Literature Review

Effective policies for eliminating nursing workforce shortages: A systematic review

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ABSTRACT

Objectives: Applied policy options were reviewed for evidence of their effectiveness in reducing nursing shortages.
Background: The stable supply and qualitative maintenance of a healthy nursing workforce significantly impact patients' outcomes; therefore, providing adequate nursing is a major global issue in terms of health policies.
Methods: We conducted a systematic review of relevant studies to identify evidence of the effectiveness of applied policy options in managing shortages of nurses via four electronic databases. The data collection period was January 23–31, 2019.
Results: After screening 2151 initial candidate studies, 12 articles were included, 10 quantitative and 2 qualitative. Various policies had been implemented worldwide to combat nursing shortages, classified as new payment agreements, emergency hiring plans, RN residency programs, special contracting systems, rural allowance policies, and recruiting and guaranteeing incentives for nursing graduates and full-time government employment. Each study reviewed the implementation of policies tailored to the health-care environment of one country and reported successful results regarding nursing staff supply.
Conclusions: Through the current review, the authors seek to promote policies using a multi-dimensional approach of cooperation between the government and health institutions, systematic information collection on health-care personnel, and government investment in crucial private programs during times of need.

Introduction

The need for a steady supply and maintenance of health personnel is a major issue worldwide [1]. In particular, the nursing workforce, which accounts for a large proportion of the healthcare workforce, should be well-trained, sufficiently available, properly distributed by region, and efficiently utilized. However, the nursing workforce shortage in South Korea is serious. According to a 2018 OECD report, the average number of nurses per 1000 people in OECD member countries is 9.2, but only 6.9 in South Korea. Countries with similar GDP levels per capita show much higher figures: Japan stands at 11.3, New Zealand at 10.2, and France at 10.5 [2]. The difficulty in supplying and maintaining an adequate nursing workforce has made it impossible to properly respond to growing demands for healthcare services in an aging South Korean society. The lack of nurses has a direct impact on patient safety and health outcomes. Many countries have reported a strong association between nursing workforce and patient outcomes [3–7]. A lower ratio of nursing staff to patients has been associated with increased mortality rates [3]. In addition, the incidence of complications, such as post-operative infections, and the length of hospital stays also increased [3–5]. In South Korea, the risk of death also increased by 9% as the number of patients per nurse in intensive care units increased [6]. According to the results of a systematic review, assigning additional patients to each nurse increases deaths, resuscitations, and days spent in the hospital [7].

In addition, according to a recent study conducted in the United States, most nursing leaders agreed that the quality of the U.S. health care system depends on improvements in effectively managed, highly educated nursing personnel, both quantitatively and qualitatively [8]. Studies have consistently reported that not only quantitative factors like the number of nurses but also qualitative factors, such as the proper placement of nursing staff, improved job satisfaction, the education level of nurses, and career length of

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nursing, affect patients' health outcomes [4,9–12]. Therefore, both recruitment and retention are crucial for maintaining a productive nursing workforce.

In order to address the shortage of working nurses, since the 1980s South Korea has implemented policies aimed at increasing the total nursing workforce. Under such policies, the supply of nurses temporarily increased across the country; in particular, since 2000 the concentration of nurses in Seoul, the nation's capital, has increased. However, most hospitals outside the metropolitan area are not able to meet nursing staff requirements. A survey of about 1600 hospitals across the country found that 92.3% were suffering from nursing shortages [13]. In response, the Korean government implemented a policy to increase the enrolment quota of nursing colleges in 2008 [14], but the shortage in the nursing workforce has yet to be resolved. Even in 2014, the number of nursing graduates stood at 2.0 million, 1.5 times the number of 1.3 million in 2013 [15]. Increased supply was expected to solve the problem of nursing workforce shortages, but the employment rate of nurses in hospitals decreased by 9.2 percentage points from 50.1% in 2000 to 40.9% in 2012 [16,17] because the poor nursing work environment has not significantly improved. As a result, the turnover of nurses continues and the number of clinical nurses remains low. The policy of increasing the number of nursing students is too restricted to solve the complex issues involved in managing nursing shortages and ensuring the availability of qualified nursing staff.

To increase the nursing workforce, various policies have been implemented in many countries around the world. However, there has not been a systematic, integrated review assessing the effectiveness of these policies. In addition, such issues should be dealt with differently depending on the time and culture. Thus, it is necessary to examine and synthesise data on the effectiveness of policies addressing nursing workforce shortages by reviewing recent studies. Such a review could provide information that might be helpful in determining effective policies regarding nursing shortages around the world, including South Korea.

