

Does integrated care mean less hospitalization?

Evaluation of a French field experiment

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SMART AGEING AND HEALTHY LIFE Summer School

2021 September 20-26, Iasi

Context of Healthcare coordination in France

- **2019 : France devoted more than 11% of its GDP to healthcare spending**
 - Population ageing
 - Rise in chronic pathologies
 - Diffusion of new technologies
- **Share of health spending is projected to continue to increase in the coming years** (Joo, 2014 ; Brainard & *al.*, 2016 ; Huntley & *al.*, 2016)

Context of Healthcare coordination in France

- **Use of care in hospitals is an increasing burden on health spending**
 - Between 2012 and 2016, the number of emergency department visits in France rose from 18.4 million to 21.2 million (Rapport public annuel, 2019)
 - 20% of ED visits were inappropriate, inducing avoidable expenditures of about €500 million
- **Organization of primary care seems crucial to limit the use of emergency care (Or & Penneau, 2018), and more generally hospital care**

Context of Healthcare coordination in France

A few improvements ...

- Ambulatory sector not designed for coordination
 - Fee-for-services payment
 - Stand-alone medical practices
- Some changes in the last 15 years
 - Pseudo-gatekeeping scheme since 2005 (*médecin traitant*)
 - Incentives for collective medical practices (*MSP*)
 - Specific coordination models for elderly patients
 - E-health and information system to support coordination

Context of Healthcare coordination in France

... but persisting lack in coordination

- Between hospitals and GPs
- Between GPs and paramedics
- Between GPs and social workers

➤ **Still overuse in hospital care: excessive/avoidable hospitalizations and visits to emergency departments**

TSN policy – purpose

TSN = *Territoires de Soins Numériques*

General purpose

- Sustain coordination between healthcare organizations and providers and improve access to information for patients
- Through organizational and technological innovations relying on Health Information Technologies (HIT)
- **Main organizational feature:** Territorial coordination support structure (PTA).
9 professionals full-time equivalent; about 2,000 patients followed since August 2015
- **Main technological feature:** Health Information Exchange Software to equip health providers in order to share information, schedule, medical results... about their patients

Literature review

Effects of coordination interventions involving case manager on hospital outcomes:

- Mixed results on hospitalization (Huntley & *al.*, 2013 ; Matthys & *al.*, 2017; Joo & *al.*, 2018; Poupard & *al.*, 2019)
- Positive results on ED visits (Joo & *al.*, 2018; Poupard & *al.*, 2019)

Health Information Technology (HIT) and coordination :

- HIE can contribute to reduce ED visit, hospital admissions and readmissions (Hersh & *al.*, 2015; Walker, 2017)

➤ **Evaluate to what extent the design of the TSN experiment in the Landes district reduces inappropriate hospital use**

