

## Non-Government Application for Massachusetts All-Payer Claims Data [Exhibit A]

### I. INSTRUCTIONS

*This form is required for all Applicants, except Government Agencies as defined in 957 CMR 5.02, requesting protected health information. All Applicants must also complete the Data Management Plan, attached to this Application. The Application and the Data Management Plan must be signed by an authorized signatory of the Organization. This Application and the Data Management Plan will be used by CHIA to determine whether the request meets the criteria for data release, pursuant to 957 CMR 5.00. Please complete the Application documents fully and accurately. Prior to receiving CHIA Data, the Organization must execute CHIA's Data Use Agreement. Applicants may wish to review that document prior to submitting this Application.*

*Before completing this Application, please review the data request information on CHIA's website:*

- Data Availability
- Fee Schedule
- Data Request Process

*After reviewing the information on the website and this Application, please contact CHIA at [apcd.data@state.ma.us](mailto:apcd.data@state.ma.us) if you have additional questions about how to complete this form.*

*All attachments must be uploaded to IRBNet with your Application. All Application documents can be found on the CHIA website in Word and in PDF format or on IRBNet in Word format. If you submit a PDF document, please also include a Word version in order to facilitate edits that may be needed.*

***Applications will not be reviewed until the Application and all supporting documents are complete and the required application fee is submitted. A Fee Remittance Form with instructions for submitting the application fee is available on the CHIA website and IRBNet. If you are requesting a fee waiver, a copy of the Fee Remittance Form and any supporting documentation must be uploaded to IRBNet.***

### II. FEE INFORMATION

1. Consult the most current Fee Schedule for All-Payer Claims Database data.
2. After reviewing the Fee Schedule, if you have any questions about the application or data fees, contact [apcd.data@state.ma.us](mailto:apcd.data@state.ma.us).
3. If you believe that you qualify for a fee waiver, complete and submit the Fee Remittance Form and attach it and all required supporting documentation with your application. Refer to the Fee Schedule (effective Feb 1, 2017) for fee waiver criteria.
4. Applications will not be reviewed until the application fee is received.
5. Data for approved Applications will not be released until the payment for the Data is received.

**III. ORGANIZATION & INVESTIGATOR INFORMATION**

Project Title:	Hospital-Physician Acquisition, Provider Behavior, and Patient Well-Being
IRBNet Number:	
Organization Requesting Data (Recipient):	National Bureau of Economic Research
Organization Website:	www.nber.org
Authorized Signatory for Organization:	Alterra Milone
Title:	Director of Research and Grants Management
E-Mail Address:	alterra@nber.org
Address, City/Town, State, Zip Code:	1050 Massachusetts Ave, 3rd Floor Cambridge, MA 02138
Data Custodian: (Individual responsible for organizing, storing, and archiving Data)	Mohan Ramanujan
Title:	Data Custodian, Unix Administrator
E-Mail Address:	mohan@nber.org
Telephone Number:	617-588-0367
Address, City/Town, State, Zip Code:	1050 Massachusetts Ave, 3rd Floor Cambridge, MA 02138
Primary Investigator (Applicant): (Individual responsible for the research team using the Data)	Martin Gaynor
Title:	Research Associate
E-Mail Address:	Martin_gaynor@nber.org
Telephone Number:	412-268-7933
Names of Co-Investigators:	Shruthi Venkatesh
E-Mail Addresses of Co-Investigators:	shruthiv@cmu.edu

**IV. PROJECT INFORMATION**

1. What will be the use of the CHIA Data requested? [Check all that apply]

- |   |  |  |
|---|--|--|
| <input type="checkbox"/> Epidemiological                  | <input type="checkbox"/> Health planning/resource allocation | <input type="checkbox"/> Cost trends                     |
| <input checked="" type="checkbox"/> Longitudinal Research | <input type="checkbox"/> Quality of care assessment          | <input type="checkbox"/> Rate setting                    |
| <input type="checkbox"/> Reference tool                   | <input checked="" type="checkbox"/> Research studies         | <input type="checkbox"/> Severity index tool             |
| <input type="checkbox"/> Surveillance                     | <input checked="" type="checkbox"/> Student research         | <input type="checkbox"/> Utilization review of resources |
| <input type="checkbox"/> Inclusion in a product           | <input type="checkbox"/> Other (describe in box below)       |  |

2. Provide an abstract or brief summary of the specific purpose and objectives of your Project. This description should include the research questions and/or hypotheses the project will attempt to address, or describe the intended product or report that will be derived from the requested data and how this product will be used. Include a brief summary of the pertinent literature with citations, if applicable.

