



An overview and policy implications of national nurse identifier systems: A call for unity and integration

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ABSTRACT

There is a clear and growing need to be able record and track the contributions of individual registered nurses (RNs) to patient care and patient care outcomes in the US and also understand the state of the nursing workforce. The National Academies of Sciences, Engineering, and Medicine report, *The Future of Nursing 2020–2030: Charting a Path to Achieve Health Equity* (2021), identified the need to track nurses' collective and individual contributions to patient care outcomes. This capability depends upon the adoption of a unique nurse identifier and its implementation within electronic health records. Additionally, there is a need to understand the nature and characteristics of the overall nursing workforce including supply and demand, turnover, attrition, credentialing, and geographic areas of practice. This need for data to support workforce studies and planning is dependent upon comprehensive databases describing the nursing workforce, with unique nurse identification to support linkage across data sources. There are two existing national nurse identifiers– the National Provider Identifier and the National Council of State Boards of Nursing Identifier. This article provides an overview of these two national nurse identifiers; reviews three databases that are not nurse specific to understand lessons learned in the development of

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those databases; and discusses the ethical, legal, social, diversity, equity, and inclusion implications of a unique nurse identifier.

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Introduction

During the past two years, unprecedented demand has been placed on the nursing workforce due to the worldwide COVID-19 pandemic. The focus on health-care workers during the pandemic made the role of nurses more visible to the public. Yet the increased attention also highlighted the absence of robust data to track the nurse workforce. The absence of nurse data has hindered the ability to understand the factors driving high turnover and professional attrition. This gap has made it impossible to study the outcomes of nursing education in the manner similar to how other health professions have been examined. During a public health emergency, national, state, and local governments have limited data on how many licensed nurses are in a given locality, as well as where or whether they were practicing. The lack of nurse attribution data and a nurse tracking system directly impacts the ability to address a surge in the demand for patient care, such as issuing a call to licensed nurses to help in times of crises. It also impairs the ability of organizations to leverage experienced nurses that have left the bedside to mobilize support for younger nurses in their transition to practice.

As a result, there is a growing call to record and track the individual and collective contributions of registered nurses (RNs) to patient care and patient care outcomes in the US. As [Reed \(2020\)](#) states, “In the current healthcare climate, invisibility in data equals invisibility, period” (p 233). Further, the recent National Academies of Sciences, Engineering, and Medicine report, *The Future of Nursing 2020–2030: Charting a Path to Achieve Health Equity* ([National Academies of Sciences, Engineering, and Medicine \[National Academies\] 2021](#)), identified the need to track nurses’ collective and individual contributions to patient care outcomes. This capability depends upon the adoption of a unique nurse identifier, its implementation within electronic health records, and linking it to broader publicly available data sets that track the health workforce, health care, and health. Additionally, there is a need to understand the nature and characteristics of the overall nursing workforce including supply and demand, turnover, attrition, credentialing, and geographic areas of practice. This need for data to support workforce studies and planning is dependent upon comprehensive databases describing the nursing workforce, with unique nurse identification to support linkage across data sources.

Currently, the two main reasons for nurse identifiers that are in separate databases are for (a) efficiently and

effectively transmitting financial transactions and health information electronically via the National Provider Identifier, and (b) for licensure tracking through the National Council of State Boards of Nursing Identifier. The unique identification of RNs is a critical step in advancing information technology interoperability. As part of Section 4,003 (c) of the 21st Century Cures Act ([21st Century Cures Act, H.R. 34, 114th Congress 2015](#)); Public Law 114–255: 2016), healthcare systems will be required to create a trusted universal framework as a means of authenticating providers in EHRs for assured exchange of patients’ health information.¹ For nurses, the critical first step in doing so is the identification and adoption of a nurse identifier.

Unique nurse identification also brings opportunities for clarity of remuneration, either the nurse directly or to the employing agency, reflective of their contribution to care. Currently, in most settings nursing care is bundled into aggregate costs, for example, hospital room rates. As such, the clinical contributions of individual nurses are not discernable. Since the vast majority of nurses in the US are not reimbursed directly for their services, there is little impetus for them to register for a National Provider Identifier (NPI) through the National Plan and Provider Enumeration System (NPPES), or for health care systems to track them as unique providers in electronic health records (EHRs). Participation in both of these data systems would enhance our understanding of the nurse workforce and its contributions to safe, effective, high-quality care. This is particularly critical as the nation increasingly transitions to value-based care in which reimbursement reflects achievement of quality and cost metrics. Nearly 60 percent of all healthcare payments in the U.S. either stem directly from value-based models or linked in some manner to outcomes, quality, and cost, and this proportion is expected to increase ([LaPointe, 2021](#)). An empirical link between a nurses’ contribution to value and their salary may be particularly critical, given new evidence that among essential workers, RNs are the least satisfied with their salaries and less likely to perceive them as fair relative to other healthcare workers ([DeSilva, 2022](#)).

