China' s nursing academia pioneered the painless injection technique, with its education and widespread application leading the world for thirty years.

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Date: 2025-07-15T00:00:00+00:00

Abstract

In the "Learning from Nurse Liang Jielian in 1954" section of the Health Daily' s 70th National Day special issue, it introduced the historical facts of Liang' s creation of the painless injection method and its promotion, noting that "this was the most heartwarming scene in China' s nursing profession of that era." This paper compares Liang' s work with important foreign literature on the history of technological development (Nicoll & Hesby,2002, App Nursing Res. 引用 130 次) and relevant content in current textbooks (Dougherty & Lister,2015, 皇家临床护理手册专业第 9 版). The results show that Liang' s innovation was 20 years ahead, and its main techniques remain applicable to this day. Liang Jielian had not attended formal school; during the Anti-Japanese War, she participated in a four-week training course of the Chinese Red Cross Rescue Corps, which constituted her entire professional training. Her work represented innovation not in an obscure technique, but in a fundamental technique that has been long and widely used by thousands of nurses worldwide, which further highlights the inherent innovative talent of our people. China' s current nurses and nursing practitioners have all received excellent education and possess even greater innovative capacity and wisdom. With enhanced confidence, they will certainly be able to innovate more and more meaningful advanced concepts and methods, such as new approaches to better address the needs of an aging society, thereby making the painless and happy old age—a universal ideal and dream of humanity—potentially achievable!

The new method of painless injection only acquires genuine and practical social significance when it is transformed into widespread and long-term application through learning and promotion, continuous education, and persistence. In these aspects, our country leads foreign nations by at least 30-40 years. This is primarily attributable to the personal experience and support of leaders at all

levels; the organization and promotion by the Ministry of Health and the Chinese Nursing Association; the introduction by media such as Health Daily and nursing journals; and most importantly, the continuous efforts and education by generations of nursing experts and professors including Mei Zuyi, Yin Lei, Li Xiaohan, and Shang Shaomei, as well as the active learning and long-term persistence of numerous nurses.

In summary, this is yet another example that demonstrates the institutional advantage of our nation in accomplishing good deeds more quickly and more effectively.

Full Text

Preamble

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Abstract

A section in the *Health News* 70th-anniversary special issue titled "Learning from Nurse Liang Jielian in 1954" recounts the history of Liang' s creation and promotion of the painless injection method, describing it as "the most heartwarming scene in China' s nursing field of that era." This article further contextualizes Liang' s work through comparative analysis with seminal international literature on the topic—such as Nicoll & Hesby' s highly-cited review (130 citations) in *Applied Nursing Research* (2002)—and major contemporary textbooks, including the 9th edition of *The Royal Marsden Manual of Clinical Nursing Procedures* (Dougherty & Lister, 2015). The results confirm that Liang' s innovation predated international counterparts by two decades, and its principal techniques remain applicable today.

Liang Jielian had no formal schooling; her entire professional training consisted of a four-week course with the Chinese Red Cross Ambulance Corps during the Anti-Japanese War. Her innovation was not in an obscure technique, but in a foundational procedure used extensively by thousands of nurses worldwide —further underscoring the inherent innovative capacity of the Chinese people. China' s contemporary registered and practical nurses have received excellent education and possess superior innovative talents and wisdom. By building their confidence, they can undoubtedly create more numerous and meaningful advanced concepts and methods, such as novel approaches to better address the needs of an aging society. Consequently, the widely-held ideal of a painless and fulfilling life in old age may become attainable.

A new method for painless injection achieves genuine social significance only when translated into widespread, long-term application through learning, promotion, continuing education, and persistence. In these aspects, China has led other nations by at least thirty to forty years. This success is primarily

attributed to the firsthand experience, emphasis, and support from leaders at all levels; the organization and mobilization by the Ministry of Health and the Chinese Nursing Association; broad dissemination by media outlets including *Health News* and nursing journals; and most critically, the sustained efforts and educational leadership of generations of nursing experts such as Mei Zuyi, Yin Lei, Li Xiaohan, and Shang Shaomei, coupled with the active learning and long-term commitment of countless nurses. In short, this case powerfully illustrates our nation' s systemic advantage in implementing beneficial initiatives with greater speed and effectiveness.