Methods

Data sources

We conducted a systematic review of relevant studies to identify evidence of the effectiveness of applied policy options to manage shortages of nurses. This was performed by searching four electronic databases (MEDLINE, Embase, CINAHL, and Pubmed) using keywords and related terms, including 'nurs*', 'shortage', 'leave', 'retention', 'turnover', and 'policy'. The data collection period was January 23–31, 2019.

Inclusion and exclusion criteria

The systematic literature review focused on papers written in English published between January 2009 and January 2019. The reason for this time restriction is that only the most recent ten years of data on changing global and national conditions in hospitals after policy application were considered appropriate for the purposes of this study. Inclusion criteria were defined according to the PIO framework [18]—where 'P' stands for *population*, 'I' for *intervention of interest*, and 'O' for *outcome*—of the abstract [19]. In a systematic review, the first step is to state a research question for the PIO process [20]. The research question of this study was, 'What is an effective policy for addressing the shortage of nurses?' For this study, *P* was 'a country that has experienced a shortage of nurses', *I* was 'a policy to address a shortage of nurses', and *O* was 'results for a policy that has been implemented'. The inclusion criteria were as follows: (1) peer-reviewed research; (2) using experimental, cohort, survey, or qualitative designs; (3) written in English; and (4) policy attempts at addressing a shortage of nurses. Articles that did not meet these criteria were excluded from the study. The exclusion criteria were: (1) editorials, opinion pieces, or conference abstracts; (2) review papers; (3) non-English language papers; and (4) examinations without policy attempts to address the shortage of nurses.

Selection process and data extraction

Studies were selected in a two-step procedure. First, search results were filtered according to title and abstract, and then narrowed further using the formal inclusion and exclusion criteria. In this stage, those excluded were mainly duplicates. In the second phase, the extracted studies were independently reviewed by two experts. Questions used to conduct the review were developed following PIO and read as follows: 'Is this research a study of policy aspects of the shortage of nurses?'; 'Are there issues and concerns of this study related to policies to address a shortage of nurses?'; and 'Is there a clear statement of findings with regard to policies regarding nursing shortages?' Each question was rated on a 4-point Likert scale (4 = *strongly agree*, 1 = *strongly disagree*). Once the appropriate articles were selected, full texts were obtained. Papers were included if both reviewers agreed on inclusion. If the two reviewers disagreed, a third reviewer was invited to appraise the paper. The sampling and evaluation process are illustrated in Fig. 1.

Results

The literature search initially yielded 2151 candidate articles. After 270 duplicate articles were removed, titles and abstracts of 1881 papers were reviewed, as a result of which 1621 articles were excluded and 260 references that appeared to meet the study eligibility criteria were reviewed thoroughly (as full texts). After screening abstracts and full texts, and after consensus was reached between the authors, a total of 12 articles were included. As no additional studies were identified through the references consulted, this resulted in a final sample of 12 studies in the review (Fig. 1). It is recognized that there are many strengths to systematic reviews; however, it is important to note that systematic reviews should be conducted with similar rigor as the studies they summarize [21]. On this basis, using the method of Hawker et al. [21], the 12 studies had a score of 30–36 and could thus be considered high-quality papers that use a rigorous methodological approach (10 = *very poor* and 40 = *good* as per Hawker et al.). Consequently, the final number of studies included was 12.

Characteristic of publications

Of the initial 2151 records identified through the database search, a total of 12 articles were included for full-text review. The mean publication year was 2012. Of the studies, 10 used quantitative designs: 7 were comparison, 2 were experiment analysis, and 1 was simulation. Two studies used qualitative methods; one study used mixed methods. The studies were conducted in eight countries, namely Canada (four articles), South Africa (two articles), New Zealand, Kenya, USA, Senegal, Peru, and Zimbabwe (one each). Populations studied included nurses, specifically graduate nurses and young nurses (below 30 years of age), and health care personnel, including midwives and physicians. Another characteristic of the study populations was that they involved nurses from rural and underprivileged areas. In one qualitative study, interviews were conducted with not only nurses, but also midwives, environmental health technicians, nurse aids, and community health volunteers (Table 1).

Table 1
Result of systematic review ($n = 12$).