This project investigates how hospital-physician acquisition affects health care prices, hospital-insurer contracts, and patient well-being. We aim to leverage the Massachusetts APCD to address three objectives: (1) Describe the association between hospital-physician acquisition and hospital-insurer contractual form, negotiated prices, and

patient referrals; (2) Estimate the causal effect of hospital-physician acquisition on prices and clinical quality of care; (3) Examine how provider coordination, hospital bargaining power with insurers, and rival provider foreclosure affects hospital-physician practice acquisitions and their subsequent effects on prices and quality.

The effect of hospital acquisition of physician practices on patient welfare is ambiguous. On the one hand, consolidation between hospitals and physicians may harm competition as it allows hospitals to capture physicians' referral networks and thereby restrict patients' access to rival providers. This can disadvantage rivals and allow the acquiring hospital to increase its negotiated prices with insurers. On the other hand, consolidation may improve provider coordination, lower administrative costs, and provide incentives for hospital investments in quality. These efficiencies may better patient care and lower spending. However, there is no empirical evidence about the impacts of hospital-physician acquisitions on the foreclosure of rival providers versus benefits from integration.

Recent research shows hospital acquisitions of physician groups increase spending for privately insured patients (Capps et al 2018; Neprash et al 2015; Baker, Bundorf, and Kessler 2014; Robinson and Miller 2014). There is also some evidence that these acquisitions do not improve the clinical quality of care for Medicare patients (Koch, Wendling, and Wilson 2017). However, there is no evidence about the impact of acquisitions on the quality of care for privately insured patients, and there is no evidence about the incentives or mechanisms that drive hospital-physician practice acquisitions and their effects on prices and quality.

3. Has an Institutional Review Board (IRB) reviewed your Project?

- Yes [If yes, a copy of the approval letter and protocol must be included with the Application package on IRBNet.]  
 No, this Project is not human subject research and does not require IRB review.

4. **Research Methodology:** Applicants must provide either the IRB protocol or a written description of the Project methodology (typically 1-2 pages), which should state the Project objectives and/or identify relevant research questions. This document must be included with the Application package on IRBNet and must provide sufficient detail to allow CHIA to understand how the Data will be used to meet objectives or address research questions.

## V. PUBLIC INTEREST

1. Briefly explain why completing your Project is in the public interest. Use quantitative indicators of public health importance where possible, for example, numbers of deaths or incident cases; age-adjusted, age-specific, or crude rates; or years of potential life lost. *Uses that serve the public interest under CHIA regulations include, but are not limited to:*

*health cost and utilization analysis to formulate public policy; studies that promote improvement in population health, health care quality or access; and health planning tied to evaluation or improvement of Massachusetts state government initiatives.*

The United States health care system faces rapid and extensive provider consolidation. There has been so much consolidation in health care markets over the last two decades that most cities are now dominated by one or two very large health systems (Gaynor 2014). Hospital acquisition of physician practices represents a more recent and growing trend in hospital consolidation. One-third of physician practices are now owned entirely by a hospital (Venkatesh 2019). Only 47.1 percent of practicing physicians have an ownership stake in their practice (Kane 2018). For the first time, in 2018, there were fewer physician owners (45.9 percent) than employees (47.4%) (Kane 2018). This reflects the prevalence of hospital-physician over the past ten years.

The effects of hospital-physician acquisition on patient well-being is unclear. On the one hand, hospital-physician acquisitions may improve provider coordination, physician specialization, and result in improved clinical outcomes for patients. On the other hand, the acquisitions may enhance hospital bargaining power with insurers as hospitals capture acquired physicians' referral base. This could result in higher prices for patients.

**VI. DATA REQUESTED**

The Massachusetts All-Payer Claims Database is comprised of medical, pharmacy, and dental claims and information from the member eligibility, provider, and product files that are collected from health insurance payers licensed to operate in the Commonwealth of Massachusetts. This information encompasses public and private payers as well as data from insured and self-insured plans. APCD data are refreshed and updated annually and made available to approved data users in Release Versions that contain five calendar years of data and three months of run-out. Data requests will be fulfilled using the most current Release Version. For more information about the most current APCD Release Version, including available years of data and a full list of elements in the release please refer to release layouts, data dictionaries and similar documentation included on [CHIA's website](#).

Data requests are typically fulfilled on a one time basis, however; certain Projects may require future years of data that will become available in a subsequent release. Applicants who anticipate a need for future years of data may request to be considered for a subscription. Approved subscriptions will receive, upon request, the same data files and data elements included in the initial Release annually or as available. Please note that approved subscription request will be subject to the Data Use Agreement, will require payment of fees for additional Data, and subject to the limitation that the Data can be used only in support of the approved Project.