¹ The passage of the Health Information Technology for Economic and Clinical Health Act (HITECH Act) in 2009 spurred the use of health information technology (HIT) and the scope of the health information environment ([Mathematica Policy Research, 2015](#)). Originally, the goal was broad adoption of EHRs for better data collection and analysis. Since then, EHRs and information technology have become more sophisticated, with secure data exchange within and across health systems for improved coordination of care, efficiency, and health outcomes now being the driver of HIT advances.

There are two existing systems that uniquely identify individual RNs at the national level: the National Provider Identifier (NPI) and the National Council of State Boards of Nursing identifier (NCSBN ID). This paper examines the advantages and disadvantages each. By way of comparison, we also describe the benefits, challenges, and lessons learned of three other national provider databases that are not specific to nursing.

The National Provider Identifier (NPI)

One of the Administrative Simplification provisions of the Health Insurance Portability and Accountability Act (HIPAA) of 1996 (Public Law 104–191) required the creation and adoption of a unique identification number for providers, health plans, and healthcare clearinghouses to improve the efficiency and effectiveness of electronic transmission of health information and financial transactions ([CMS Medicare Learning Network, 2021](#)). The Administrative Simplification standards, sometimes known as the electronic data interchange (EDI) standards, help save time and costs across different healthcare systems. For example, these standards mandate industry interoperability across EHRs and other electronic healthcare databases and systems to streamline paperwork and exchange of information such as transactions for pharmacy and healthcare administrative information, including healthcare claims ([Centers for Medicare and Medicaid Services \[CMS\], n.d.](#)). The NPI is one standard included as an EDI standard.

The NPI is a 10-digit number that allows providers to identify themselves in the healthcare system and is associated with an individual provider for the duration of their career ([CMS Medicare Learning Network, 2021](#)). NPIs are available for registered nurses, advanced practice registered nurses (APRNs), physicians, dentists, chiropractors, and psychologists, among others. Enrollment for an NPI through the Centers for Medicare and Medicaid Services (CMS) National Plan is free of charge, and the database is the Provider Enumeration System (NPPES). It takes from 1 to 20 days to receive an NPI, once a completed application is received. Data on active and deactivated NPIs are compiled monthly, with incremental updates provided weekly ([CMS, 2021](#)). The data are stored in the NPPES NPI Registry and disclosed to the public under the Freedom of Information Act. Therefore, the data in the NPPES NPI Registry, which includes the fields noted in [Table 1](#), are available to download free of charge.

Currently, all healthcare clinicians, including nurses, who conduct electronic transactions and transmit health information, are required to obtain an NPI. Many nurses also use the NPI for direct billing for their services². Payers and researchers use the NPI in analysis of prescription, screening, and diagnostic trends ([CMS Medicare Learning Network, 2021](#)). [Klein \(2008\)](#)

Table 1 – NPI and Nursys Data Fields

NPI (selected fields)	Nursys
NPI number	License number(s)
Full name	Full name
Practice or business mailing address, telephone number, country	License status
License(s) type, number(s), state(s)	<ul style="list-style-type: none"> • Unencumbered (full unrestricted license to practice) • Cease and desist • Denial of license • Expired license • Other license action • Probation • Reprimand • Restriction • Revoked • Suspension • Voluntary agreement to refrain from practice • Voluntary surrender
NPI deactivation reason, date	
Healthcare provider taxonomy code(s)	
Gender	
Sole proprietor or Organization	

highlights specific requirements for nurses to obtain an NPI number, including: (a) nurses who participate in, provide services, and are paid by federally funded programs, such as Medicare, Medicaid, and Community HOME Investment Program; (b) nurses who work in specific settings that bill for nursing services separately, such as home health, long-term care, occupational health, and other areas that bill for nursing services; and (c) nurses participating in research performed in large healthcare systems or health plans, especially as health systems continue to merge.

Nurses can apply for their NPI while still a student and change their status once they pass the licensure test and have obtained employment.

A greater understanding of nurses' roles, work settings, and activities via an NPI would flow from the availability of NPIs for other providers along with RNs, thus allowing for a complete picture of relationships between providers, analyses of care teams, and underlying healthcare workforce issues.

National Council of State Boards of Nursing Identifier (NCSBN ID)

The NCSBN ID has been recognized as an opportunity to enhance the "visibility of nurses' contributions" ([Beale et al., 2021](#), p 21). The NCSBN ID was designed by the National Council of State Boards of Nursing in response to the long-recognized importance of uniquely identifying individual nurses to gain insight into practice patterns and workforce issues.

The NCSBN ID was initially used as a unique identifier to verify licensure, discipline, and practice privileges for RNs, APRNs, and licensed vocational/practical nurses (LVN/LPNs) in specific jurisdictions. The NCSBN ID can be automatically and universally

assigned to nurses when they are initially licensed, and some states boards of nursing have begun to do so. The system and underlying database for updating and maintaining records of individual nurses with a NCSBN ID is called Nursys. This database system is used by state licensing bodies to access and update information on individual nurses. NCSBN has indicated that Nursys also is available to researchers and quality experts to engage in quality, patient outcome, and health services research (Sensmeier et al., 2019). Currently, all RNs, APRNs, LVNs, and LPNs with a record of licensure in the United States hold an NCSBN ID. Data fields that are available within Nursys are found in Table 1.

