

Are public subsidies effective to reduce emergency care use of dependent people? *Evidence from the PLASA randomized controlled trial*

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Acknowledgements

The PLASA study was supported by a grant from the French Ministry of Health (PHRC 02-006-01). Promotion of the PLASA study was supported by the University Hospital Centre of Toulouse. The data sharing activity was supported by the “Association Monegasque pour la recherche sur la maladie d’Alzheimer” (AMPA) and the INSERM-University of Toulouse III UMR 1027 research unit.

Context

- Dependence = key driver of long-term care expenditures in the elderly population
 - ➔ can last several years (Norton, 2010)
- Policy answer: many countries like the US, UK, France or Sweden provide public financial support to disabled elderly (OECD, 2005)

Public financial support

- Objective: improve access to basic care such as home help or food services
- Rationale: an increase in basic care consumption may help people staying at home for a longer period of time
- Indeed: institutionalizations very expensive!

In France: APA

- Eligibility: people 60+ under disability conditions (<GIR5)
- Generosity: €500/month on average, depending on both the income and the dependency level (Bérardier & Clément, 2011).
- Pay for:
 - professional (formal) and/or informal care
 - home improvements, devices or nursing home fees.

Offset effect?

- Non-medical care cost sharing decrease the rate of institutionalization (Ettner, 1994)
- **Impact on emergency care use?**
 - ➔ not investigated yet, but:
 - ➔ cost sharing for medical care impacts hospital utilization in the elderly (Chandra et al., 2010; Kolstad & Kowalski, 2012)
 - ➔ providing an early management of AD patients could be lead to a reduction of emergency hospitalizations (Nouraschemi et al 2001)

Theoretical framework

- Model of care decisions by Stabile et al. (2006)
- Representative household: patient + informal caregiver
- Maximization of an utility function that depends on the consumption of goods and services, leisure time, and the patients' ability to perform ADLs.
- Subject to budget + technology constraints (patients' ability to perform ADLs)

Our assumption

- Stabile et al (2006): the public subsidy increases...
 - ...patients' ability to produce ADLs
 - ...patients' formal care consumption
- Empirical evidence that ADL production and formal care use reduce hospitalization rates (Kohn & Liu, 2013)
- It can be assumed that APA has a negative impact on the probability of emergency care use through two effects: a direct income effect, and an indirect effect associated with the decrease in informal care activities

Methodological issue: endogeneity

- **Voluntary health seeking behaviors**: it is likely that patients who receive APA have specific characteristics that may influence their emergency care use
- **Non-random allocation of APA**: attribution mechanisms vary across geographic areas (Billaud et al., 2013; Jeger, 2005)

IV??

- Rapp et al (2011), Fontaine (2012): macroeconomic variables but weak IV
- Hard to find perfect instruments but imperfect instruments yield biased results (Basu & Chan, 2014)
- Our problem: to find a microeconomic variable that is exogenous

The PLASA intervention

- 1,131 patients with Alzheimer's Disease (AD) recruited between 2003 and 2005 nationwide (Nourhashemi et al., 2010).
- Randomization:
 - Intervention arm: multicomponent care program that includes APA demand
 - Control arm: standard of care (SOC)

Our IV = intervention vs. SOC

- 100% exogenous because of the randomization
- At inclusion: 81% of patients did not have APA (same proportion in both arms).
- On average: 48% of APA demands were granted.
- Not surprisingly, receiving the PLASA intervention was positively associated with APA receipt ($p < 0.01$).

Timeline: 1-year and 2-year analyses

- Baseline: PLASA randomization (1131 patients: month 0)
 - Intervention group → APA demand by specialist
 - Control group → standard of care
- 1-year analysis (770 patients: month 6-12):
 - Month 6: Do you have APA?
 - Month 12: During the past 6 months, were you admitted into an hospital?
- 2-year analysis (606 patients: month 18-24):
 - Month 18: Do you have APA?
 - Month 24: During the past 6 months, were you admitted into an hospital?

IV interpretation

- Heavily depends on the context in which they are used (Murray, 2006).
- IV and APA correlated because the intervention facilitated access to APA
- The nature of the standardized intervention being only decided at baseline
- Exclusion restriction assumption?