Country	Authors (year of publication)	Study population	Study methods	Type of intervention/Policy	Outcomes	Findings
New Zealand	Buchan and North [22]	RN	Pre-post comparison, Interview	New pay agreement	RN staffing Vacancy rate Application to schools of nursing	Steady growth in staff numbers, reduced difficulty in recruiting, reduced vacancy rates, increased application rates to school of nursing Some health-care employers not covered by the pay award reported negative knock-on effects
USA	Ulrich et al. [23]	Graduate nurses	Pre-post comparison	RN residency program	Turnover Turnover intent Competency Nurse satisfaction Organizational job satisfaction Self-confidence Leader empowering behavior	Accelerated increase in competence and self-confidence and a significant decrease in turnover intent and actual turn over
Canada	Murphy et al. [24]	RN	Simulation	Multifaceted approaches by simulation model	RN staffing	Eliminate the RN shortage within 5 years
	Murphy et al.[25]	RN	Pre-post comparison	RTA (Research to Action) project	Job satisfaction, Empowerment, Occupational commitment, Intention to stay, Leadership support Clinical preparedness, Satisfaction with nursing, Professional development, Turnover, Overtime, Absenteeism	Effective at improving work environments and thereby promoting the retention and recruitment of nurses
	Alameddine et al. [26]	Young nurses (age below 30yrs)	Pre-post comparison	Nursing Graduate Guarantee initiative	Full time employment Job stickiness	Improved FT employment and stickiness of the young nurses
	Baumann et al. [27]	New graduate nurses	Participant/non-participant cross-sectional comparison	Government full time employment	Full time employment, retention, perceptions of clinical proficiency	More to be employed full-time, more to be retained in their initial positon, higher clinical proficiency in participant group

Table 1 (*continued*)

Country	Authors (year of publication)	Study population	Study methods	Type of intervention/Policy	Outcomes	Findings
Peru	Huicho et al. [28]	Nurses and midwives in rural area	Discrete choice experiment analysis, Interview	Incentives (health center, getting permanent position, scholarship for specialization, salary increase)	Opting for a rural job	Combined financial and non-financial incentives could almost double rural job intake by nurses and midwifes
Kenya	Gross et al. [29]	Public nurses in rural and undeserved areas	Pre- post comparison	Emergency hiring plan	RN staffing	Increasing of nursing staffing
Senegal	Zurn et al. [30]	Health workers (physicians, nurses, midwives)	Pre-post comparison	Special contracting system	Health worker staffing	Increased staffing Successful reopening of health outposts
South Africa	Ditlopo et al. [31]	Policy markers, hospital managers, health professionals(nurses, doctors)	Interview	Rural allowance policy	Influence on the motivation and retention in hospitals	Partially effective in the recruitment of health professionals, Unintended negative consequences of perceived divisiveness and staff dissatisfaction
	Lagarde et al. [32]	Rural nurses	Discrete choice experiment analysis	Recruiting & incentive policy	Cost-effectiveness of interventions	Involving the selection of more nursing trainees from rural areas are shown to be the most cost-effective interventions
Zimbabwe	Taderera et al. [33]	Health professionals (nurses, midwives, environmental health technicians, nurse aids and community health volunteers)	Interview	Retention strategy* between 2009–2014	Influence on the retention	Strategies critical towards the retention

* Retention strategy: 1) Engaging international partners through a program-specific partners, 2) Mobilization of the community to assist health personnel at the clinics, 3) Supporting health personnel in post-basic training and development, 4) Salary increase, 5) Non-monetary long-service benefits, 6) Responsive support in the provision of medical supplies and sundries, 7) Protocol to protect health personnel from communicable diseases.
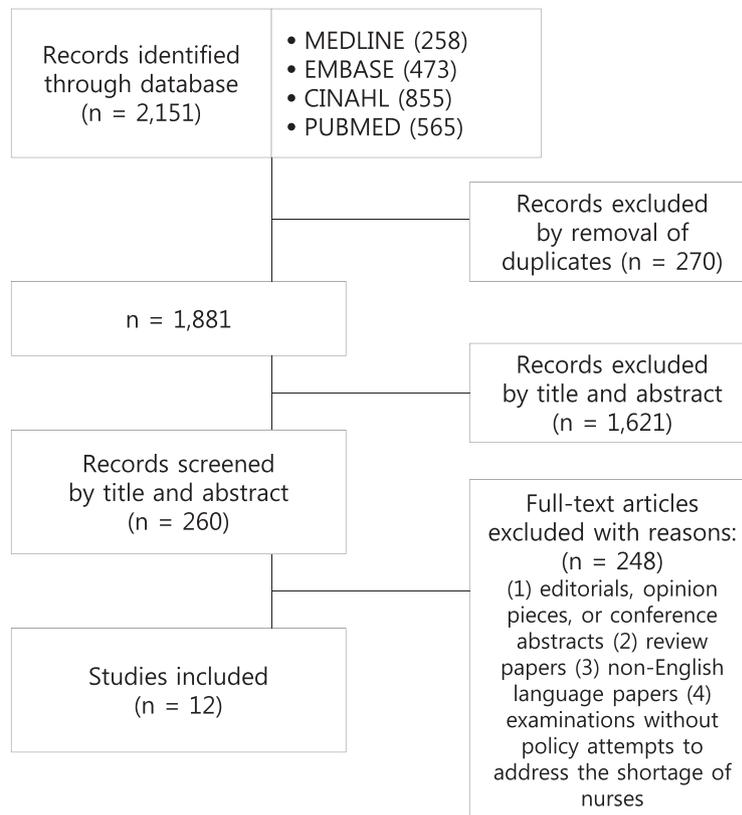
Fig. 1. Systematic review flow diagram.

