an independent consultant with extensive industry experience, explains the ineffectiveness of current guidelines. “Everyone is publicly against ghostwriting, but the key thing is, industry organisations and a few watchdogs define it in the wrong way. They say that ghostwriting only occurs if the writer is not acknowledged. Using that definition, they can generate a piece, put an acknowledgement in the footnotes, and say it is not ghostwritten, which is either a lie or disingenuous, because the piece was still conceived and developed primarily by commercial interests.”

Some point out that the highly cited industry documents quoted above are now some years old. However, Carl Elliot, professor in the Center for Bioethics and the departments of pediatrics and philosophy at the University of Minnesota, says, “The problem with deciding whether industry has changed is that it takes many years for court documents to be unsealed. So we will not know for certain for years [whether ghostwriting is still occurring now]. When industry says, ‘everything is different now,’ I would ask them to show you the proof rather than asking critics to prove that things have not changed.”

Medical writers argue that they fill a needs gap: not all researchers are able to write well, or are simply too busy to put in the time necessary to produce publications.

Adam Jacobs, founder of medical writing company Dianthus Medical Communications, says that employing medical writers is a more efficient use of resources. “Many clinical investigators are highly paid people who may not write very efficiently, and it is daft for them to spend their valuable time writing papers if someone else can do it more efficiently,” he says.

However, it is not necessarily the integrity of the medical writers that is the cause for concern. “Medical writers are hired to write and they usually do it well,” Bero says. “It is the motives of the industries that hire them that need to be questioned.”

Although it has been major law suits that have turned attention to ghostwriting, it is not a new phenomenon in medicine. Nicholas Rasmussen, professor of history at the University of New South Wales, has traced concerns about industry’s
influence on research back to the early 20th century. “Reformers like JAMA editor George Simons [were] outraged at drug firms ‘debauching our journals’,” Rasmussen says.

By the 1930s drug companies had grasped the role medical journals could play in marketing their products. Memos from this period show the relationship between the drug company Smith Kline French and Joseph Scarano, a rhinologist from Philadelphia. The company was involved in “outlining Scarano’s protocols in advance, preparing his illustrations, and submitting papers to journals for him (presumably after editing by the firm).”

“Marketing and medical staff in companies like Smith Kline French learned how to design trials to meet commercial goals, and then to commission clinicians to conduct these firm initiated and sponsored studies. In some cases they seem also to have written up (or helped write) the resulting reports, as in Scarano’s case,” says Rasmussen.

The marketing drive found further impetus after the second world war, when new medicines, surgical procedures, and psychological treatments led to a rise in spending on biomedical research and healthcare. As the drug market became more competitive, companies began to hire medical writers as part of their marketing teams.

A gradual evolution

The thalidomide disaster in the 1960s, where the morning sickness drug was found to cause birth defects, heralded the start of drug regulation and companies turned to medical writers to compile the complex dossiers required by regulators.

It was in the 1980s that the medical writing industry really took off, as the commercialisation of research began in earnest. Partnerships between universities and industry were actively encouraged in the US, and a number of policies encouraged private companies to invest heavily in university research. Legislation persuaded researchers to patent publicly funded work and then to license it to private companies in return for royalties. By 2003, an estimated 60% of biomedical research in the US was funded by private companies. The UK witnessed a similar expansion with universities operating increasingly as businesses.

Marcia Angell, senior lecturer in social medicine at Harvard Medical School and former editor of the New England Journal of Medicine, says, “Academic medical centres have largely become arms of the pharmaceutical and device industries, and adopted their agendas,” and that commercial research needed marketing.

The marketing was partly done via so called communications, such as journal articles, conference papers and posters, and patient education information. “Given the huge costs of bringing a new product to the market and the short patent protection, companies have to sell as much of the product as quickly as possible in order to finance the development of new products,” says one medical writer.

Drug companies began to outsource their communications strategies to cut overheads. Sensing the commercial potential, medical communications agencies began to emerge. Early examples include Scientific Therapeutics Information (established in 1985), Health Science Communications (established in 1987), and Fleishman-Hillard (established in 1988).

The sector has since boomed and medical writing has become an industry in its own right. Medical writers can now be found working in a variety of arenas: independent agencies, subsidiaries of advertising and public relations companies, contract research organisations, journal publishers, and as freelancers. They are employed to communicate clinical and scientific research and they work on a variety of materials, such as regulatory documents, marketing materials, and journal articles. It is hard to tell exactly how many agencies or professional medical writers there are as there is no formal registered database.

A number of organisations have been established to represent the industry and are keen to see medical writing become a respected profession.