Since its creation, the NCSBN ID has gained favor and support in the nursing community. The Alliance for Nursing Informatics (ANI), a collaboration of more than two dozen professional organizations engaged in nursing informatics whose members include the American Association of Colleges of Nursing, American Nurses Association, American Nursing Informatics Association, and Healthcare Information and Management Systems Society, has endorsed the following policy statement:

“The NCSBN ID should be used by key stakeholders as a nurse identifier to demonstrate the value of nursing through research and enhance individual care and health outcomes via more comprehensive documentation in the EHR (electronic health record), ERP (enterprise resource planning) and technologies and systems” (ANI, 2020).

Currently, efforts to advance the adoption of the NCSBN ID as a unique nurse identifier in electronic health records continue to be led by the Nursing Knowledge: Big Data Science Initiative (BDSI), facilitated by the Alliance for Nursing Informatics. Though recognizing the importance of the NPI for payment to advanced practice registered nurses, BDSI also acknowledges the opportunity for widespread implementation provided by the NCSBN ID, which can be automatically assigned to new nurses when they pass their licensure exam (Sensmeier et al., 2019). BDSI has moved forward with the development of an action plan aimed at achieving widespread adoption and implementation of the NCSBN ID as a consensus standard for uniquely identifying nurses in electronic health records and health information exchanges, as well as to support health services research. Additionally, several pilot projects are in progress entailing the implementation of the NCSBN ID as a unique nurse identifier within EHRs within HCA Healthcare, the University of Alabama in Huntsville, and at the Center for Medical Interoperability (ANI, 2021).

Lessons From Other National Databases

An analysis of other national or widely used databases is crucial to learn about the issues and challenges of

those identification databases to avoid pitfalls in the development of the nursing system or network of systems to fully account for and attribute work to the nursing workforce. An overview of functions, issues, and challenges of three databases will be reviewed: the American Medical Association (AMA) Physician Masterfile, the National Practitioner Data Bank (NPDB), and the Acute Physiology and Chronic Health Evaluation (APACHE) database.

AMA Physician Masterfile

The AMA Physician Masterfile is the most well-established health profession database and its success and some of the controversies surrounding it may provide insights. Given that academic and licensing agency data are entered directly into the database, the physician Masterfile is considered a primary resource for verification of credentials and other activity by third-party organizations such as employers. Unlike the NCSBN ID, the Masterfile uses the NPI as the primary identification system.

The Masterfile was created in 1906, initially as a record keeping method supporting membership and mailing activities of physicians within the United States (AMA, n.d.a.). Today, a record within this database is generated when an individual enters a medical school accredited by the Liaison Committee on Medical Education (LCME) or if the physician was educated in a foreign country and is considered an international medical graduate (IMG). The IMG record is generated upon entry into a post-graduate residency training program accredited by the Accreditation Council for Graduate Medical Education (ACGME) or if the IMG is licensed in one of the 68 US licensing jurisdictions. The database collects a wide range of data on each individual physician or trainee such as, but not limited to, name, professional mailing address and telephone number, birthplace and date, medical and/or osteopathic education and year of graduation, graduate medical education specialty/subspecialty and the sponsoring institution with training dates, state license numbers, Drug Enforcement Agency registration status, NPI registration information, licensure or other federal sanctions, major professional activity, and practice specialty (AMA, n.d.b.).

Third-party organizations can access the physician Masterfile for a fee, including research institutions, governmental agencies, professional medical organizations, universities and medical schools, and other health-related groups (AMA, n.d.a.). The AMA has mechanisms for database licensing, contracts, and royalties, although details of these mechanisms are not publicly available (AMA, n.d.c.; AMA, n.d.d.).

Prior to 2006, the AMA Physician Masterfile data were available for sale to pharmaceutical companies for direct marketing purposes regardless of physicians' privacy or other objections (Wolfe, 2012). In 2004, the AMA

commissioned a Gallup poll of physicians to understand physician preferences about privacy as it relates to pharmaceutical companies, and the poll found that two-thirds of physicians were opposed to the release of data, and 77% felt that an opt-out program would alleviate concerns about release of the data (Saul, 2006). As a result of the objections, the AMA included new functionality to prohibit a physician's information from being shared with industry for marketing purposes or any other reason (Wolfe, 2012). This privacy function is an opt-out system rather than an opt-in system (Wolfe, 2012), meaning that the physician needs to be proactive and take action to prohibit release of data to industry. Today, while the AMA does not collect, license, sell, or have access to physician prescribing data, pharmaceutical companies and pharmaceutical representatives can license the AMA Physician Masterfile and match physicians with data collected by Health Information Organizations (HIOs) to understand prescribing patterns of individual physicians (AMA, n.d.e.). HIOs are organizations that serve as a local or regional health information exchange (HIE) network (Adler-Milstein, Garg, Zhao, & Patel, 2021).

