Impacts of National Drug Price Negotiation on Type 2 Diabetes Drugs Price, Volume, and Spending in China

PT5

Xichen Tong (xctong22@m.fudan.edu.cn), Wen Chen (wenchen@fudan.edu.cn), Luying Zhang (zhangluying@fudan.edu.cn)

School of Public Health, Fudan University, Shanghai, China

BACKGROUND

- Diabetes remains a major public health problem worldwide, causing a significant economic burden of disease
- As drug spending is the main component of diabetes medical costs, it is important to control the price of drugs
- Drug price negotiations have attracted worldwide attention
- China has introduced the National Drug Price Negotiation (NDPN) mechanism since 2017
- Previous studies have focused on the impact of NDPN on anticancer drugs rather than chronic disease drugs
- The effects of NDPN on drugs within the same class, including overall and structural changes, were unclear

METHODS

- **Data sources:** public hospital drug purchasing data from an eastern province in China, Jan 2018 to Dec 2021
- **Sample:** all GLP-1RA and SGLT2i drugs marketed in China by the year of 2020 (***Tab.1***)

Table 1. Basic Information of Sample Drugs

No	Generic name	Classification	Dosage form	Launch time in China	NDPN year in China	Implementation time of NDPN
1	Liraglutide	GLP-1RA	Injection	Mar 2011	2017	Jan 2018
2	Exenatide	GLP-1RA	Injection	May 2009	2019	Jan 2020
3	Lixisenatide	GLP-1RA	Injection	Sept 2017	2019	Jan 2020
4	Beinaglutide	GLP-1RA	Injection	Dec 2016	2020	Mar 2021
5	Loxenatide	GLP-1RA	Injection	May 2019	2020	Mar 2021
6	Dulaglutide	GLP-1RA	Injection	Jun 2019	2020	Mar 2021
7	Exenatide	GLP-1RA	Microspheres Injection	Jan 2018	NA	NA
8	Dapagliflozin	SGLT2i	Tablet	Mar 2017	2019	Jan 2020
9	Empagliflozin	SGLT2i	Tablet	Sept 2017	2019	Jan 2020
10	Canagliflozin	SGLT2i	Tablet	Sept 2017	2019	Jan 2020
11	Ertugliflozin	SGLT2i	Tablet	Jun 2020	2020	Mar 2021

- **Variables:** defined daily doses (DDDs), defined daily cost (DDC), purchase spending
- **Analysis methods:**
  - single-group interrupted time series (ITS) for SGLT2i and individual drugs in red font (***Fig.1***)
  - multiple treatment periods ITS for GLP-1RA (***Fig.2***)

Figure 1. ITS Model

$$Y_t = \beta_0 + \beta_1 T_t + \beta_2 X_t + \beta_3 T_t X_t + \varepsilon_t$$

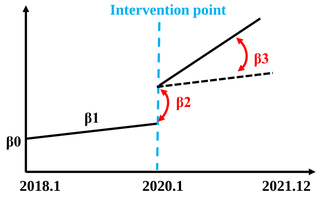
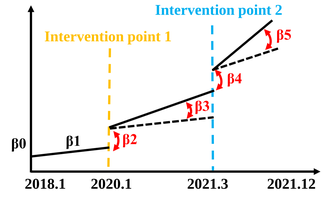


Figure 2. Multiple Treatment ITS Model

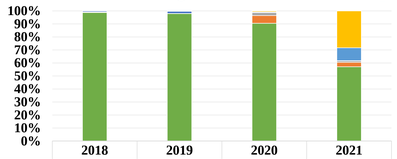
$$Y_t = \beta_0 + \beta_1 T_t + \beta_2 X_t + \beta_3 X_t T_t + \beta_4 Z_t + \beta_5 Z_t T_t + \varepsilon_t$$



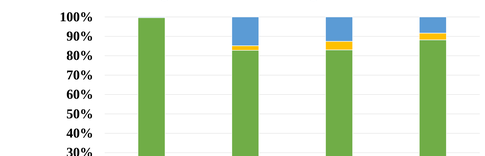
RESULTS

- **Changes in utilization proportion after NDPN policy**
  - The negotiation-based inclusion of drugs resulted in a significant increase in their utilization proportion, leading to the replacement of similar drugs (***Fig.3***)