1. List years of data requested (only list years available in the current Release Version): 2014-2017

2. Please indicate below whether this is a one-time request, or if the described Project will require a subscription.

One-Time Request OR  Subscription

3. Specify below the data files requested for this Project, and provide your justification for requesting each file.

Medical Claims

**Describe how your research objectives require Medical Claims data:**

We plan to use the Medical Claims file to track hospital-physician acquisition, identify hospital-insurer contractual form, construct several risk-adjusted physician and hospital price indexes, link to physician and hospital quality measures from CMS, and study physician referrals. We plan to link the national service provider ID (MC026) and national billing provider ID (MC077) to provider taxonomy codes in the CMS NPES files for each year-month. This allows us to observe changes in physicians' ownership status from Independent- to hospital-owned. Second, we plan to use the payment arrangement type (MC114) to measure how hospital-insurer contracts shift as a result of physician practice acquisition. Third, we calculate our main price indexes using the paid amount (MC063) and patient copay (MC065). We control for case and procedure severity using CPT codes (MC055-MC057). We plan to identify claims for several plausibly homogenous services using CPT codes to construct procedure-specific price indexes. Third, we plan to study how hospital-physician acquisition affects clinical quality measures, and we plan to link using the provider ID variables in the Medical Claims file. Lastly, we will document how hospitals may acquire physician practices to capture physicians' referral base, and will use the PCP indicator (MC119) along with the referring provider ID (MC112) and referral indicator (MC118) to study physicians' referral patterns.

 **Pharmacy Claims****Describe how your research objectives require Pharmacy Claims data:**

N/A

 **Dental Claims****Describe how your research objectives require Dental Claims data:**

N/A

 **Member Eligibility****Describe how your research objectives require Member Eligibility data:**

One of our primary research objectives is to study the effect of hospital-physician acquisition on prices. To this end, we will construct several price indexes that facilitate price comparison across hospitals. We plan to use the Member Eligibility file to control for patient characteristics (age group and gender (ME013)) along with plan enrollment information when constructing our price indexes in order to control for differences in patient risk and plan choice. Another goal of our project is to estimate the tradeoffs that patients face in choosing a vertically integrated PCP. The Member Eligibility file allows us to identify each patient's PCP (via NPI, ME046) along with the physician group of the member's PCP (ME125).

 **Provider****Describe how your research objectives require Provider data:**

N/A

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**Product**

Describe how your research objectives require Product data:

We will use the product file to control for plan characteristics when computing our risk-adjusted hospital and physician price indexes. In particular, to make sure we compare hospital and physician prices across providers whose services are included in the same types of insurance plan, we will adjusted payments made to the provider by the product line of business (PRO04), plan market (PRO05), benefit type (PRO06), and risk type (PRO08).

**VII. DATA ENHANCEMENTS REQUESTED**

State and federal privacy laws limit the release and use of Data to the minimum amount of data needed to accomplish a specific Project objective.

All-Payer Claims Database data is released in Limited Data Sets (LDS). All applicants receive the "Core" LDS, but may also request the data enhancements listed below for inclusion in their analyses. Requests for enhancements will be reviewed by CHIA to determine whether each represents the minimum data necessary to complete the specific Project objective.

For a full list of elements in the release (i.e., the core elements and additional elements), please refer to release layouts, data dictionaries and similar documentation included on CHIA's website.

1. Specify below which enhancements you are requesting in addition to the "Core" LDS, provide your justification for requesting each enhancement.

**Geographic Subdivisions**

The geographic subdivisions listed below are available for Massachusetts residents and providers only. Select one of the following options.

<input type="checkbox"/> 3-Digit Zip Code (standard)	<input checked="" type="checkbox"/> 5-Digit Zip Code***
<p>***If requested, provide justification for requesting 5-Digit Zip Code. Refer to specifics in your methodology:</p> <p>We plan to construct several risk-adjusted hospital and physician price indexes using the payment variables in the Medical Claims file. We aim to use the price indexes to compare prices across hospitals. To adequately account for differences in patient pools across hospitals, we require 5 digit zip code. This will allow us to adjust each price index for any differences in local patient populations. The three digit zip code is not sufficient because it does not allow us to granularly identify the population that serves as the patient pool for a given hospital.</p>	

**Date Resolution**

Select one option from the following options.

<input type="checkbox"/> Year (YYYY) (Standard)	<input checked="" type="checkbox"/> Month (YYYYMM) ***	<input type="checkbox"/> Day (YYYYMMDD) *** [for selected data elements only]
<p>*** If requested, provide justification for requesting Month or Day: Refer to specifics in your methodology:</p>		

Our study relies on identifying physician ownership transitions at the month level using national billing and service provider IDs in the the Medical Claims file linked to the CMS NPPES database. The CMS NPPES database contains information on entity type for each provider NPI and is updated each month. To capture changes in physician ownership from independent practice to hospital-owned, we plan to track transitions in the reported entity type from the NPPES database. In addition, we will construct our primary price and hospital-insurer contract outcome variables using the Medical Claims file. Since the NPPES database is updated every month, observing Medical Claims at the month level allows us to construct and cleanly match our price and hospital-insurer contract outcome variables to physician ownership information in the NPPES database.