Keywords: Painless injection; Liang Jielian; Innovation confidence; Painless elderly life

In the early years of the People' s Republic, patriotic public health campaigns focused heavily on preventive vaccination [1-2]. However, injection-induced pain posed a significant barrier to widespread immunization. The Chinese Medical Association' s "Common Knowledge of Epidemic Prevention" noted that some people were reluctant to receive shots due to fear of pain [3], and news reports documented instances where individuals who hid due to pain aversion were forced to undergo vaccination [4]. International research similarly demonstrates that pain during vaccination is a common problem that can lead to lifelong vaccine hesitancy or reduced willingness to vaccinate [5]. Solving the problem of painful injections thus became an urgent priority.

Nurse Liang Jielian participated in these vaccination campaigns and recognized that only by reducing or eliminating injection pain could public willingness to vaccinate be improved. This realization motivated her to develop the painless injection method through diligent study and innovation [6-8]. The *Health News* 70th-anniversary special issue featured a section titled "Learning from Nurse Liang Jielian in 1954" [1], and a column in the *Health News* 90th-anniversary issue titled "Small Techniques Bring Big Changes" [9] both documented the history and significance of this innovation. The former described it as "the most heartwarming scene in China' s nursing field of that era" [1], while the latter noted that "Liang Jielian' s injection method was recognized by patients and highly praised as a good injection technique" [9].

[Figure 1: see original paper] Left: Liang Jielian as a nurse at the Central Second Hospital in 1952 and Xuanwu Hospital in 1958. Liang received special recognition for creating the painless injection method. The *Nursing Journal* (now *Chinese Journal of Nursing*) featured her on its 1956 cover. Right: *Health News* 70th-anniversary special issue, "Learning from Nurse Liang Jielian in 1954."

Does Liang's seventy-year-old technique remain applicable today, and what is its international standing? To address these questions, this article compares Chinese and international literature on painless injection techniques and textbooks, yielding encouraging results: China developed the painless injection method in the early 1950s—twenty years ahead of international counterparts—and its

principles remain applicable today.

1. Development Process and Achievements of the Painless Injection Method

In 1952, while conducting vaccinations, Liang Jielian explored methods to reduce or eliminate injection pain, such as rapid needle insertion, achieving satisfactory results [6]. In 1953, leaders including Jin Maoyue, director of the hospital, provided strong support [8], enabling her to conduct systematic observation and research that yielded even better outcomes [7].

In January 1954, *Health News* published an interview titled "Learning from Nurse Liang Jielian' s Injection Method," which first reported novel techniques including muscle relaxation, rapid needle insertion, appropriate injection speed, and avoiding post-injection massage [6]. In 1956, Liang published more comprehensive descriptions of the new method' s key points in *People' s Daily*, *Nursing Journal* (later *Chinese Journal of Nursing*), and *Health News* [7, 11-12]. She was invited to share her experience in 25 provinces, autonomous regions, and municipalities [1] (Figure 2 [Figure 2: see original paper]). In 1957, People' s Medical Publishing House published her book *Lectures on Painless Injection Method* [8].

[Figure 2: see original paper] Liang Jielian delivering a report to Shanghai' s nursing community in 1956 (right) and a photo with Wu Zheying (first Chinese president of the Chinese Nursing Association, renowned nursing education expert, and "Mother of Nurses") (left). (Photos provided by Liang Jielian' s family)

2. China' s Painless Injection Method Predates International Work by 20 Years, with Key Principles Still Applicable Today

Nicoll and Hesby' s (2002) integrative review (cited 130 times) provides a brief history: "Nurse researchers focused attention on IM injections beginning in the 1970s···studies by Lang et al. (1976), Itty et al. (1977), Kruszewski et al. (1979), and Barnhill et al. (1996) examined procedures to minimize pain, representing a continuing area of interest" [13]. China' s research on painless injection methods was published between 1954-1957—twenty years earlier than international work.

Note 1: This review has been cited over 130 times in SCI. The original English text states: "···Nurse researchers focused attention on IM injections, beginning in the 1970s,···(p.151) and procedures to minimize pain (Barnhill ···1996; Itty··· 1977; Kruszewski···1979; Lang···,1976). This is an area of study that continues to be of interest to nurse researchers. ([13] p.152)." A screenshot of the original PDF is provided in Appendix 1.1, marked in yellow.

Are Liang' s seventy-year-old methods still applicable today? Dougherty and

Lister' s (2015) textbook *The Royal Marsden Manual of Clinical Nursing Procedures, Professional Edition, 9th ed.* presents techniques for reducing injection pain and guidelines for intramuscular injection [14]. The international nursing website *Nursing Times* recommends injection techniques for pain reduction based on this textbook [15]. This article therefore compares Liang' s methods with those in the textbook, with results shown in Table 1 .