No correlation between the PLASA intervention and emergency care use

Table 1: Impact of the PLASA intervention on emergency care use over the 2-year study period
Results of the conditional logit model

Time trend	Coefficient	Standard error
Intervention	-0.037	0.055
Standard of care	-0.084	0.092
Wald test	Prob > chi2=0.6578	
Observations	1195	

Models

- Dependent variable: use of emergency care (hospitalization, institutionalization, outpatient) over past 6-month
- Independent variable of interest: APA (yes vs. no) at the beginning of the 6-month period.
- Additional controls: gender, age, education level, income, and health (comorbidities number).
- 2 models: Probit without IV & Biprobit with IV

Table 2: Descriptive statistics and bivariate analyses after one year of follow-up

Variable	All (N=775)		APA=0 (N=490)		APA=1 (N=285)		Difference
	Mean	SD	Mean	SD	Mean	SD	
Emergency event	0.444	0.497	0.408	0.492	0.505	0.501	0.10***
APA	0.368	0.483					
Patient's age	80.734	5.447	79.933	5.402	82.112	5.253	2.18***
Patient is male	0.308	0.462	0.351	0.478	0.235	0.425	-0.12***
Baccalaureate	0.123	0.328	0.141	0.348	0.091	0.288	-0.05***
Patient's Income < 760 euros a month	0.086	0.281	0.063	0.244	0.126	0.333	0.06***
760 < Patient's Income < 1520 euros	0.414	0.493	0.380	0.486	0.474	0.500	0.09***
1520 < Patient's Income < 2300 euros	0.236	0.425	0.241	0.428	0.228	0.420	-0.01
2300 < Patient's Income < 3000 euros	0.108	0.311	0.137	0.344	0.060	0.237	-0.08***
3000 < Patient's Income	0.080	0.271	0.100	0.300	0.046	0.209	-0.05***
Patient's Number of comorbidities	2.201	1.760	2.170	1.688	2.242	1.879	0.07

^a*p<0.1, **p<0.05, ***p<0.01

Table 3: Descriptive statistics and bivariate analyses after two years of follow-up

Variable	All (N=609)		APA=0 (N=323)		APA=1 (N=286)		Difference
	Mean	SD	Mean	SD	Mean	SD	
Emergency event APA	0.414	0.493	0.396	0.490	0.434	0.496	0.04
Patient's age	81.578	5.454	81.003	5.565	82.227	5.260	1.22***
Patient is male	0.302	0.460	0.347	0.477	0.252	0.435	-0.10***
Baccalaureate	0.131	0.338	0.161	0.368	0.098	0.298	-0.06**
Patient's Income < 760 euros a month	0.099	0.298	0.087	0.282	0.112	0.316	0.03
760 < Patient's Income < 1520 euros	0.422	0.494	0.356	0.480	0.497	0.501	0.14***
1520 < Patient's Income < 2300 euros	0.228	0.420	0.235	0.425	0.220	0.415	-0.02**
2300 < Patient's Income < 3000 euros	0.105	0.307	0.133	0.340	0.073	0.261	-0.06***
3000 < Patient's Income	0.084	0.277	0.121	0.326	0.042	0.201	-0.08***
Patient's Number of comorbidities	2.159	1.931	1.985	1.475	2.357	2.329	0.37***

^a*p<0.1, **p<0.05, ***p<0.01

Table 4: Association between APA and the probability of emergency care use at one year