**National Provider Identifier (NPI)**

Select one of the following options.

<input type="checkbox"/> Encrypted National Provider Identifier(s) (standard)	<input checked="" type="checkbox"/> Decrypted National Provider Identifier(s)***
*** If requested, provide justification for requesting decrypted National Provider Identifier(s). Refer to specifics in your methodology:	
<p>We will track hospital-physician acquisitions using the national service provider ID (MC026) and national billing provider ID (MC077) linked to entity type information the CMS NPPES database using each provider's NPI as the linking variable. We then plan to identify hospital-physician acquisitions using changes in the provider entity type. We will not be able to link each physician to the entity type in the NPPES unless we observe the decrypted NPI, and will therefore be unable to identify transitions in physician ownership.</p>	

**VIII. MEDICAID (MASSHEALTH) DATA**

1. Please indicate whether you are seeking Medicaid Data:

- Yes
- No

2. Federal law (42 USC 1396a(a)7) restricts the use of individually identifiable data of Medicaid recipients to uses that are directly connected to the administration of the Medicaid program. If you are requesting MassHealth Data, please describe, in the space below, why your use of the Data meets this requirement. *Your description should focus on how the results of your project could be used by the Executive Office of Health and Human Services in connection with the administering the MassHealth program.* Requests for MassHealth Data will be forwarded to MassHealth for a determination as to whether the proposed use of the Data is directly connected to the administration of the MassHealth program. CHIA cannot release MassHealth Data without approval from MassHealth. This may introduce significant delays in the receipt of MassHealth Data.

**IX. DATA LINKAGE**

*Data linkage involves combining CHIA Data with other data to create a more extensive database for analysis. Data linkage is typically used to link multiple events or characteristics within one database that refer to a single person within CHIA Data.*

1. Do you intend to link or merge CHIA Data to other data?

Yes

No linkage or merger with any other data will occur

2. If yes, please indicate below the types of data to which CHIA Data will be linked. [Check all that apply]

Individual Patient Level Data (e.g. disease registries, death data)

Individual Provider Level Data (e.g., American Medical Association Physician Masterfile)

Individual Facility Level Data (e.g., American Hospital Association data)

Aggregate Data (e.g., Census data)

Other (please describe):

3. If yes, describe the dataset(s) to which the CHIA Data will be linked, indicate which CHIA Data elements will be linked and the purpose for each linkage.

We plan to link CHIA data to the following aggregate datasets:

1. Physician provider linkages - we will link physicians in the Medical Claims file to the CMS NPPES database using the National Service Provider ID (MC026) and the National Billing Provider ID (MC077). This allows us to track hospital-physician acquisitions and to obtain physician provider entity type, specialty, and other demographic information.
2. Hospital linkages – we plan to link hospitals in the Medical Claims file to the American Hospital Association Annual Survey Database (AHA), CMS cost reports (HCRIS), the CMS Hospital Compare file, and the Health Information and Management Systems Society database (HIMSS) using the Medicare provider number for each hospital. First, the AHA files allow us to describe how hospital-physician acquisition patterns vary based on hospital location, patient volume, and the types of physician group employment arrangements. Second, the HCRIS files allow us to document how hospital costs, revenue, and investments change as a result of hospital-physician acquisition. We will use the information from HCRIS files to understand the changes in hospital operations that accompany physician practice acquisition. Third, the Hospital Compare files allow us to study the impact of hospital-physician acquisition on survival, readmission, and other process of care measures that will serve as the clinical outcome variables of interest in our analysis. Fourth, we plan to use the HIMSS file to examine hospital investment in technology.
3. Geographic area linkages – we will link 5-digit member zip code to the corresponding geographic indicator in the American Communities Survey/ Census data to get information. We do not identify individual patients here. We only link to publicly available descriptive statistics about their zip code.



4. If yes, for each proposed linkage above, please describe your method or selected algorithm (e.g., deterministic or probabilistic) for linking each dataset. If you intend to develop a unique algorithm, please describe how it will link each dataset.

1. Physician provider links – The linking variable for each file will be the physician provider NPI in MC026.
2. Hospital provider links – The linking variable for each file will be the CMS provider number for each hospital. We will identify the CMS provider number for each hospital by selecting hospital Medicare claims using the Medicare indicator variable (MC115), type of claim (MC094), and type of institutional bill (MC026). The Billing Provider Number (MC076) on these claims will be the Medicare provider number.
3. Geography links – The linking variable will be the 5-digit member zip code.