Licensing, contracts, and royalties from the AMA Physician Masterfile are major sources of revenue. According to the AMA 2020 Annual Report (AMA, n.d.f.), revenue from publishing, health solutions, and insurance (the umbrella term that includes database products including royalties) brought in \$376 million in revenue.

Though the AMA database meets many informational needs, there are limitations. In particular, the field of "active" may be delayed in its updates, as it takes time to identify retired and deceased physicians.

Similarly, practice settings may lag in updates. Still, the benefits of having a central source for data on the education and training of physicians allows for longitudinal studies that are impossible to do for nurses.

The decades of research using the AMA Masterfile to track the physician workforce underscore the importance of this resource to advancing scholarship. One innovative effort to link educational curricula and learner outcomes to clinical outcomes led the University of Minnesota Medical School to create a Medical Education Outcomes Center (MEOC) (Rosenberg et al., 2019). The MEOC was linked to the Masterfile data of UMMS graduates and the NPI registry to connect alumni practice data to education data. In another example, researchers at George Washington University used the NPDES and the AMA Masterfile to create interactive maps at the county level to track workforce shortages during the COVID-19 pandemic (Fitzhugh Mullan Institute for Health Workforce Equity, n.d.).

National Practitioner Data Bank

The National Practitioner Data Bank (NPDB) is a web-based repository of reports related to medical

malpractice payments and certain adverse acts involving healthcare practitioners, providers, and suppliers (NPDB, n.d.a.). Over time, the NPDB has served as an important repository to ensure the quality and safe patient care through disclosure of important information about incompetent or unprofessional behavior, fraud, and abuse by healthcare professionals, providers, and suppliers. The NPDB is a national database that is free of charge, easily accessible by anyone, and demonstrates the feasibility of such a resource.

NPDB was created as a result of the passage of the Health Care Quality Improvement Act (HCQIA) of 1986 to protect the health and safety of the public by informing actual or potential employers and medical staffs of incompetent or unprofessional behavior of physicians. Initially, the law offered qualified immunity from liability for peer review of physicians, dentists, and other healthcare providers; mandated the creation of a national practitioner data bank to track incompetent, inept, or unprofessional physicians; and enacted procedural rules for due process, privilege restrictions, and reporting and disbursement of information (Horner, 1990). In the HIPAA of 1996, provisions of the law mandated the creation of the Healthcare Integrity and Protection Data Bank (HIPDB) to combat fraud and abuse in health insurance and healthcare delivery (NPDB, n.d.b.). The HIPDB housed information regarding civil judgments, criminal convictions, or actions by a federal or state licensing agency against a healthcare provider, supplier, or practitioner related to the delivery of a healthcare item or service (Scott, 1999). In 2013, due to many overlaps of data that HIPDB and NPDB collected and to reduce redundancy and duplication, pursuant to the Affordable Care Act of 2010, all data from HIPDB are now part of the NPDB database and collection system (NPDB, n.d.b.).

The NPDB is housed within the Health Resources and Services Administration (HRSA) and is a public-private partnership. The system was designed to be self-supporting through query fees (NPDB, n.d.c.). The first private company to create and manage the NPDB was Unisys in 1988, and in 1995, the contract was given to SRA International to develop and manage the second generation of NPDB (Berkshire Hathaway, 2012; NPDB, n.d.c.). In 2012, SRA International did receive a \$78.5 million contract for the Fifth Generation NPDB and the HIPDB (Berkshire Hathaway, 2012).

The NPDB was not created immediately after the passage of HCQIA of 1986 and was unveiled in 1990. Between 1986 and 1990, the rules and regulations needed to be promulgated. Early publications analyzing the NPDB identified issues to consider: disparate reporting requirements, resolving data bank disputes, the effect of terminating physician privileges as a result of data in the NPDB, corporate liability for malpractice, clinical agency liability for failure to report, increased risk for litigation and access by plaintiff lawyers for malpractice suits, when to purge information out of the NPDB, appeal rights, physician statements

regarding information found in the NPDB file, education of physicians related to the implications of the NPDB, confidentiality, third-party access to the NPDB file, and the costs of establishing and operating the NPDB (Anderson, 1990; Passin & Haberek, 1990). Many of these issues were resolved over the course of the life of the NPDB. These are potential issues for consideration in designing access to a comprehensive nurse identifier system for nationwide utilization. According to the NPDB Guidebook, only authorized entities are allowed to access the NPDB, which is not a publicly available database (NPDB, n.d.d.). Also, the practitioners, providers, or suppliers are able to enter a statement, and there is a dispute process.

Acute Physiology and Chronic Health Evaluation (APACHE)

There have been examples of health professions' databases dissolving as a result of conflict regarding funding and access issues. These risks should be duly considered in relation to the NCSBN ID and its governance.