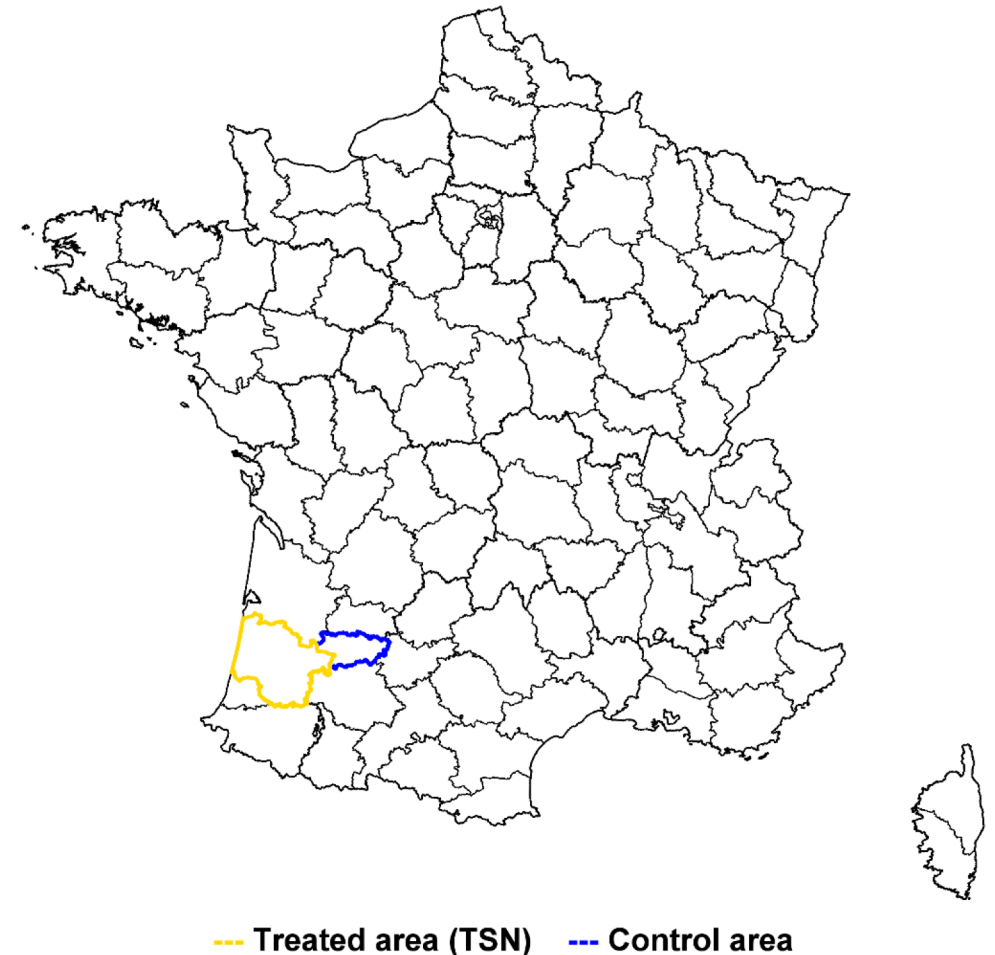
TSN policy – implementation

Implementation

- **"Treated area"** : territory of ~ 230,000 inhabitants in Landes department (Aquitaine)
- **Agenda:** TSN policy implemented in 2015 with gradual ramp-up from 2015 to 2017

Scope

- **TSN focus** both on "population" and health providers
- **Population focus:** no specific clinical focus; ageing, disability, chronic conditions
- **Providers focus:** all health providers in theory; mostly ambulatory sector (GPs, specialists, pharmacists in practice)



Treated/Control framework

Intervention group the *Landes* district (TSN)

Control group the *Lot-et-Garonne* district (TCO)

The control group (district) was created ex-ante (Buffeteau et L'Horty ,2016):

- District on the same region
- Comparable population structure : age, chronic conditions (ALD), social deprivation (CMUc), etc.
- Comparable healthcare services supply: GPs and specialists density, beds in hospitals and nursing homes, etc.

Scope & Data

Claim data

- Health reimbursement database (SNIIRAM) + French hospital discharge database in acute care (PMSI-MCO)
- Retrospective data collection

Data span 2012–2017

- Individual characteristics: annual or invariant (mostly)
- **Outcomes: annual values**
- Years 2012–2015 considered as "**Before TSN**"
- Years 2016–2017 considered as "**After TSN**"

Original sample

- **People aged 65+ years old, living in treated (TSN) or control (TCO) areas and alive in 2017**
- TSN = 40,862 TCO = 27,406

Scope & Data

Hospital outcomes

- To assess the influence of coordination and better access to health information in the ambulatory sector on emergency/unjustified hospital care use
- 1. Number of visits to emergency department** not followed by admission in hospital
 - 2. Potentially Avoidable Hospitalization**
 - 3. Rehospitalization at 30 days**

Crude individual characteristics :