5. If yes, attach or provide below a complete listing of the variables from all sources to be included in the final linked analytic file.

1. CMS NPPES:

- a. Provider NPI
- b. Entity Type Code
- c. Provider Organization Name
- d. Provider First Name
- e. Provider Last Name
- f. Provider Credential
- g. Provider Practice Location Address (First Line, Second Line, City, State, Postal Code)
- h. Provider Gender Code
- i. Healthcare Provider Taxonomy Codes 1-15

2. AHA database:

- a. Hospital control code (government federal, government non-federal, investor-owned, non-government non-profit)
- b. Hospital name
- c. Hospital street address
- d. Hospital city
- e. Hospital state code
- f. Hospital zip code
- g. Hospital NPI number
- h. Health care system ID

- i. Medicare Provider ID
- j. Number of physicians engaged in arrangement with hospital
- k. Total hospital beds
- l. Total inpatient days
- m. Total outpatient visits
- n. Total full time hospital employees
- o. Total physician and dentist full time employees
- p. Number of individual physician contracts
- q. Number of physician group contracts

### 3. HCRIS:

- a. Total hospital beds
- b. Total inpatient discharges
- c. Total income
- d. Total cost
- e. Total donations
- f. Investment income
- g. Outpatient total patient revenue
- h. Inpatient total patient revenue
- i. Outpatient charges
- j. Inpatient charges
- k. Cost to charge ratio
- l. Primary payer amount
- m. Total discharges
- n. Medicare discharges

### 4. Hospital Compare:

- a. Share of AMI patients who receive Aspirin at arrival
- b. Share of LVSD patients who receive ACE Inhibitor
- c. Beta blocker share
- d. PCI at arrival
- e. Statin Rx at Discharge
- f. Share given most appropriate antibiotic
- g. Patients left without being seen
- h. Share of hospital acquired potentially preventable VTE
- i. AMI adjusted 30 day mortality rate
- j. Heart failure adjusted 30 day mortality rate
- k. Pneumonia adjusted 30 day mortality rate
- l. All-patient adjusted 30 day readmission rate
- m. Hip/knee fracture adjusted 30 day readmission rate
- n. COPD adjusted 30 day readmission rate
- o. Stroke adjusted 30 day mortality rate
- p. Stroke adjusted 30 day readmission rate

- q. CABG adjusted 30 day mortality rate
- r. CABG adjusted 30 day readmission rate
- s. Rooms kept clean score
- t. Doctor communication score
- u. Explained medicine score
- v. Staff helpful score
- w. Given recovery info score
- x. Overall patient score
- y. Pain well controlled score
- z. Rooms quiet at night score
- aa. Would recommend to score
- bb. Survey response rate percent

5. HIMSS:

- a. Number of EMR software applications
- b. Number of HIM (health information management) applications
- c. EMR vendor name(s)
- d. EMR product name(s)
- e. Types of software applications live and operational in the hospital

6. ACS/Census Data:

- a. Total population
- b. Number of uninsured lives
- c. Median household income
- d. Number of privately insured lives
- e. Percent of adults age 18-64 with employer-sponsored insurance

6. If yes, please identify the specific steps you will take to prevent the identification of individual patients in the linked dataset.

The linked datasets are all aggregated at the physician provider, hospital, or geography level. It is not possible to identify individual patients at this level of aggregation. As a result, the linked files do not increase the ability to identify individual patients, and will therefore not jeopardize patient confidentiality. Our data management plan will ensure the confidentiality of the CHIA data.

**X. PUBLICATION / DISSEMINATION / RE-RELEASE**

1. Do you anticipate that the results of your analysis will be published or made publically available? If so, how do you intend to disseminate the results of the study (e.g.; publication in professional journal, poster presentation, newsletter, web page, seminar, conference, statistical tabulation)? Any and all publication of CHIA Data must comply with CHIA's cell size suppression policy, as set forth in the Data Use Agreement. Please explain how you will ensure that any publications *will not disclose a cell less than 11*, and percentages or other mathematical formulas that result in the display of a cell less than 11.

We will submit the results of our project for academic publication in peer-reviewed journals and present in seminars and conferences as appropriate. We will have summary statistics and analyses completed using the data, but no identification of any cell size fewer than 11 will be included. To construct each analytic file in our dataset, we will drop hospitals, physician providers, and any zip codes that contain fewer than 11 cells in the CHIA data. As an additional check, we plan to write assert statements in our processing code that will result in an error and stop running whenever a cell size fewer than 11 is used to compute a statistic.