Although some organisations have developed codes of practice, they do not have to be followed and many medical writers are not even aware of their existence. Adam Jacobs and Cindy Hamilton conducted a survey on ghostwriting in 2008 that found only 58% of those questioned were aware of the 2003 Good Publication Practice guidelines developed by the International Society for Medical Publication Professionals (ISMPP), who are themselves funded by industry.

Jacobs, who was president of the European Medical Writers Association in 2004, also acknowledges that although the organisation can encourage its more than 900 European members to abide by good practice, it has little control over the writers beyond its member base.

Some argue that self imposed standards miss the point entirely, as they fail to address the conflict between science and marketing that leads to biased literature.

Indeed, despite its commitment to good publication practice, medical writing agencies affiliated with ISMPP have, in the past, been involved in ghostwriting publications for the pharmaceutical industry.

One of these is US firm DesignWrite. The company’s CEO, Rosie Lynch, is on ISMPP’s board of trustees. Wyeth (now part of Pfizer) employed DesignWrite at the end of the 1990s to ghostwrite articles on its hormone replacement therapy drug, brand name Prempro. The company promised to provide “the bridge between marketing and clinical disciplines” and assured “that benefits of publication planning are achieved.” DesignWrite was paid $80 000 (£51 000; €59 300) to ghostwrite four articles on the Health and Osteoporosis, Progrestin, and Estrogen (HOPE) trials of low dose Prempro.

Another of ISMPP’s funders, Complete Healthcare Communications, was the medical writing company employed by SmithKline Beecham on their CASPPP programme.

The medical writing industry appears to be striving for recognition as a profession, and in the US various courses have been established to this end. Johns Hopkins University, Emerson College, and Tufts University are among those offering masters degrees in medical and health communications. Similar courses are now slowly beginning to appear at higher education institutions in Europe. The University of Worcester in the UK started a postgraduate certificate in medical communications in October 2010, offering modules that teach students how to prepare regulatory documents, present posters, identify and work with key opinion leaders (influential physicians and academics), and plan publications.

It is unclear how much information these courses provide on ethical publication practice and the most explicit references accompany the courses at the University of Worcester and at Tufts University. The former’s handbook says that, “Students will be trained in the codes of practice applicable,” and the latter has an optional module on ethical issues in health communication, which covers the function of professional codes of conduct. However, that is not to say that the other courses do not tackle this important topic. The University of Innsbruck in Austria has recently redeveloped its masters in medical writing in conjunction with EMWA, and says that about 20% of the new course, to launch in 2012, will cover good publication and writing practice.

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References can be found on bmj.com.

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Entries open for BMJ Group Improving Health Awards 2012

The *BMJ* Group Improving Health Awards are back for a fourth year with a raft of new categories designed to highlight UK medical talent, reports Rebecca Coombes.

Entries open on 8 December for a total of 12 awards—more than half of which are brand new categories—to recognise excellence in medical practice, especially in the UK. The BMJ Group awards are now established as one of the pre-eminent medical awards, and we hope to get even more than the 643 nominations received last year.

This year we have retained some categories from previous years, including Research Paper of the Year and Junior Doctor of the Year. But we have also launched seven new categories, largely aimed at showcasing the best medicine being practised in the UK. In the year that London hosts the Olympic Games, we have established an award for sport and exercise team of the year, which will go to the clinical team most successfully promoting physical activity or engaged in improving the care of athletes. Tim Brabants, the British kayaker and doctor who won a gold medal at 2008 Olympics in Beijing, will join the judging panel for this award.

Speaking from South Africa, where he is currently training, he said: “It is really important to encourage more work in this area as more people recognise the need to increase their daily levels of physical activity. It is not just for the elite level athletes that this specialist area of medicine is required. As an increasing number of people become more physically active, the numbers requiring specialist advice will also increase. “I hope to see a wide range of nominations in this diverse category that covers not only elite level sport and disability sport but also areas that encourage all people to do more physical activity.”

Fiona Godlee, editor in chief of the *BMJ*, said: “This is the fourth year of the awards and we are continuing the focus on celebrating excellence, but in 2012 the specific remit is to reward people who are improving healthcare. We want to give recognition to the unsung heroes in healthcare. In our new categories we have tried to reflect the changing environment in the UK with commissioning and the need to work in partnership.” To that end, other new awards include Clinical Commissioning Team of the Year and Working in Partnership.

Also new for 2012 is the Karen Woo Award, sponsored by BUPA. Karen Woo was a doctor killed in Afghanistan last year while working for a relief charity. Andrew Vallance-Owen, group medical director, said: “There aren’t many awards that recognise the work of doctors ‘out of normal service,’ by which we mean those who have gone beyond the call of duty, which is exactly what Karen did when helping people in Afghanistan. This new award is open to any doctor working as a volunteer or engaged in community service in their spare time. They may be working in a combat zone, in developing countries, or dealing with communities in the UK.”