One example is the Acute Physiology and Chronic Health Evaluation (APACHE) tool. The APACHE II system was a free database intended to be used as a quality improvement tool (Knaus, 2002). It became the "gold standard" for quality for medical and surgical care monitoring and was widely accepted and used in clinical care. In over 20 years, more than 2,000 peer-reviewed scientific research studies used APACHE (Knaus, 2002). APACHE and APACHE II were managed and further refined by APACHE Medical Systems, Inc. (AMSI). AMSI was funded by the National Institutes of Health and private foundations.

When the AMSI decided to create the next version of APACHE – APACHE III – AMSI decided to seek venture capital and have APACHE III become the new commercial version of APACHE. The APACHE III public offering in 1996 raised \$25 million to help with further research, development, and distribution (Knaus, 2002). Subsequently, questions were raised that federal monies were spent inappropriately to promote APACHE's commercial operations; yet AMSI was cleared of these allegations after a prolonged legal review by the Agency for Healthcare Quality and Research (formerly the National Center for Health Services Research). Even so, clinical colleagues were critical of the commercialization and demanded that the APACHE software be free. Ultimately, because of the commercial controversy, the field of risk scoring and prognostication in critical care became confused and fragmented. Instead of a single tool being the standard for illness severity and prognosis, other systems that were free to use such as the Simplified Acute Physiology Score (SAPS), the Mortality Probability Model (MPM), and the Society for Critical Care Medicine's Project IMPACT tool, among others proliferated and entered the field.

There are some lessons to be learned from the APACHE example. If databases are privatized and access to the data are not free or are not available for a nominal fee, then the potential for finding alternatives to the centralized database that allow for free access to data can splinter the centralized database and create many other databases. As a result, there is no unified and reliable single source of information. This disunity of prognostication and quality improvement tools has led to confusion among the various tools. Choosing the incorrect tool among all of the available tools can lead to wastage of time, increased cost, unwarranted clinical extrapolations, and poor science (Rapsang & Shyam, 2014).

Discussion

There is an urgent need for a reliable and comprehensive healthcare workforce database to support workforce planning and evaluation at the national, state, and local level and to ensure that the contributions of nurses are fully taken into account as value-based payment evolves (Reed, 2020). The pandemic has shown how important it is for the government and large employers to have data on the current supply of licensed nurses, as well as where and whether they are working. There is also evidence that hospitals known for nursing excellence perform better in value-based payment arrangements such as Hospital Value-Based Purchasing (Lasater et al., 2016). This program, as well as the Hospital Acquired Condition (HAC) Reduction Program, and the Hospital Readmission Reduction Program all rely on nurse sensitive or fully nurse-driven performance measures. Yet, to the authors' knowledge, the enhanced reimbursement stemming from value-based payments has not flowed to the nurses who shape these outcomes. If reimbursement is based on value metrics and measurement of nurses' contributions to outcomes is absent, then nurses' contributions are excluded from the financial analysis and are therefore viewed as only a labor expense. Dimond (2019) underscores the existing absence of nurse/value-based payment "profit-sharing" (para 3) and suggests that nurses only receive negative feedback when performance metrics linked to payment are not achieved. Unique identifiers may offer one strategy whereby the nurses who create the value can be more directly compensated for it. Such efforts may also offer corrective action to address the findings of Yang & Anderson (2022). This study of 8,862 hospital-year observations found that non-profit hospitals with more revenue largely did not allocate those resources to expenditures that impact patients, service offerings, or the workplace environment, but instead to administrative expenses and revenue surpluses. Having a unique nurse identifier has the potential to more accurately determine the relationship between revenue and nurses' contributions. However, more

discussions about the impact of a unique identifier on health care finance is essential.

Conversely, is there the potential for unintended negative consequences? Would individual nurses be targeted for poor performance on metrics for reasons that are beyond their control, such as inadequate staffing, system failures, or legal controversies? The RaDonda Vaught criminal charge offers a chilling view into a specter where an individual nurse is blamed for a broader system failure.² The tenets of a *Just Culture* take in consideration the quality of one's choices, risk, systems design, human behavior, and patient safety (Boysen, 2013; Marx 2022). The attribution of an error and the subsequent criminalization of that error through a unique nurse identifier are a topics for much more discussion in the nursing profession. Additionally, the HIPAA Privacy Rule ensures that protected health information (PHI) including information related to abortion and other sexual and reproductive health care will be kept private (U.S. Department of Health and Human Services, 2022). While HIPAA does afford privacy of PHI, privacy advocates are concerned that search engines could be used to prosecute abortion seekers (Allyn, 2022) and some abortion clinic providers are only using paper charts to ensure the maximum privacy of patients (Collier, 2022). Considerations regarding the ethical, legal, and social implications as it relates to privacy and how law enforcement may try to access PHI and provider practices needs to be discussed before any implementation is enacted.