2. Describe your plans to use or otherwise disclose CHIA Data, or any Data derived or extracted from such Data, in any paper, report, website, statistical tabulation, seminar, or other setting that is not disseminated to the public.

All results will be available for no fee at the researchers' websites or upon email request.

3. What will be the lowest geographical level of analysis of data you expect to present for publication or presentation (e.g., state level, city/town level, zip code level, etc.)? Will maps be presented? If so, what methods will be used to ensure that individuals cannot be identified?

We plan to present aggregate results that average over all hospitals and physician providers in the sample. We do not plan to present maps or other geographic analysis that represents specific localities. In this way, we ensure that individuals cannot be identified.

4. Will you be using CHIA Data for consulting purposes?

Yes

No

5. Will you be selling standard report products using CHIA Data?

Yes

No

6. Will you be selling a software product using CHIA Data?

Yes

No

7. Will you be using CHIA Data as in input to develop a product (i.e., severity index tool, risk adjustment tool, reference tool, etc.)

Yes

No

8. Will you be reselling CHIA Data in any format not noted above?

Yes

No

If yes, in what format will you be reselling CHIA Data?

9. If you have answered "yes" to questions 5, 6, 7 or 8, please describe the types of products, software, services, or tools.

10. If you have answered "yes" to questions 5, 6, 7 or 8, what is the fee you will charge for such products, software, services or tools?

## XII. APPLICANT QUALIFICATIONS

1. Describe your previous experience using claims data. This question should be answered by the primary investigator and any co-investigators who will be using the Data.

I am a PhD student in Public Policy at Carnegie Mellon University with graduate training in econometrics, statistics, machine learning, and economic theory. I have three years of experience with Medicare claims data structure and processing which I bring to the proposed work with the Massachusetts APCD. In one project that overlaps with the first stage of the proposed work, I use the 20% Carrier and 100% MedPAR files to estimate the effect of hospital acquisition on referrals. This involved identifying physicians' referrals, matching claims, and tracking changes in reported tax identification numbers. In separate project, we examine the effect of a single hospital system acquisition on clinical quality using Medicare claims. Here, I constructed hospital-level clinical quality measures, including risk-adjusted 30-day mortality and 30-day readmission rates, for a variety of patient cohorts. In sum, I am very familiar with the data structure and analysis of claims data to analyze physician behavior and patient outcomes.

2. **Resumes/CVs:** When submitting your Application package on IRBNet, include résumés or curricula vitae of the principal investigator and co-investigators. (These attachments will not be posted on the internet.)

**XIII. USE OF AGENTS AND/OR CONTRACTORS**

By signing this Application, the Agency assumes all responsibility for the use, security and maintenance of the CHIA Data by its agents, including but not limited to contractors. The Agency must have a written agreement with the agent of contractor limiting the use of CHIA Data to the use approved under this Application as well as the privacy and security standards set forth in the Data Use Agreement. CHIA Data may not be shared with any third party without prior written consent from CHIA, or an amendment to this Application. CHIA may audit any entity with access to CHIA Data.

Provide the following information for all agents and contractors who will have access to the CHIA Data. *[Add agents or contractors as needed.]*

AGENT/CONTRACTOR #1 INFORMATION	
Company Name:	
Company Website	
Contact Person:	
Title:	
E-mail Address:	
Address, City/Town, State, Zip Code:	
Telephone Number:	
Term of Contract:	

1. Describe the tasks and products assigned to the agent or contractor for this Project and their qualifications for completing the tasks.

2. Describe the Organization's oversight and monitoring of the activities and actions of the agent or contractor for this Project, including how the Organization will ensure the security of the CHIA Data to which the agent or contractor has access.

3. Will the agent or contractor have access to or store the CHIA Data at a location other than the Organization's location, off-site server and/or database?

- Yes
- No

4. If yes, a separate Data Management Plan **must** be completed by the agent or contractor.

AGENT/CONTRACTOR #2 INFORMATION	
Company Name:	
Company Website:	
Contact Person:	
Title:	
E-mail Address:	
Address, City/Town, State, Zip Code:	
Telephone Number:	
Term of Contract:	

1. Describe the tasks and products assigned to the agent or contractor for this Project and their qualifications for completing the tasks.

2. Describe the Organization's oversight and monitoring of the activities and actions of the agent or contractor for this Project, including how the Organization will ensure the security of the CHIA Data to which the agent or contractor has access.

3. Will the agent or contractor have access to or store the CHIA Data at a location other than the Organization's location, off-site server and/or database?