- Gender / Age / Statutory Health Insurance (SHI) / Social deprivation (measured at city level) / Chronic disease (ALD benefit) / Living in nursing home (EHPAD)

Method: methodological framework

Difference-in-difference (ATT estimate)

- Follow up from 2012 to 2017 of healthcare consumptions of the treated and control populations
- **2 years of treatment: 2016 and 2017**
- A trend analysis was conducted to verify the parallel trends assumption

"Intention to treat" framework

- **Patients actually benefiting from TSN policy** (followed by PTA platform and/or treated by providers that are equipped by HIT innovations) **cannot be identified in SNIIRAM-PMSI**

Sample matching or weighting

Entropy balancing

- **Weighting scheme to satisfy a set of balance constraints imposed on the sample moments of the covariate distributions** (Hainmueller, 2012)
- Balance constraints on 3rd order moments (mean, variance, skewness)
- On individual covariates and lagged outcomes

Matching TSN and TCO samples (robustness check)

- **Matching on Propensity Score at the individual level**
- Propensity Score (Probit): on covariates and lagged outcomes (before treatment) to control for unobservable variables with time varying effect (O'Neill et al, 2016)
- Matching features: greedy algorithm, standard caliper, matching with replacement

Estimation strategy

Model specification

- Using **outcomes /individual pooled /year** instead of individual-level panel data (Imbens 2007)
- **Linear probability models**
- **Basic specification:** with "after TSN" effect aggregated in a single dummy variable (DV)

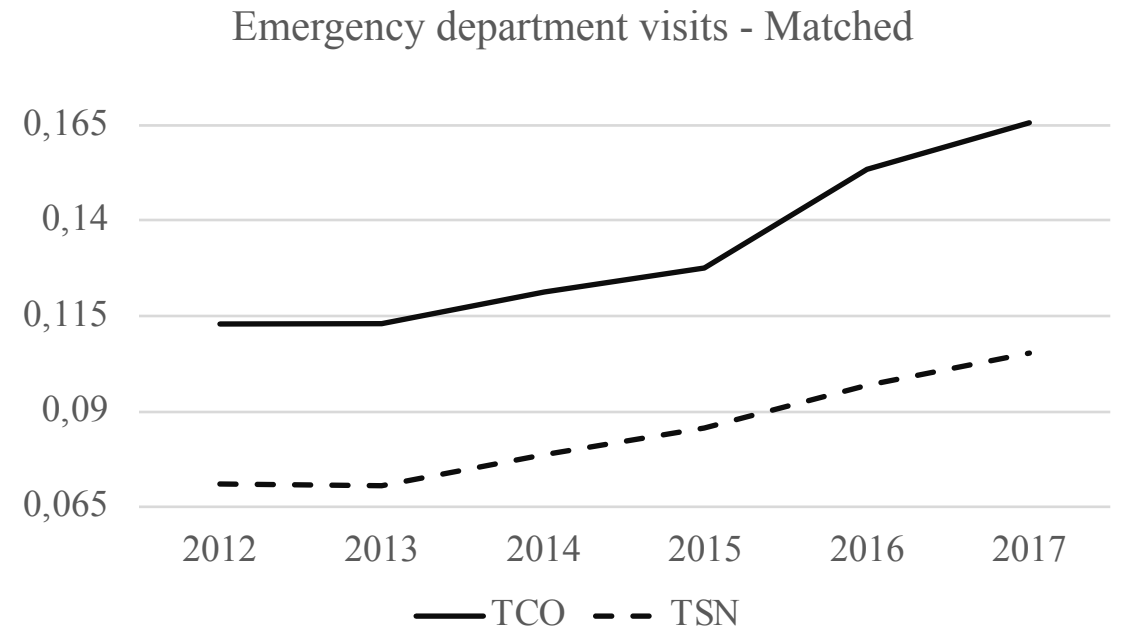
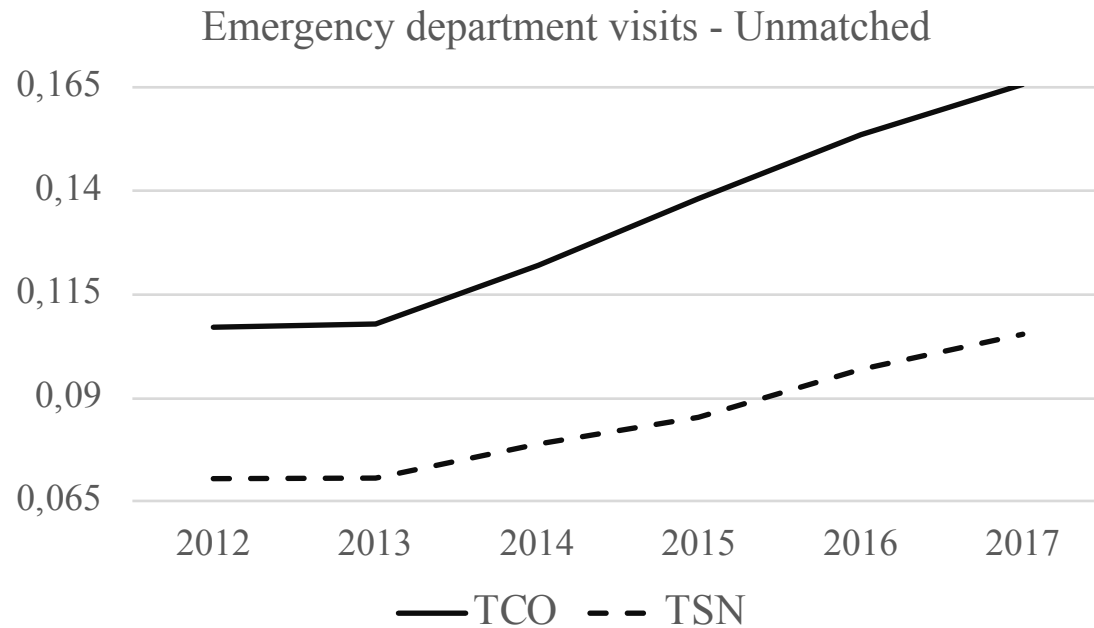
$$y_{it}^* = \beta_0 + \beta_1 After_t + \beta_2 TSN_i + \beta_3 TSN.After_{it} + \sum_{k=1}^K \beta_k X_{ik} + \mu_{it} \quad (1)$$