Figure 3. The Utilization Proportion of GLP-1RA Drugs and SGLT2i Drugs



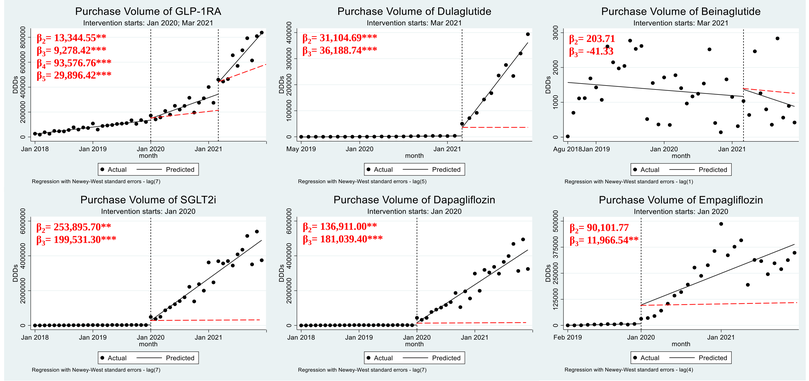
	2018	2019	2020	2021
Exenatide (Microspheres)	0.00%	0.14%	0.01%	0.00%
Dulaglutide	0.00%	0.11%	0.74%	28.32%
Loxenatide	0.00%	0.00%	0.02%	9.92%
Beinaglutide	0.79%	1.71%	0.56%	0.18%
Lixisenatide	0.00%	0.00%	2.17%	1.14%
Exenatide	0.48%	0.01%	5.99%	3.35%
Liraglutide	98.73%	98.02%	90.51%	57.08%



	2018	2019	2020	2021
Empagliflozin	0.37%	14.86%	12.57%	8.33%
Canagliflozin	0.00%	2.32%	4.38%	3.48%
Dapagliflozin	99.63%	82.82%	83.05%	87.98%
Ertugliflozin	0.00%	0.00%	0.00%	0.21%

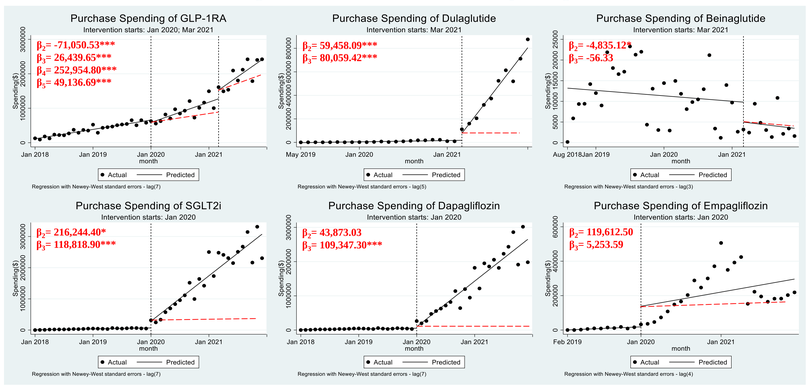
- **Changes in daily costs after NDPN policy**
  - The DDC was reduced by over 60%
- **Impact of NDPN policy on frequency of utilization**
  - The DDDs of GLP-1RA and SGLT2i increased both in level and trend, while the impacts varied for different individual drugs (***Fig.4***)

Figure 4. ITS Results of Purchase Volume



- **Impact of the NDPN policy on spending**
  - Most drugs showed an increase in spending either in level or trend, but the impact was not consistent across all drugs (***Fig.5***)

Figure 5. ITS Results of Purchase Spending



MAIN FINDINGS

- The implementation of NDPN led to a significant reduction in costs per DDD of TD2M drugs and a sharp increase in their purchased volumes, similar to anticancer drugs
- This resulted in negotiated drugs taking a larger utilization proportion within the class of drugs
- The changes in both price and volume led to an overall increase in spending, which was not consistent with previous studies focusing on anticancer drugs
- The impact of the NDPN on purchasing volume and spending varied among individual drugs

Strengths

- To our knowledge, it is the first time that the impact of the NDPN on drugs for chronic diseases has been estimated
- All GLP-1RA and SGLT2i drugs marketed by 2020 were included in this study, enabling us to explore the overall and structural impact of the NDPN on a class of drugs
- Multiple treatment periods interrupted time series models were adopted, which are sufficient to distinguish the impact of two NDPN rounds on GLP-1RA drugs

Limitations

- Appropriate comparisons for interrupted time series models were not included since the NDPN influences drugs across all disease domains
- The study used data from only one eastern province, which limited its ability to reflect the situation in provinces with varying stages of development
- The effects of NDPN might have been confounded due to the marketing of two GLP-1RA drugs in China in 2019

POLICY IMPLEMENTATION

- Further implementation of the national drug price negotiation for diabetes drugs is advisable
- It is necessary to monitor the spending on NDPN diabetes drugs and ensure their rational use