Characteristics of applied policies and findings

The following policies were meant to solve the shortage of nurses in various countries. As shown in Table 1, various policies were applied.

The first study to be included evaluated the results of a policy for a new nurse wage system applied in New Zealand, creating an average pay increase of 7%. The new pay rates for RNs ranged from $40,000 to $54,000, compared to previous salaries of around $33,917 to $45,000 (in New Zealand dollars). Indicators pointing to improvements included: steady growth in staff numbers; reduced difficulty in recruitment; reduced vacancy rates; and increased application rates to nursing schools [22].

Another study concerned residency programs in the US. Outcome data were collected over a 10-year period for over 6000 newly graduated nurses who completed an RN residency. The results indicate an accelerated increase in competence and self-confidence and a significant decrease in turnover intent and actual turnover [23].

In Canada, while other studies did not examine actual policy, they suggest that nursing shortages will gradually decrease if multi-faceted policies are applied, such as considering the health needs of a population, sufficient level of service delivery, and productivity. These scenarios might consider, for example, increasing the scope of medication-prescribing privileges for RNs—which would increase the number of duties of RNs—or delegating certain RN tasks to auxiliary nursing categories, which would reduce RN requirements, all other things being equal [24]. The Research to Action (RTA) project in Canada proved effective at improving work environments and promoting the retention and recruitment of nurses. For example, in consultation with stakeholders, processes should be put in place to share knowledge and best practices in nursing management, practices, staffing models, and innovations in workplace health and well-being [25]. Another

paper examines the impact of the most recent of these policies, the Nursing Graduate Guarantee (NGG). The NGG is a system of financial incentives for employers offered through salary provisions given during the first six months of employment of newly recruited RNs in temporary full-time positions. The NGG was launched in Canada in 2007 with an initial investment of $89 million and contributed to an improved full-time employment rate and greater retention of young nurses in hospitals. In the community sector, however, this policy requires further investigation since the effects on employee retention were not significant [26]. Another study of 2369 nurses that evaluated the effects of government policy on full-time nursing employment in Ontario showed that policy participants were 1.5 times more likely to be employed full-time and 2.3 times more likely to remain in their initial position at the time of survey than non-participants [27].

A discrete choice experiment was conducted to evaluate the job preferences of nurses in the public sector in Peru. Policy simulations showed that the most effective attraction package for undertaking a rural job included a 75% increase in salary plus scholarships to fund continued education in a specialization; these factors were shown to increase the proportion of health workers taking a rural job from 36.4% to up to 60% [28].

The Emergency Hiring Plan in Kenya was created to increase nursing staff in public health facilities through donor-supported 1- to 3-year contracts. As a result of the increase in nurses, the number of functioning public health facilities increased by 29%. This was mainly possible with the support of five donor organizations. However, researchers suggest that continued monitoring is needed of long-term retention [29].

A special contracting system in Senegal contributed to the successful recruitment of health workers in remote and rural regions. The long-term sustainability of such an approach, particularly in fiscal terms, must be given close consideration [30].

Another study conducted 40 in-depth interviews with policy-makers, hospital managers, nurses, and doctors at five rural hospitals and found design weaknesses in the rural allowance policy of South Africa. Although the rural allowance was partially effective in the recruitment of health professionals, it has led to the unintended negative consequences of perceived divisiveness and staff dissatisfaction [31]. Recent discrete choice experiments include one that assesses the effects of potential incentives on the attraction of nurses to rural areas in South Africa. Measures involving the selection of more nursing students likely to accept positions in rural areas have been shown to be the most cost-effective intervention [32].