- Yes
- No

4. If yes, a separate Data Management Plan must be completed by the agent or contractor.


**[INSERT A NEW SECTION FOR ADDITIONAL AGENTS/CONTRACTORS AS NEEDED]**

**IVX. ATTESTATION**

By submitting this Application, the Organization attests that it is aware of its data use, privacy and security obligations imposed by state and federal law *and* confirms that it is compliant with such use, privacy and security standards. The Organization further agrees and understands that it is solely responsible for any breaches or unauthorized access, disclosure or use of CHIA Data, including, but not limited to, any breach or unauthorized access, disclosure or use by any third party to which it grants access.

Applicants approved to receive CHIA Data will be provided with Data following the payment of applicable fees and upon the execution of a Data Use Agreement requiring the Organization to adhere to processes and procedures designed to prevent unauthorized access, disclosure or use of data.

By my signature below, I attest: (1) to the accuracy of the information provided herein; (2) that the requested Data is the minimum necessary to accomplish the purposes described herein; (3) that the Organization will meet the data privacy and security requirements described in this Application and supporting documents, and will ensure that any third party with access to the Data meets the data use, privacy and security requirements; and (4) to my authority to bind the Organization.

Signature: (Authorized Signatory for Organization)	
Printed Name:	Alterra Milone
Title:	Director of Research and Grants Management

Attachments



A completed Application must have the following documents attached to the Application or uploaded separately to IRBNet:

- 1. IRB approval letter and protocol (if applicable), or research methodology (if protocol is not attached)
- 2. Data Management Plan; including one for each agent or contractor that will have access to or store the CHIA Data at a location other than the Organization's location, off-site server and/or database
- 3. CVs of Investigators (upload to IRBnet)

**APPLICATIONS WILL NOT BE REVIEWED UNTIL THEY ARE COMPLETE, INCLUDING ALL ATTACHMENTS.**

**[INSERT IRB approval letter and protocol, or research methodology]**



September 12, 2019

FWA #00003692  
IRB Ref#19\_376

Professor Martin Gaynor  
Heinz College  
Carnegie Mellon University  
5000 Forbes Avenue  
Pittsburgh, PA 15213-3890  
Tel: 412/268-7933

Dear Professor Gaynor:

Your recently submitted IRB Protocol entitled "Hospital-Physician Acquisition, Provider Behavior, and Patient Well-Being" was reviewed by the Chair of the NBER Institutional Review Board.

Your project has been determined to not involve the use of Human Subjects per the OHRP guidance. Your project will not need an annual review by the IRB. However, it is your duty to notify the IRB should any changes to the use of human subjects or human subjects data occur.

If you have any questions, please feel free to contact me. My phone number is (617) 588-0307 and the email address is [irb@nber.org](mailto:irb@nber.org).

Sincerely,

Kristen Kenny  
Research Compliance Manager

## Research Methodology

This project aims to (1) describe the relationship between hospital-physician acquisition, hospital-insurer contracts, negotiated prices, and patient referrals; (2) estimate the causal effect of hospital-physician acquisition on prices and clinical quality of care; and (3) examine how provider coordination, hospital bargaining power with insurers, and rival provider foreclosure motivates hospital-physician acquisition and subsequent effects on prices and quality.

To track hospital acquisition of physician practices, we plan to construct a master file with physicians' demographic and ownership information at the month-year level. We will link each national service provider ID (MC026) and national billing provider ID (MC077) reported in the Medical Claims file to the provider's taxonomy code in the CMS NPPES at the year-month level using the NPI variable. We will then use changes in the billing NPI taxonomy code to track transitions in physician and physician practice ownership status. For example, if a physician in the Medical Claims file reports a billing provider that represents a physician group or individual physician taxonomy code and later transitions to billing with a hospital NPI, we will label that physician as hospital-acquired.

This analysis is focused on the aggregate effects of hospital acquisitions of physician practices. Our analysis will strictly be at the provider-year level. Only aggregate statistics will be published, such as the average impact of hospital acquisitions of physician practices on prices paid for physician services. We will not make public in any way individual payer-provider payment amounts or contractual agreements.

The first step of our analysis will describe the associations between hospital-physician acquisition, hospital-insurer prices, average hospital payment arrangement types, and patient referrals for hospitals and physicians. To examine the hypothesis that hospitals acquire physicians to capture physicians' referral base, we will identify PCP acquisitions (using the PCP indicator MC119) and document how PCPs' referrals change with hospital acquisition (using referring physician ID MC112 and referral indicator MC118). We then plan to construct a risk-adjusted composite inpatient price index and several risk-adjusted procedure-specific price indexes. These indexes will be constructed separately for hospitals and for physicians. The composite inpatient price index computes prices for all inpatient services, while the procedure-specific price indexes compute prices for inpatient and outpatient services that require relatively homogenous resource inputs (for example, lower limb MRIs, hip and knee replacement, and cesarean and vaginal deliveries). We plan to identify the claims for each service using ICD-9 procedure and diagnoses codes (MC041-053, MC055-058).