Unique nurse identifiers, if included in the EHR, would allow for clearer understanding of the value of nurses' work in various practice settings that use the EHR. For example, it could also help identify and distinguish RN roles and the roles of unlicensed health-care workers with the aim of ensuring a safe and effective healthcare system with all nurses practicing to the full extent of their education and licensure or certification. It could also allow for real-time implementation research to assess the contribution of nurses to value-based performance and payment metrics that go beyond the traditional nurse-sensitive measures (e.g., hospital acquired infections, patient falls, pressure ulcer, and patient satisfaction). As new measures are added to reporting requirements, such as those related to severe hypoglycemia and hyperglycemia within the Hospital Inpatient Quality-Reporting Program, nurses who understand quality and payment measures are in an optimal position to deploy identifiers to maximize not only the quality of care, but also their professional practice (Sensmeier et al., 2019). Moreover, the unique identification of nurses is essential for robust systems of interoperability and health

information exchange needed to support patient care across settings.

As summarized in Table 2, the attributes and foci of the NPI and NCSBN ID differ, and each has advantages and disadvantages, when considered in light of the lessons learned through the three other databases reviewed above. At the same time, the increased visibility of individual nurses' performance could have unintended consequences to the nursing workforce and individual nurses. For example, nurses who contribute to poor outcomes for which hospitals are penalized under the HAC Reduction Program could be unfairly targeted (CMS, n.d.), even when organizational factors, such as overall staffing levels and skill mix, were the primary drivers of poor outcomes. Critical strengths of NCSBN ID are its comprehensive coverage, automatic re-enrollment, and automatic updating. The NCSBN ID could be feasibly implemented in EHRs. The major challenge, as suggested by the AMA and the APACHE cases, is a lack of certainty around how future public access and fee structures could affect the viability of its long-term use as a unique nurse identifier. As such, it will be important for NCSBN to engage with state boards of nursing and stakeholders with an interest in using the NCSBN ID to ensure appropriate governance and access.

The NPI also has advantages and disadvantages. As a federal database subject to the Freedom of Information Act, the prospective issues of access and fee structures do not represent a barrier to nurses or researchers. The NPI would also provide a number that could be used in studies of teams and other cross-professional research questions. The system would allow for local, state, and federal level planning and evaluation of the nursing workforce, which is critical during public health emergencies, as well as for long-term estimations of needs and allocative efficiencies. Currently, registration is not necessary for practice as an RN. Consequently, the overwhelming majority of RNs do not register for NPIs.

While NPIs could be a powerful complement to the NCSBN ID in advancing nursing workforce data, policy action addressing barriers to registration are necessary for the NPI to evolve into a robust workforce database for nurses. Further, the US Congress would likely need to authorize additional funding for CMS to modernize the NPPES NPI Registry to accommodate millions of additional records and new user interaction with the system. Both funding and policy investments would be necessary for its use as a unique nurse identifier.

As the development of a system or network of systems are developed to create a unified national nurse identifier system, it is important to keep in the national discourse and understanding regarding the desired needs and the intended and unintended impact or outcomes on the ethical, legal, and social factors of the unique nurse identifier. For example, when the Human Genome Project was being established, the healthcare and scientific community was concerned about how the new genetic information was going to be used, how the genetic data would be housed,

² See the letter from the American Nurses Association and Tennessee Nurses Association to the Judge Jennifer Smith regarding the sentencing of RaDonda Vaught at <https://www.nursingworld.org/~49a0c0/globalassets/practiceandpolicy/ethics/vaught-judge-letter-05092022.pdf>

Table 2 – Comparison of the NPI and NCSBN ID

Dimension	NPI	NCSBN ID
Owner	Centers for Medicare and Medicaid Services	National Council of State Boards of Nursing
Database Enrollment	NPPES NPI Registry Voluntary; RN/APRN must apply	Nursys Automatically enrolled and an identifier is assigned upon initial licensure
Coverage	Most APRNs, low percentage of RNs	All RNs, APRNs, and LVN/LPNs with a record of licensure
Fee for identifier number for nurses Database access	Free Publicly available	Free <ul style="list-style-type: none"> • Accessible for matching, via API or web interface, at no cost • Data not available for download in its entirety as a database; it is owned by the individual state boards of nursing.
Fee for accessing database	No	Yes
How the identifier is updated	RN/APRN must submit updates.	Automatically upon licensure Changes
Current use case	<ul style="list-style-type: none"> • All clinicians who conduct electronic transactions and transmit health information are required to have an associated NPI. • Payers and researchers use the NPI in the analysis of prescription, screening, and diagnostic trends. • An NPI is used for billing purposes with payers. 	<ul style="list-style-type: none"> • Unique identifier for the purposes of licensure, discipline, and practice privileges for RNs, APRNs, and LVN/LPNs. • Track nurses electronically across state licensures • Pilot projects in progress or completed by HCA Healthcare, University of Alabama in Huntsville, and the Center for Medical Interoperability (Alliance for Nursing Informatics, 2021)
Planned use	CMS' call for interoperability includes requirement that all providers be included in NPPES	<ul style="list-style-type: none"> • Ongoing effort to endorse and promote use in EHRs by the Alliance for Nursing Informatics • Use in EHRs for the purposes of health information exchange • Health services and workforce research
Summary of Limitations	<ul style="list-style-type: none"> • Only RNs that bill or are in certain federal-funded programs are required to register. Others have no incentive to sign up. • NPI holders must submit changes, including when an RN/APRN leaves the profession. As with other professions in NPPES, there are instances when this does not happen. • When health professionals change jobs, their new employer should upload new work address, but sometimes this does not happen. • Only a small percentage of the nursing workforce holds an NPI. 	<ul style="list-style-type: none"> • Although virtually all of the nursing workforce holds an NCSBN ID, it has not been widely adopted within EHRs. • Functions as a free unique nurse identifier, and Nursys® can be used to look up or match identities, but the data cannot be downloaded in its entirety, which could be a limitation in some types of workforce studies.