In Zimbabwe, a programme-specific strategic partnership between the government and donor communities contributed towards the mobilization of more health personnel, health facilities, worker development, and remuneration. The review of salaries, engagement of strategic international partners, payment of top-up allowances, support for advanced training and development, increased mobilization of health personnel, addition of non-monetary incentives, and healthcare worker protections were all found to be critical for the retention of health personnel [33].

Discussion

According to recent papers, a shortage of nurses is a worldwide trend, and policy changes to secure and supply quality nurses are constantly being attempted. This review evaluates 12 studies from eight countries around the world, each of which investigates policies appropriate to address issues in the healthcare environment of the country examined and reports successful results in increasing the supply of nurses in the workforce. At the same time, however, they show unexpectedly negative results or discuss policies that helped create a short-term supply of manpower but failed to lead to long-term retention. These results present some common suggestions for policy-making on nursing shortages in the workforce from an international perspective.

Multi-dimensional approach

First, a multi-dimensional approach is needed for the formulation of policies for the nursing workforce. It is quite risky to establish a policy that considers only one dimension or indicator, such as the ratio of nurses to the national population. As an example, in South Korea, a policy addressing the shortage of nurses has focused on increasing the absolute number of RNs for the last 30 years. Such a consistent policy led to an increase of the number of new RNs; however, there is still a shortage of nurses, especially in rural areas, and the number of unemployed nurses has also been rising. Such results could reflect the risk of using a one-dimensional policy to affect increases in nursing personnel. In other words, in order to implement policies effectively, each country ought to adopt multiple sustainable and integrated policies appropriately addressing its local situation(s). Relying on a single policy has a high risk of failure and can hardly be maintained in the long term. Thus, a multi-dimensional approach—including the three dimensions of supply, demand, and working conditions—could provide a practical solution to the lack of nurses [24].

In terms of supply, it is necessary to secure a curriculum and educational institutions to train quality nurses and maintain their productivity, as well as increase the total number of nurses. In the report *The Future of Nursing*, published by the US's National Academy of Medicine, it is recommended that the proportion of nurses obtaining a bachelor degree be increased to 80% and the number of those receiving a Ph.D. be doubled by 2020 to prepare for emerging technologies and increases in (or diversification of) the types of severe illnesses affecting patients. In this regard, it was

suggested that various channels for obtaining primary level degrees must be developed [34]. In addition, taking advanced courses leads to increased competence and confidence in nurses and a remarkable decline in intentions to leave and in actual turnover rates, which both contribute to the maintenance of well-trained quality nursing personnel [34].

As for demand, the effectiveness of nursing services needs to increase to meet the surging demand for healthcare services and increased service expectations of consumers. This issue is directly related to productivity and should be addressed efficiently according to the education level and competency of nurses. As practical strategies, establishing a nursing residency program and eliminating barriers to the scope of work for nurse practitioners and nurses with advanced practice are included [23]. In addition, the management of human resources is necessary to develop a harmonized workforce, particularly through clear role-setting for nurses, doctors, assistants, and other health workers at a health care site.

Finally, working conditions for nurses should be improved. If a shortage of nurses results from a low regional total of RNs, one means of improvement would be finding new ways to increase the absolute number of working RNs. This has been employed in Korea since 2008 in the same context as increasing the number of nursing college students. However, in the ten years that have passed since the policy was implemented, the country's lack of nurses remains a challenge. This fact should be interpreted as a result of a lack of people willing to work as nurses under current working conditions [14]. Policies offering a wage increase or financial incentives are considered to be both the most expensive and effective; however, it has been reported that a wage increase combined with other supplementary solutions would be more effective in long-term retention than a strategy focused only on wages [28,32]. Thus, it would be necessary to continue monitoring nurses' satisfaction with their working conditions, management skills in implementing policies, organizational processes, and ongoing support for problems [31]. In addition, flexible working hours, full-time employment, and continuous education for professionals are reported to be effective policies with beneficial effects on retention as well as reinforcing nurses' clinical skills and improving patients' outcomes [25,27,35].