To construct the composite inpatient price indexes, we will first identify all hospital and physician inpatient claims with the type of claim indicator variable (MC094) and institutional bill

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type (MC036). We will then sum the paid amount (MC063) along with the patient copay (MC065) on each line item of each carrier-specific claim ID (MC004) to calculate either the hospital or physician price. We plan to identify individual members using the carrier-specific member ID (MC137). We will adjust the total payment to each hospital for differences in patient risk pool by using controls for patient gender, age groups, and zip code, along with resource intensity of the claim using the primary ICD9 diagnoses and procedure codes. To make sure we are comparing hospital or physician prices within the same types of insurance plans, we will also control for the product line of business (PR004), plan market (PR005), benefit type (PR006), and risk type (PR008). We plan to construct the procedure-specific price indexes in a similar manner: we will use the inpatient claims for each procedure to compute payments and adjust for patient risk and plan characteristics. We finally plan to examine the average share of claims at the provider-year level that fall under each payment type (MC113). Each step of this analysis will strictly aggregate information at the provider-year level.

Table 1 offers an example of our physician practice-level analysis. Here we compare average negotiated prices for physician services between hospital owned and independent physician practices. This type of analysis allows us to compare the effects of hospital acquisitions on physician prices on average across all payers.

**Table 1:**

Service	Independent practices average	Hospital-owned practices average
Lower limb MRI	\$xx.yy	\$xx.zz
Hip replacement	\$xx.yy	\$xx.zz
Knee replacement	\$xx.yy	\$xx.zz
Cardiac stent surgery	\$xx.yy	\$xx.zz
Cesarean section	\$xx.yy	\$xx.zz
Vaginal delivery	\$xx.yy	\$xx.zz

The second step of our analysis will estimate the aggregate impact of hospital acquisition on hospital-insurer prices, hospital and physician prices, and the clinical quality of care. This analysis will also be conducted at the provider-year level. We will not publish analysis of prices or quality at the provider-payer level. We plan to use econometric models for causal inference, such as difference-in-differences methods. The dependent outcome variables of interest are the measures constructed in the first step of our analysis in addition to clinical

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patient outcome measures from CMS Hospital Compare data. We plan to model these outcomes as a function of whether the hospital or physician is vertically integrated. Our models will also control for time-invariant hospital characteristics and eliminate bias from unobservable factors that vary over time but are constant across hospitals.

Table 2 below shows how our analysis will study the causal effects of physician practice acquisitions on inpatient hospital prices. This analysis will be at the hospital-year level. We plan to compute a hospital inpatient price index and measure the effect of physician practice acquisition on inpatient prices. Our regression analysis will compare the average negotiated rate across at hospitals that have acquired a physician practice(s) against those who have not for various services.

**Table 2:**

	Effect of physician practice acquisition
Lower limb MRI	\$xx.yy (.zz)
Hip replacement	\$xx.yy (.zz)
Knee replacement	\$xx.yy (.zz)
Cesarean section	\$xx.yy (.zz)
Vaginal delivery	\$xx.yy (.zz)
Patient controls	Yes
HRR controls	Yes
Plan type control	Yes

The numbers in parentheses in Table 2 represent the standard deviation of each estimate in the regression analysis. Table 2 also indicates that we plan to control for patient characteristics, plan characteristics, and other observables when measuring the effect of physician practice acquisition on hospital prices.

The third step of our analysis will build and estimate a fully specified econometric model to quantify the economic mechanisms that motivate hospital-physician acquisitions. In earlier

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work, we use Medicare claims data to show that hospital-acquired physicians are nine times more likely to refer to the owning hospital in the quarter after acquisition. This suggests that hospitals may acquire physicians in part to capture physicians' referral base and restrict patient access to rival providers. First, we aim to model hospitals' decisions to acquire a physician practice as a bargaining process, where both parties negotiate an acquisition and set an employment contract. The physician practice acquisitions we observe in this dataset will help us identify the main parameters in this stage. Second, we will model the aggregate impact on hospital-insurer bargaining over a set of procedure-specific fees using a Nash Bargaining framework (Gowrisankaran, Nevo, Town 2015; Ho and Lee 2017; Crawford et al 2018). This analysis will not be hospital-payer specific. Instead, we will estimate the effects of acquisition on aggregate hospital bargaining power across all payers. The parameters of interest in this stage of the model will be identified using the hospital payments that we observe for each diagnoses and procedure code in the data. Finally, we will estimate a model of patient choice of physician to show how hospital-physician acquisition will change the parameters of the hospital-insurer bargaining process, subsequent effects on price and quality, and ultimately patient welfare.