APRN, advanced practice registered nurse; HER, electronic health record; LVN, licensed vocational nurse; LPN, licensed practical nurse; NPPES, National Plan and Provider Enumeration System; NPI, National Provider Identifier; RN, registered nurse.

and how individuals and society should be protected from possible harm. As a result, the Ethical, Legal, and Social Implications (ELSI) program of Human Genetics Research was created to examine and address those issues and assist in the development of policy recommendations and guidelines to protect individuals and society

([National Institutes of Health, 2012](#)). Examples of possible use case scenarios are listed in [Table 3](#). Ethicists, thought leaders, and business leaders should engage in the discourse about the issues and controversies that confronted the AMA Physician Masterfile, NPDB, and APACHE in addition to how to ensure that any organization provides

Table 3 – Possible Use Case Scenarios

Identified Need for an Integrated Nurse Identifier System	Use Case
Understanding and analyzing workforce issues, such as supply, demand, shortage areas, migration of the workforce, specialty, and subspecialty practice.	Designation of shortage areas could include nurses, and it would be possible at a highly localized level, using a valid and reliable public data source. Health Professional Shortage Areas (HPSAs) currently include only physicians, for example, but if data were available for nurses in the NPPES, it would be possible for the US Department of Health and Human Services to add them, or create a new designation regarding the nurse workforce.
Attribution of work to understand quality of care, the value and contributions of nursing, and reimbursement models.	Any of the services nurses can provide in ambulatory, community, and primary care settings are billable if nurses have an NPI (Flinter, Hsu, Cromp, Ladden, & Wagner, 2017). There is a growing body of evidence highlighting the potential roles of RNs in primary care, including preventive care, chronic illness management, practice operations, care management, and hospital transition care (Flinter et al., 2017; Bodenheimer & Mason, 2017; Needleman, 2017). Needleman (2017) points out that RNs practicing in primary care can bring significant income into this practice setting, far above the cost of RN employment. Further, RNs in the outpatient community, and primary care settings are practicing more autonomously, leading case management, managing patient panels, and coordinating complex care (Flinter et al., 2017). Another example is a nurse identifier would allow the nursing profession to expand its impact in the context of interdisciplinary teams in various types of practice settings. Using common, consistent, and accessible identifiers across provider types allows employers, researchers, and policymakers to understand specific team configurations in relation to specific types of population needs and could lead to greater efficiency and effectiveness. The NPI allows nursing to join an interprofessional identifier system, one that would enhance visibility in healthcare and health services research and increase the likelihood of future models of interprofessional care optimizing the scope of nursing practice.
Credentials and privileges to understand scope of services and scope of practice.	Attribution data cross-referenced with workforce data can help articulate the scope of services and scope of practice of nurses and advanced practice registered nurses to inform policy and education in various types of practice settings.
Evaluating nursing educational outcomes on quality of care.	The Medical Education Outcomes Center (MEOC) (Rosenberg et al., 2019) is a good example of how new innovations can help evaluate the effectiveness of curricula and andragogies can have an impact on graduates and the quality of care.
Evaluation of the impact of federal dollars, grants, scholarships, and loans on the nursing workforce to support future funding.	The Health Resources and Services Administration (HRSA) is supportive of the expansion of NPIs to nurses because it would allow them to track clinicians over time and assess the impact of grants/loan/scholarship programs. This would help them build links between education, training, and healthcare service in various types of practice settings. Such linkages would empower HRSA and the nursing community to demonstrate the value and reach of these workforce programs and support future funding.

equitable access while remaining financially solvent. Further deep discussions should also include topics such as how minority nurses can be hurt or helped by a unique nurse identifier and what the intended and unintended consequences are of a nurse identifier. A nurse identifier is yet another label that is attached to someone. While there are no databases that currently collect personal

demographic data such as race and ethnicity, future iterations of a national unique nurse identifier could include those data, especially for workforce studies. Both the National Academy of Medicine's report, *The Future of Nursing 2020 to 2030: Charting a Path to Achieve Health Equity* (2021) and the *National Commission to Address Racism in Nursing* (2022) report call