Table 1. Comparison of Liang Jielian' s Painless Injection Method (1956-1957) with International Textbooks (2015)

Liang Jielian (1956-1957)	International: Dougherty & Lister Textbook (2015, 9th ed.)
Select appropriate syringe and needle	Correct length and gauge of needle
Appropriate site: avoid major nerves and blood vessels	Correct site
Proper positioning: muscle relaxation	Positioning of patient so that muscles are relaxed
Avoid alcohol stimulation: wait until dry before injection	Clean the injection site with alcohol and allow to dry
Before insertion: displace skin[1]; rapid needle insertion with practice method	Z-track; Stretch skin slightly around the injection site; Insert and remove the needle smoothly and quickly
Vertical insertion (IM): safe needle-holding method; Correct angle: 90° (for IM)	Correct angle: 90° (for IM)
Extend middle finger to control insertion depth	Hold syringe steady once the needle is in the tissue to prevent tissue damage
Determine appropriate injection speed and frequency based on medication properties	Insert medication slowly but smoothly
Rapid needle withdrawal; no post-injection massage	Withdraw the needle quickly. Apply gentle pressure to any bleeding point but do not massage the site

[1] **Note 2:** Liang' s method key points are from *Lectures on Painless Injection Method* (book, 1957 [8]) and "My Experience with Injections" (*Health News*, 1956 [11]). International sources: Dougherty & Lister textbook (2015 [14]): pain reduction p.722, IM injection guidelines pp.741-2, Z-track p.741. Screenshots of

these three sections from the original book (National Library copy) are provided in Appendix 2.

Note 3: Liang' s "displace skin" technique is essentially identical in operation and purpose to the recently recommended Z-track method (Dougherty & Lister, 2015 [14] p.741), both preventing medication leakage and bleeding after injection. Liang believed that displacing the skin more than the underlying muscle created an oblique needle track, eliminating the need for painful alcohol swab pressure on the injection site [7]. The only difference is explanatory: Liang thought the skin displacement exceeded muscle displacement, creating an oblique track, while international literature suggests muscle doesn' t displace, so the track remains vertical in muscle but oblique in subcutaneous tissue—hence "Z-track."

The above comparison, along with the fact that numerous Chinese nursing textbooks from 1958 to the present—such as Mei Zuyi & Zhang Yuehua' s *General Nursing* (1958) [16], Yin Lei' s *Fundamentals of Nursing* (2003) [17], and Li Xiaohan & Shang Shaomei' s *Fundamentals of Nursing* (2017) [18]—have consistently included these technical points, clearly demonstrates that Liang' s seventy-year-old method, covering pre-, intra-, and post-injection phases, remains applicable today [9].

How did Liang Jielian, an ordinary nurse, achieve such remarkable results? As she wrote: "The achievements I have gained today are entirely due to the Party' s care and cultivation, as well as the help of comrades and encouragement from patients" [8]. The establishment of New China and support from leaders at all levels provided her with favorable working conditions and research environment. Additionally, her constant concern for patients, freedom from traditional method constraints, keen observation, critical thinking, and discovery of differences through extensive practice enabled her to develop effective methods.

Liang Jielian worked as a child laborer and had no formal schooling [19]. During the Anti-Japanese War, she attended a four-week wartime health personnel training course organized by Robert Lim with the Chinese Red Cross Ambulance Corps—her only professional training [20]. She then began observing and contemplating injection pain [8]. Her innovation was not in an obscure technique, but in a foundational technology used extensively by thousands of nurses worldwide, further highlighting the inherent innovative talent of the Chinese people.

Note 4: Modern readers accustomed to internet literature searches may wonder why Nicoll et al.' s reviews (1995, 2002) do not mention Chinese work. The primary reason is the lack of academic exchange between China and the West before reform and opening. Domestic journals and newspapers introducing Liang' s method, including *Health News* and *Nursing Journal*, were in Chinese without English titles or abstracts. There were no computers, databases, or internet. CNKI, China' s most comprehensive database including journals, newspapers, and books, launched domestically in 2003 and only established eight overseas mirror sites in the US, Germany, and elsewhere in 2010. Early papers existed

only in print and were added to CNKI much later. Searching CNKI with the traditional Chinese characters "梁潔蓮" yields her 1956 paper, but clearly notes: "This article' s online publication date on CNKI platform is 2009-08-09." CNKI' s *Health News* collection begins in 2000, so the 1954 article introducing Liang' s work is not included. Therefore, it was impossible for international experts like Nicoll to know about China' s 1950s progress before 2010, making their omission of Chinese innovations in 1995 and 2002 reviews understandable.