Variable	Probit model		Instrumental variable bivariate probit model					
	Pr(Emer. event)		Pr(APA receipt)			Pr(Emergency event)		
	AME	RSE	Coefficient	AME	RSE	Coefficient	AME	RSE
APA	0.084	0.037**	0.045			-1.258	-0.423	0.014***
Patient's age	0.004	0.003	-0.259	0.016	0.003***	0.035	0.012	0.003***
Patient is male	0.015	0.040	-0.040	-0.091	0.037**	-0.126	-0.043	0.031
Baccalaureate	-0.176	0.060***	0.006	-0.014	0.056	-0.312	-0.105	0.045**
Patient's Income < 760 euros a month								
760 < Patient's Income < 1520 euros	-0.058	0.051	0.005	0.002	0.051	-0.103	-0.035	0.042
1520 < Patient's Income < 2300 euros	0.037	0.057	-0.082	-0.029	0.056	0.014	0.005	0.046**
2300 < Patient's Income < 3000 euros	-0.052	0.071	-0.557	-0.197	0.069***	-0.418	-0.141	0.056
3000 < Patient's Income	0.024	0.081	-0.638	-0.225	0.087***	-0.332	-0.112	0.068
Patient's Number of comorbidities	0.019	0.010*	0.005	0.002	0.009	0.033	0.011	0.008
Patient has received the intervention			0.348	0.123	0.022***			
Observations	775		775			775		

IV bivariate probit Wald test of $\rho=0$: $\chi^2(1) = 53.2056$, $\text{Prob}>\chi^2 = 0.0000$

Hausman test $\chi^2(10)=1323.07$, $\text{Prob}>\chi^2 = 0.0000$

^a $p<0.1$, $**p<0.05$, $***p<0.01$; AME: Average marginal effect; RSE: robust standard error

Table 5: Association between APA and the probability of emergency care use at two years

Variable	Probit model		Instrumental variable bivariate probit model					
	Pr(Emer. event)		Pr(APA receipt)			Pr(Emergency event)		
	AME	RSE	Coefficient	AME	RSE	Coefficient	AME	RSE
APA	0.031	0.041				-1.329	-0.428	0.014***
Patient's age	0.001	0.004	0.025	0.009	0.003***	0.017	0.005	0.003*
Patient is male	0.069	0.044	-0.185	-0.069	0.043	-0.005	-0.002	0.033
Baccalaureate	0.073	0.063	-0.054	-0.020	0.062	0.092	0.030	0.049
Patient's Income < 760 euros a month								
760 < Patient's Income < 1520 euros	0.028	0.058	0.151	0.056	0.056	0.171	0.055	0.043
1520 < Patient's Income < 2300 euros	0.052	0.065	0.014	0.005	0.063	0.101	0.033	0.048
2300 < Patient's Income < 3000 euros	-0.005	0.081	-0.320	-0.119	0.085	-0.193	-0.062	0.066
3000 < Patient's Income	0.011	0.088	-0.575	-0.214	0.087**	-0.323	-0.104	0.068
Patient's Number of comorbidities	0.041	0.011	0.076	0.028	0.010***	0.107	0.034	0.008***
Patient has received the intervention			0.426	0.158	0.027***			
Observations	609		609			609		

Wald test of rho=0: chi2(1)=17.065 Prob > chi2 = 0.0000

Hausman test chi2(10)=1312.85, Prob>chi2 = 0.0000

*p<0.1, **p<0.05, ***p<0.01; AME: Average marginal effect; RSE: robust standard error

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Sensitivity analyses

- Adding interaction terms between our instrument and several macroeconomic variables
 - None of them were significantly associated with the probability of APA receipt.
- Therefore: better to use only one strong IV (Givord, 2010)
- Propensity scores not possible given our sample size

Interpretations

- Mean reduction of emergency care use quite large
- 3 explanations: APA associated with...
 - ...an **income effect** → emergency care more affordable
 - ...an increase in informal care **quality** → better health
 - ...a **better follow-up** → better care integration

Integrated care effect

- Idea: a better integration leads to...
 - ...a better efficacy (lower care consumption)
 - ...a better efficiency (lower costs per outcome)
- Integration of care is a measure of the French Alzheimer Plan
 - Is APA the first step to case management?
- That indirect effect has not been explored yet in the literature: further research needed!

Public policy relevancy

- APA protective effect for emergency care use confirmed the relevancy of this public policy tool
- Hospitalizations increase risks of nursing homes use (Goodwin et al., 2011)
 - APA could be a huge cost saver!
- Keeping disabled elderly at home improves their quality of life (Norton, 2010)
 - APA could be a QALY gainer!
- APA has a good chance of being cost-effective!

Thank you!

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