- **Complete specification:** with separate DVs for all years "before" and "after" TSN

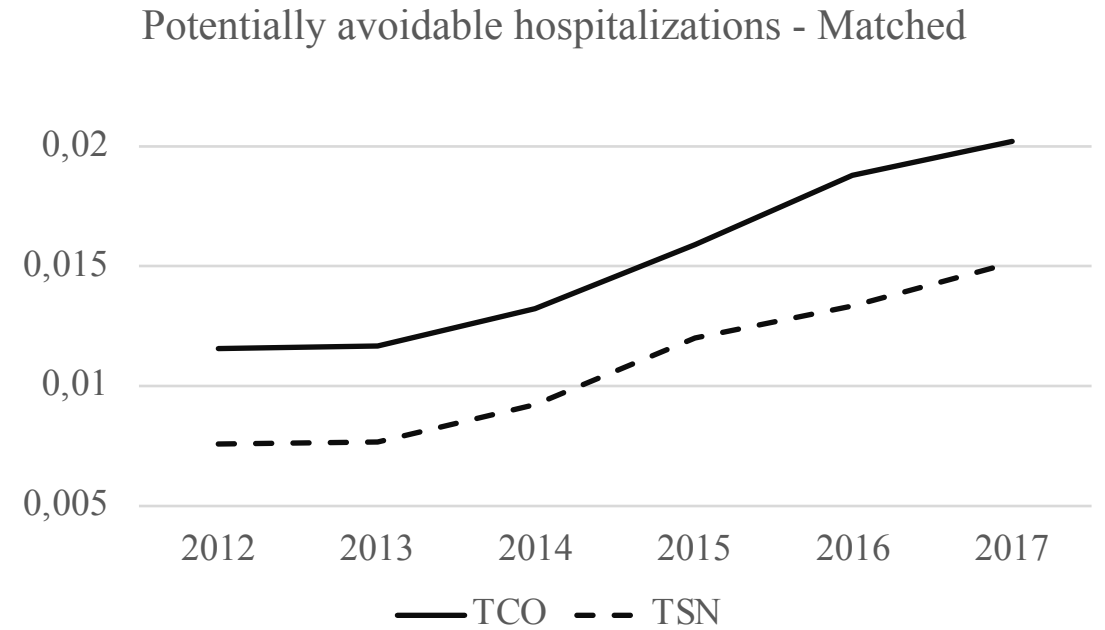
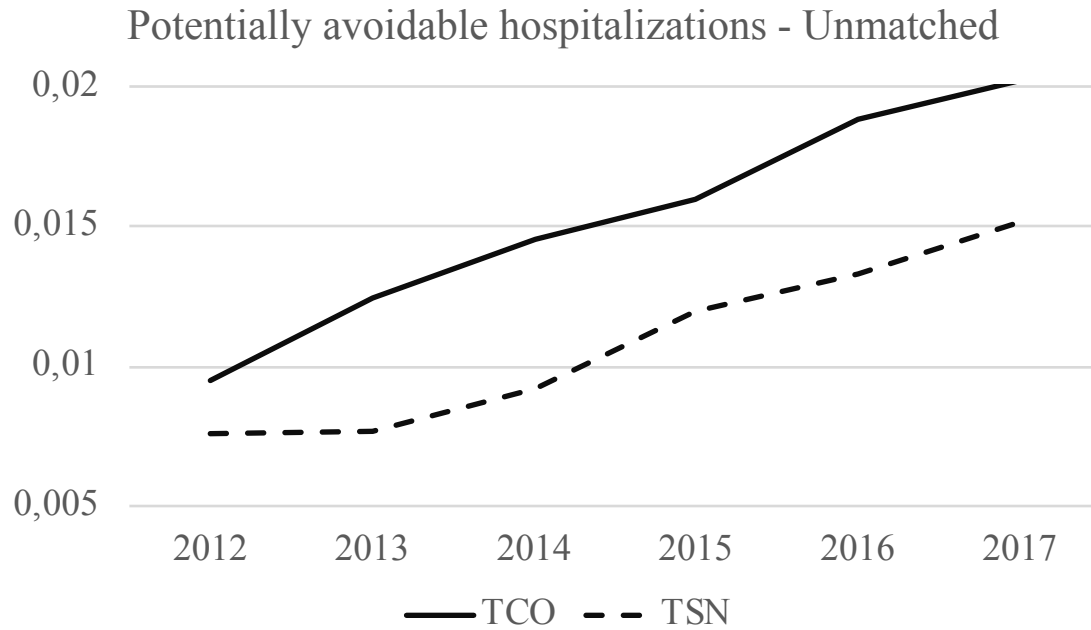
$$y_{it}^* = \beta_0 + \sum_{t=2013}^{2016} \beta_{1t} \cdot Year_t + \beta_2 \cdot TSN_i + \sum_{t=2013}^{2016} \beta_{3t} \cdot TSN_Year_{it} + \sum_{k=1}^K \beta_k X_{ik} + \mu_{it} \quad (2)$$

Parallel Trends before TSN (ED)