3. Boosting Confidence, Pursuing Innovation, and Realizing Dreams

As described above, in the early years of liberation, Liang Jielian developed an internationally leading painless injection method to overcome vaccination pain. Today, better addressing the challenges of population aging represents one of society' s major and urgent needs. China' s current doctors, registered nurses, and practical nurses are well-trained with higher innovative potential [21]. By building their confidence [22], they can undoubtedly create more advanced concepts and methods, such as new geriatric care philosophies like "prevention first" and "treating before illness" [23-24], leveraging advanced technologies like AI to alleviate or eliminate pain and suffering in the elderly, thereby significantly improving quality of life and happiness while reducing burdens on young family members and society. A painless and joyful old age—the universal ideal and dream, especially among older adults—may thus become attainable.

4. Education and Widespread Application of China' s Painless Injection Method Leads International Practice by 30-40 Years and Continues to the Present

A new painless injection method achieves genuine social significance only when translated into widespread, long-term application through learning, promotion, continuing education, and persistence. In these aspects, China leads other nations by at least thirty to forty years.

4.1 Learning, Education, and Promotion of Painless Injection Method in the 1950s

The *Health News* 70th-anniversary special issue describes the historical events as follows: "One day in 1954, after receiving an injection from Liang Jielian at the Central Second Hospital, Liu Shaoqi felt no pain and requested the Ministry of Health promote this patient-friendly method···She was invited to share her experience in 25 provinces, autonomous regions, and municipalities. In February 1956, *Health News* published a series of articles including Liang' s 'My Experience with Injections' and an editorial 'Improving Injection Methods.' The nationwide effort of nurses learning and improving injection techniques was the most heartwarming scene in China' s nursing field of that era" [1]. The *Health News* editorial stated: "The Chinese Nursing Association and medical

prevention departments bear responsibility to organize nurses' learning, conduct further research, and improve···" [10]. It further reported: "Changsha, Lanzhou, Beijing and other branches of the Chinese Nursing Association convened local forums for nurses with excellent injection techniques to exchange experiences; Shanghai Municipal Health Bureau instructed its subordinate units to systematically learn and implement Liang Jielian's method···The Beijing branch specially invited Liang to present her experience and organized injection technique symposiums···" [25]. In October 1956, Liang attended the First National Conference of Activists in Workers'Science and Technology Popularization, where Chairman Mao and other central leaders received delegates [26,27].

Note 5: Liu Shaoqi was one of the principal leaders of the Party and the state at that time.

The *Nursing Journal* published research papers on painless injection methods as early as 1955 [25], the earliest internationally. In 1956, *People' s Daily* and *Nursing Journal* published Liang' s articles "Injections Can Be Painless" [12] and "How I Studied Injection Methods" [7], with the journal reprinting the *Health News* editorial. In 1957, People' s Medical Publishing House published her book *Lectures on Painless Injection Method* [8], which was printed three times with a total circulation of 43,600 copies—remarkable when the nation' s nurses numbered only in the hundreds of thousands.

4.2 Sustained Education and Widespread Application

Long-term, broad application of new methods requires sustained education, in which textbooks play a crucial role. *Health News* reported the technical points of painless injection in 1954; Liang' s monograph *Lectures on Painless Injection Method* was published three years later in 1957; and the 1958 textbook *General Nursing* [16] detailed the techniques just four years after initial reporting—whereas internationally, two decades elapsed between research publication and textbook incorporation. Specifically, China' s 1958 textbook *General Nursing* by Mei Zuyi and Zhang Yuehua, with 72,000 copies printed, stated in its preface: "This book···combines China' s actual conditions and incorporates new theories and achievements in nursing work, such as painless injection, energy-saving principles, and displacement enemas···The Ministry of Health convened a review symposium to revise this textbook." The book introduced all key principles and operational points of painless injection [16]. Subsequent texts including *Rural Doctor' s Handbook* (1971, 1986, with millions of copies printed) and *PLA Doctor' s Handbook* (1980) also included relevant content [31-33]. In the 21st century, China' s secondary and higher nursing planning textbooks have consistently included painless injection methods (e.g., Yin Lei' s *Fundamentals of Nursing* (2003), Li Xiaohan & Shang Shaomei' s *Fundamentals of Nursing* (2007, 2017) [17-18]).