Table 4 – Key Questions for Policy Development Related to a National Nurse Identifier System

<p>How can we leverage the relative strengths of the NCSBN ID and NPI to optimize nursing workforce data for knowledge development and decision making?</p> <p>Should nurses with additional license types be required to register in the National Provider Index?</p> <p>What would it mean for a nurse to be potentially identified and tracked with risk of harm based on surveillance and access to their personal data or a negative incident report associated with their identifier?</p> <p>In the current and proposed systems, could data (gender, race, etc.) be used to discriminate, exclude, or control nurses who are perceived as undesirables or expendable?</p> <p>Design and use of data to pick and choose preferences based on bias is well documented in the technology and artificial intelligence literature (Hoffman, 2021; Panch, Mattie, & Atun, 2019). How can this be prevented in the new system or network of systems?</p> <p>What laws should be considered to protect nurses' privacy and protect them from bias, discrimination, and false attribution of adverse events and discipline?</p> <p>What are other ethical, legal, and social implications of creating a system or network of systems for a national nurse identifier?</p> <p>How will nurses be educated and informed about a national nurse identifier system or network of systems? How will their support and concerns be collected and incorporated into the development of a system or network of systems?</p> <p>What modifications to the NPI would be required to support the large-scale registration of other nursing license types in the NPI?</p> <p>What type of coordination between the NCSBN ID system and the NPI would best optimize nursing workforce data?</p> <p>What types of policy changes would promote the adoption of unique nurse identifiers within electronic health records?</p>

upon the nursing profession to dismantle structural and cultural racism. In discussing the racial, ethical, legal, and social implications of a unique national nurse identifier before the identifier is linked to demographics can potentially avoid the need to dismantle structural and cultural racism. Additionally, determining the types of information that current and potential users want and for what purposes is a critical component of the national dialogue among nursing leadership. Learning from past examples will help the nursing profession plan for a smooth, equitable, fair, and just development of a nurse identifier system or network of systems. Some key questions are listed in Table 4 and are intended to engage nursing and health-care leaders to proactively address the ethical, legal, and social implications of a national nurse identifier.

Conclusion

Collaborative development and adoption of an accessible national nurse identifier system to improve the value-based purchasing dimension of nursing and

health care is imperative. Collaboration and mandating that frontline nurses, especially nurses of color and other minority nursing groups, who will be affected by a national nurse identifier must be involved in the policy discussions; we know that whoever controls the power also controls the narrative about nursing and the nursing workforce. Ensuring that the frontline nurses be involved can proactively help address and possibly resolve the ethical, legal, and social implications of the unique nurse identifier. A unified system or network of systems needs to be a functional, unbiased repository of nurse data controlled by nursing.

In summary, the NPI and NCSBN ID systems for identifying nurses have complementary advantages and disadvantages, and both systems hold value. Thanks to the efforts of nursing leaders and many years of hard work, there has been substantial progress in advancing the implementation of the NCSBN ID as a unique identifier for nurses within the EHR. Moreover, as states respond to the requirements of Section 4003 of the Cures Act (Public Law 114–255: 2016), we have a new opportunity to advance the NPI as a parallel effort, recognizing (a) the complementary nature of the systems, and (b) the fact that some actors may opt to use NPIs as a means of authenticating providers in EHRs for assured exchange of patients' health information.¹

Given this evolution and the new opportunities at hand, it is important to understand ways that both systems can be enhanced simultaneously. Even if the NCSBN ID becomes a resource as important as the AMA Physician Masterfile in the future, the need for NPIs will continue so long as RNs and APRNs bill for services. Further, the usefulness of the NCSBN ID will be substantially enhanced through linkage to the NPI, and advancement in the comprehensiveness of the NPI, as well as the widespread adoption within EHR systems. Advancing the co-development of the two systems is, therefore, an important next step in meeting nursing workforce needs while attending to the intended and unintended consequences of creating a national nurse identifier system.

Authors' Contributions

GKC: Conceptualization, writing-original draft, writing-review & editing; MR C: Conceptualization, writing-original draft, writing-review & editing; CST:

³ The passage of the Health Information Technology for Economic and Clinical Health Act (HITECH Act) in 2009 spurred the use of HIT and the scope of the health information environment (Mathematica Policy Research, 2015). Originally, the goal was broad adoption of EHRs for better data collection and analysis. Since then, EHRs and information technology have become more sophisticated, with secure data exchange within and across health systems for improved coordination of care, efficiency, and health outcomes now being the driver of HIT advances.

Conceptualization, writing-original draft, writing-review & editing; BR: Writing-original draft, writing-review & editing; DIA: Writing-review & editing; MM-O: Writing-original draft, writing-review & editing; CC: Writing-original draft, writing-review & editing; ET: Project administration, writing-review & editing; P (Polly)P: Conceptualization, writing-original draft, writing-reviewing & editing.

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