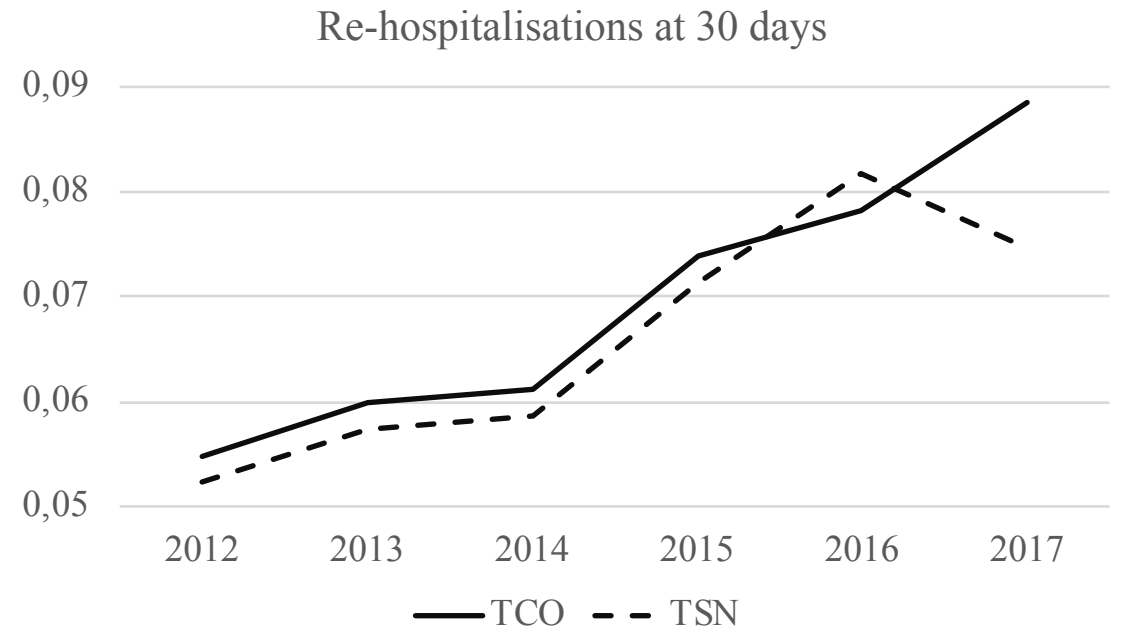
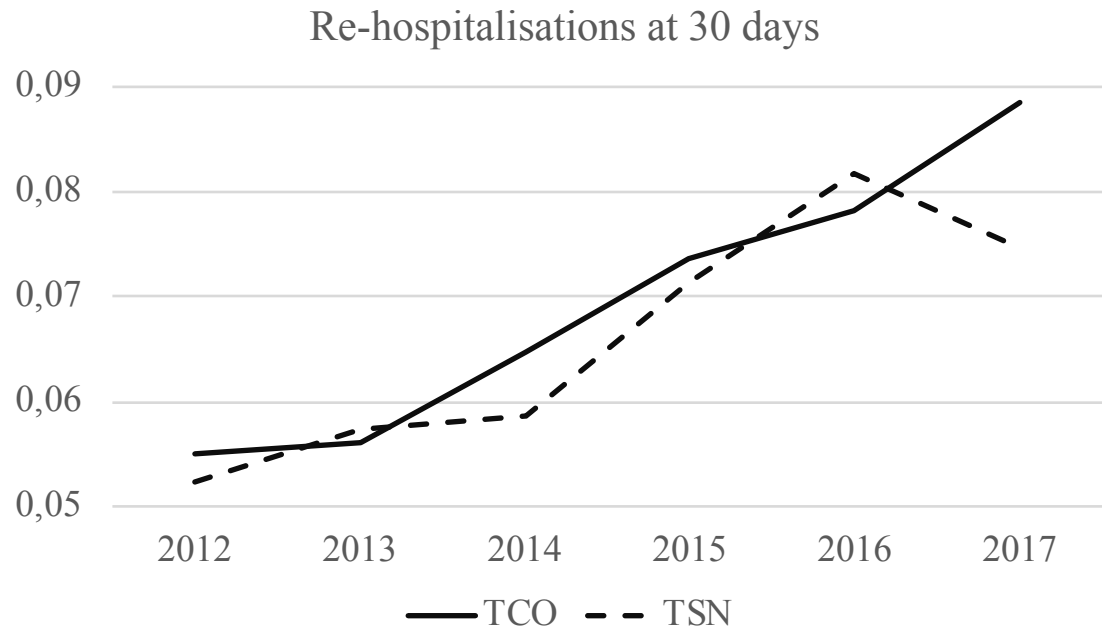
Already acceptable on original unmatched data; improved with matched samples