In contrast, early 1990s international fundamentals of nursing textbooks (Berger & Williams, 1992; Craven & Hennle, 1992; Kozier et al., 1993; Kozier, Erb, &

Olivieri, 1991; Smith & Duell, 1992; Taylor, Lillis, & Lemone, 1993) were criticized in Beyea & Nicoll' s (1995) review for presenting "proper" procedures for intramuscular injection that were often non-research-based and contained erroneous or out-of-date recommendations [31]. These errors may have constrained international experts from developing and applying advanced painless injection techniques earlier. As described above, China began learning, educating about, and widely applying painless injection methods in the 1950s—at least thirty to forty years ahead of international practice.

Note 6: This review has been cited over 60 times in SCI. The original English text states: "However, after a critical review of nursing fundamentals texts it was found that the 'proper' procedure was often non-research based and usually contained erroneous and/or out-of-date recommendations regarding the technique (Berger & Williams, 1992; Craven & Hennle, 1992; Kozier, Erb, Blais, Johnson, & Temple, 1993; Kozier, Erb, & Olivieri, 1991; Smith & Duell, 1992; Taylor, Lillis, & Lemone, 1993). [31] P.23." A screenshot of the original PDF is provided in Appendix 1.2, marked in yellow.

The textbooks cited in Dougherty & Lister' s (2015) manual as the basis for painless injection techniques and guidelines include Downie et al. (2003) as the earliest [32], likely the first comprehensive international textbook presenting correct painless injection methods—more than twenty years after Nicoll & Hesby' s (2002) review noted that international research on pain-minimizing injection procedures began in the 1970s [13].

Notably, good methods do not necessarily guarantee widespread application. A 2011 article titled "Most Nurses Don' t Follow Guidelines on IM Injections" [33] and a 2015 study noting that many pain-reduction methods for vaccination are not routinely used [5] demonstrate this challenge internationally. In China, beyond the organized learning and promotion by Chinese Nursing Association branches mentioned above [25], multiple news reports in *People' s Daily*, *Health News*, and *Guangming Daily* documented learning and application of painless injection methods in hospitals of all sizes across Shanghai, Lüda, Jiamusi, and Liuyang, as well as in military and factory hospitals, including by Bai nurses in border regions [34-39]. These reports reflect the breadth and effectiveness of technology dissemination. Recent research continues to explore painless injection techniques and devices [40]. Notably, the creation of the painless needle insertion method in the nationally recognized intangible cultural heritage "Lingnan Chen' s Acupuncture" was inspired by Liang Jielian' s painless injection method [41,42].

In summary, China' s sustained education and widespread application of painless injection methods have been remarkably advanced, leading international practice by at least thirty to forty years. This success is primarily attributed to leaders' firsthand experience, emphasis, and support; the organization and mobilization by the Ministry of Health and Chinese Nursing Association; broad dissemination by media including *Health News*, *Nursing Journal*, *People' s Daily*, and People's Medical Publishing House; and most critically, the sustained efforts

and educational leadership of generations of nursing experts such as Mei Zuyi, Yin Lei, Li Xiaohan, and Shang Shaomei, coupled with the active learning and long-term commitment of countless nurses. This case powerfully illustrates our nation' s systemic advantage in implementing beneficial initiatives with greater speed and effectiveness.

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Appendix 1.1 Nicoll, Hesby. *Intramuscular injection: An integrative research review and guideline for evidence-based practice. Applied Nursing Research*, 2002, 15(3):149–162. (130+ citations) Screenshot of original PDF p.152, marked in yellow.

Appendix 1.2 Beyea SC, Nicoll LH. *Administration of Medications via the Intramuscular Route: An Integrative Review of the Literature and Research-Based Protocol for the Procedure. Applied Nursing Research*, 1995, 8(1): 23-33. Screenshot of p.23, marked in yellow.

Appendix 2. International: Dougherty & Lister textbook (2015 [14]). Screenshots from original book (National Library copy): (1) Pain reduction Box 12.16 p.722; (2) Z-track technique p.741; (3) IM injection guidelines Procedure Guideline 12.21 pp.741-742; (4) IM injection guidelines Procedure Guideline 12.21 (continued) p.742.

Note: Figure translations are in progress. See original paper for figures.