So why enter? Ian Roberts is principal investigator of the CRASH trials, whose team won the Research Paper of the Year award last year for a paper on the effects of tranexamic acid in trauma patients. Of winning the award, he said: “I’m usually quite a Methodist about award ceremonies but I was completely taken by the *BMJ* Group awards—we felt like superstars. We saw it as something to share with our collaborators, including 280 hospitals; it was something for everyone to celebrate. Obviously it’s difficult to make a causal connection, but this award did help us disseminate the research in the USA, and overall it gives you a badge of quality. We were very excited about that.”

For the third year, the Medical and Dental Defence Union of Scotland (MDDUS) will be the headline sponsor of the awards.

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Daniel won the 2011 award from a shortlist of 39 candidates, all with vivid stories to tell. As a medical student, Daniel cofounded the Kenyan Orphan Project, a child health charity supporting the health and education of orphaned children in Africa. A specialist trainee in paediatrics, Daniel is unit lead for maternal and child health on the international health BSc at the University of Bristol and a member of the International Child Health Group committee. Daniel is doing a masters degree in epidemiology at the London School of Hygiene and Tropical Medicine.

“My wife Kerry nominated me and I had no idea. You never feel that what you do is worthy of recognition. I really thought it would be one of the other two finalists. It was such a humbling experience, not just to receive the award but to actually be at an award ceremony with so many accomplished and inspiring people. For months afterwards I was in a haze—a “did that really happen to me?” kind of thing. “It really helped to cement my commitment to wanting to push forward a global child health [agenda], not just in my personal and professional life but through the networks and the links that I’m already in. To some degree, we’re all seeking validation, whether it’s in our personal lives or work. I think if you’re pursuing non-commercial endeavours, a number of years go by when all hours at home and work are invested in doing things where the reward isn’t obvious. In a way receiving the award validates our efforts, and it really spurs you on. You think “if people think what I’ve been doing so far is a good idea, then I’m really going to push on with that.”

Maham Khan, Clegg Scholar, BMJ

The BMJ Group is seeking entries in 12 categories:

**RESEARCH PAPER OF THE YEAR**
Sponsored by GlaxoSmithKline, this award is for original research published after 1 January 2011, either in the UK or internationally, that makes an important addition to knowledge and helps doctors make better decisions about clinical practice, research methods, or health policy.

**IMPROVEMENT IN PATIENT SAFETY**
A new award in which judges will be looking for the project or initiative that most shows a measurable improvement in patient safety sustained for at least 18 months. The Health Foundation sponsors this award.

**WORKING IN PARTNERSHIP**
This Takeda sponsored award recognises medical teams and organisations that in 2011 have worked with external partners to improve patient outcomes. Charities, social services, and commercial bodies are examples of such external partners.

**KAREN WOO AWARD**
BUPA sponsors this award in memory of the doctor who was killed in Afghanistan last year. It recognises an individual who has gone well beyond the call of duty to care for patients.

**EXCELLENCE IN HEALTHCARE EDUCATION**
This recognises a project that demonstrates outstanding innovation in healthcare education and performance improvement. This award is sponsored by MSD.

**CLINICAL LEADER OF THE YEAR**
For a motivational and inspirational UK leader who has led a clinical team to achieve real service improvements.

**HEALTH COMMUNICATION CAMPAIGN**
New for 2012, this award celebrates a campaign or a communication to educate patients about health.

**GLOBAL HEALTH INITIATIVE**
An individual, organisation, or initiative that can demonstrate true vision, leadership, and impact in improving healthcare in developing and low income countries.

**SPORT AND EXERCISE TEAM OF THE YEAR**
For a clinical team successfully promoting physical activity or engaged in improving the care of athletes.

**JUNIOR DOCTOR OF THE YEAR**
This rewards the junior doctor who has done the most to improve the world or to inspire others.

**CLINICAL COMMISSIONING TEAM OF THE YEAR**
This award is for an initiative, started in 2010 or later, by a UK clinical commissioning team that has resulted in the provision of an innovative health or health improvement service.

**TRANSFORMING PATIENT CARE USING TECHNOLOGY**
Open to UK healthcare professionals, this award spotlights new and innovative use of health technology. Eligible projects are those started in 2010.

**ENTER NOW** online at groupawards.bmj.com until 28 February 2012.
Register your interest for tickets to the ceremony in London on 23 May 2012 by email to awards@bmjgroup.com.