Parallel Trends before TSN (PAH)



Parallel Trends before TSN (R30)



Results

	ED			PAH			R30		
	DID	Matched	Matched With control	DID	Matched	Matched With control	DID	Matched	Matched With control
Basic specification									
TSN	-.030*** (.001)	-.031*** (.001)	-.031*** (.001)	-.003*** (.000)	-.003*** (.000)	-.003*** (.000)	-.002 (.001)	-.001 (.001)	-.001 (.001)
After	.026*** (.001)	.029*** (.002)	.027*** (.002)	.004*** (.001)	.004*** (.001)	.003*** (.001)	.010*** (.002)	0.014*** (0.002)	.010*** (.002)
TSN*after	-.008*** (.002)	-.009*** (.001)	-.009*** (.002)	-.001 (.001)	-.000 (.001)	-.000 (.001)	-.003 (.002)	-.003 (.002)	-.003 (.002)
Complete specification									
TSN13	.002 (.003)	.002 (.003)	.002 (.003)	-.003*** (.001)	-.001 (.001)	-.001 (.001)	.004 (.003)	.002 (.003)	.002 (.003)
TSN14	-.003 (.003)	.001 (.003)	.001 (.003)	-.003*** (.001)	-.000 (.001)	-.000 (.001)	-.002 (.003)	-.000 (.003)	-.000 (.003)
TSN15	-.011*** (.003)	-.001 (.003)	.001 (.003)	-.002 (.001)	-.000 (.001)	-.000 (.001)	.001 (.003)	.001 (.003)	.001 (.003)
TSN16	-.010*** (.003)	-.006** (.003)	-.007** (.003)	-.003*** (.001)	-.001 (.001)	-.001 (.001)	.002 (.003)	.002 (.003)	.002 (.003)
TSN17	-.013*** (.003)	-.011*** (.003)	-.011*** (.003)	-.002** (.001)	-.000 (.001)	-.000 (.001)	-.006* (.003)	-.006* (.004)	-.007* (.004)

Robustness Results

	ED	PAH	R30
Subsample 75+			
TSN	-0.032*** (0.002)	-0.005*** (0.001)	-0.000 (0.002)
After	0.035*** (0.003)	0.006*** (0.001)	0.011*** (0.003)
TSN*after	-0.012*** (0.003)	-0.001 (0.001)	-0.003 (0.003)
Subsample 85+			
TSN	-0.036*** (0.004)	-0.003* (0.002)	-0.002 (0.003)
After	0.031*** (0.006)	0.009*** (0.003)	0.011** (0.005)
TSN*after	-0.013* (0.007)	-0.005 (0.004)	0.001 (0.006)

Discussion & Limitations

"Evaluability" of TSN policy per se

- **Perimeter:** ambiguous or very general objectives + implementation with ramp-up
- **Scope:** no specific focus on subpopulations + "intention to treat" framework
- **Choice of outcomes:** identified as key measures by policymakers ex-ante, although not always highly sensitive to TSN "qualitative" services

Results

- TSN program decreases the ED visits and have very limited effect on others outcomes → **specify the size of the effects**

Limits

- Intention-to-treat framework → Targeting more restrictively the studied population (75+, chronic conditions...) ?
- Lack of information of patient's socio-demographic variables
- 2 years after implementation

Thank you for your attention

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