Cooperation between governments and institutions

Second, in cases in which policy decisions are being made, the government and related institutions ought to exhibit a cooperative attitude. In New Zealand, a new pay agreement was implemented at the national level [22]. The significant and unusual aspect of this agreement was that it included established guidelines on safe staffing and healthy workplaces that should be followed by these institutions. The new pay rewards demonstrated positive effects: a steady rise in the number of nurses, declines in the reported difficulty of finding employment, and increased application rates to nursing school. In fact, institutions that chose not to raise nursing pay rates reported negative effects on retention and recruitment. Also, it has been found in developing countries that a cooperative attitude between the public and the private sector in determining and implementing policies increases the speed of both recruitment and deployment while improving nursing training [29]. Private donors contribute to developing a greater nursing workforce and facilities by encouraging and contributing to better pay. The government can intervene in agreements on salaries and provide ongoing support for the training and education of nurses.

Systematic information collection about health-care personnel

Third, after policy implementation, systematic information collection will have to be strictly carried out in accordance with

CONTEXTS OF HEALTH SYSTEMS			CHARACTERISTICS OF POLICY	NAME OF POLICY
TARGET OF SUPPLY	SECTOR	FUNDING STATUS		
Rural	Public	Governmental funding	Monetary incentives, specialized recruiting	Special contracting system
		Donor-supported	Expansion of hiring	Emergency hiring plan
		–	Comprehensive intervention	Incentives
	Private and Public	Governmental funding and donor-supported	Comprehensive intervention	Retention strategy
	–	Governmental Funding	Monetary incentives	Rural allowance policy
	–	–	Monetary incentives, specialized recruiting	Recruiting &incentive policy in rural areas
–	Public	Governmental Funding	Improving work environments	RTA (Research to Action) Project
			Monetary incentives	Nursing Graduate Guarantee initiative / Government full time Employment
		–	Comprehensive intervention	Multifaceted approaches by simulation model
	Private and Public	–	Monetary incentives	New pay agreement
	–	Donor-supported	Education	RN residency program

Fig. 2. Policy matrix to address shortages of nurses.

regular monitoring of ongoing policies [14,29]. It is very important that accurate information on the market of nursing personnel; data demonstrating the effectiveness of nurses; and institutional, regional, and national information on the supply and demand of health-care personnel be identified. These aspects will form the basis on which health policies can be implemented through evidence-based decision-making.

Policies tailored to the context of each country

Lastly, differing situations and environments in each country ought to be considered. The eight countries in this review included both developed countries, such as Canada, the US, and New Zealand, and countries that are actively developing, like South Africa, Senegal, and Zimbabwe. Each country tried a differently-tailored policy based on differences in their healthcare systems, particularly the supply and demand of nursing personnel. The more advanced a nation's healthcare system, the more it shifted to policies focused on quality rather than quantitative aspects of the nursing workforce. For this reason, evidence regarding the policies implemented in various countries does not permit clear causal inferences for policy-making. Therefore, careful consideration of each country's situation is required for the effective application of the study results. Perhaps consideration of Fig. 2 will help determine policies to address the shortage of nurses in the context of different national health care systems (rural or urban, private or public sector, funding status, etc.).

Limitations

Some limitations and future research directions should be considered. First, the weakness of this study is that the policies presented in the study arose in the contexts of very different national situations, thereby limiting their generalizability. Another is the limitations associated with the research methodology, suggesting that previous reviews and comments regarding the shortage of nurses were not included in the analysis of this study.

Conclusion

We collected evidence on the effectiveness of policies to eliminate shortages of nurses and included 12 original studies conducted in eight countries. Each study examined a policy tailored to the health-care environment faced by a particular country and reported successful results in increasing the supply of nursing staff. Also, some studies concerned policies that resulted in unexpectedly negative results and failed to lead to long-term retention of nursing personnel. The current evidence shows that policy effectiveness varied greatly, underlining the need for more evidence. Future policy evaluations should focus on the effectiveness of qualitative as well as quantitative aspects of the nursing workforce. We summarized various evidence and provided a broad overview of the current literature on effective policies to eliminate nursing shortages, for example, policies such as new pay agreements, emergency hiring plans, and RN residency programs. In other words, continued efforts to improve the working environment for nurses through concurrent investment and intervention by the respective government, particularly monetarily, are needed. Although not involving amounts as large as those invested in the countries introduced in this study, it is necessary to selectively invest in rural areas where the shortage of nurses is severe and to maximize effectiveness through cooperation with private investors. While it may not be continuously applicable, proper government

intervention during times of needed investment is more efficient than the alternative of allowing increases to continue in the number of nursing students.

With regard to the individual situation of each country, such as South Korea's, it is necessary to test-run an RN residency program and consider in-depth the application of a specific contractual system for rural areas that offers financial incentives to employers of new nurses. Because it is an investment for future national health, it will be a cost-effective way for the government to invest in the health sector in the long run.

Author statements

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