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INTRODUCTION

- China government has issued a National Volume-Based Drug Procurement (NVBP) policy in January 2019. The NVBP policy represents the first attempt at nationwide volume-based drug procurement in mainland China, aiming to provide patients with high-quality drugs at lower prices through economies of scale [1].
- Previous studies had focused on the impact of the NVBP performance [2-4]. In the NVBP process, forecasted volumes determine the contracted volumes awarded to successful bidders. Pharmaceutical companies submitted bids with price-quantity pairs, and contracts were allocated based on price rankings. Despite the importance of accurately forecasting the drug use volume, relevant studies of this process are scarce.

OBJECTIVE

To describe the difference between contracted and actual drug purchasing volumes, and investigated related influential factors under the NVBP policy.

METHOD

Data collection and definition

Data on VBP contracted volumes and actual drug purchasing volumes were from the Shanghai Sunshine Medical Procurement Center All-In One (SMPA) for the first round of VBP drugs along the time horizon between March 2019 and July 2023, including the succession procurement period after the end of contract.

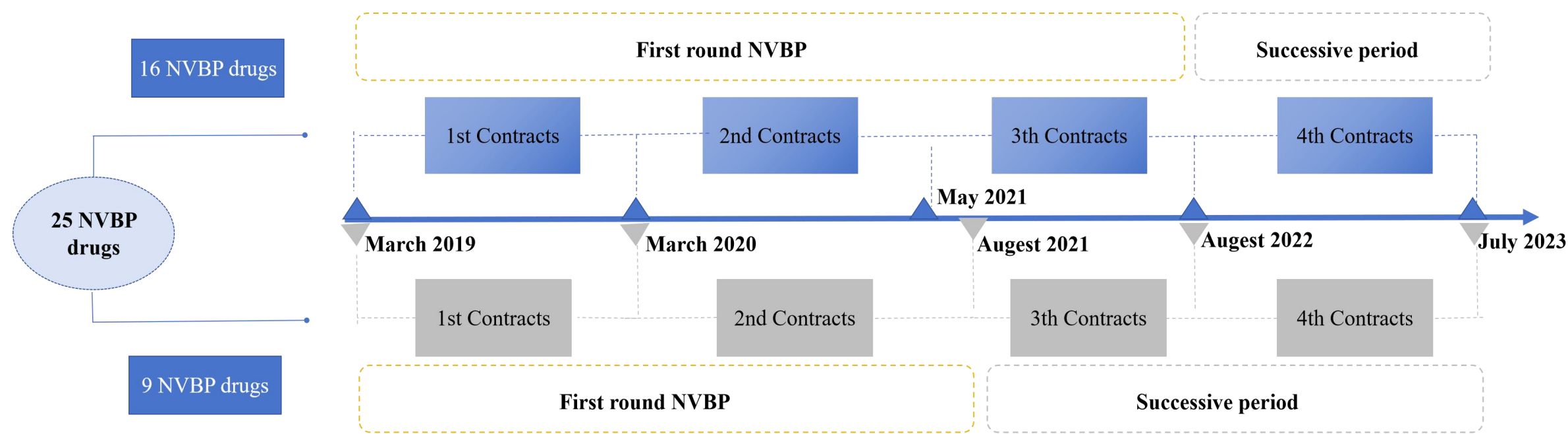


Figure 1. Data Structure and Scope in study

METHOD

Outcome variable

To enhance comparability across different drug forms, both actual procurement and contracted volumes are expressed in terms of defined daily doses (DDDs). The ratios of the actual drug purchasing to contracted volume were computed for each of the four contract periods along the VBP time horizon (Formula 1).

Acutal to contracted ratio =  $\frac{\text{The actual drug purchasng volumes}}{\text{The contracted volumes}}$  (Formula 1)

Statistical analysis

A multiple regression model was used to assess factors influencing the ratios, including the order of contract period, contract execution speed, and some attributes of drugs such as national essential medicine, Anatomical Therapeutic Chemical (ATC) classification, and dosage form.

RESULTS

Features of the included NVBP drugs and ratios

A total of 25 first-round NVBP drugs were analyzed to compare the contracted and actual purchasing volumes of the four continuous contract periods along VBP horizon.

Table 1 Characteristic of included VBP phases and ratios

Variables	Median(IQR)
<b>Drug purchasing phases</b>	
NVBP	1.72(1.48, 2.13)
Successive period	1.6(1.35, 1.97)
<b>Contract periods</b>	
1st Contracts	1.90(1.56, 2.13)
2nd Contracts	1.81(1.57, 2.3)
3th Contracts	1.48(1.24, 1.76)
4th Contracts	1.51(1.35, 1.98)
<b>Drug purchasng phases &amp; contract periods</b>	
<b>16 NVBP drugs</b>	
First round NVBP & 1st contracts	1.82(1.52, 1.96)
First round NVBP & 2st contracts	1.80(1.57, 2.28)
First round NVBP & 3th contracts	1.46(1.23, 1.69)
Successive period & 4th contracts	
<b>9 NVBP drugs</b>	
First round NVBP & 1st contracts	2.09(1.83, 2.23)
First round NVBP & 2st contracts	1.81(1.57, 3.33)
Successive period & 3st contracts	1.74(1.39, 1.89)
Successive period & 4th contracts	2.13(1.37, 2.34)

Table 2 Characteristic of included VBP drugs and ratios

Variables	n(%)	Median(IQR)
<b>National essential medicines(NEM)</b>		
No	16 (64)	1.81(1.45, 2.23)
Yes	9 (36)	1.52(1.35, 1.88)
<b>First round NVBP &amp; non-NEM</b>		
First round NVBP & NEM		1.81(1.52, 2.3)
Successive period & non-NEM		1.58(1.44, 1.88)
Successive period & NEM		1.78(1.37, 1.98)
<b>Dosage form of drugs</b>		
Oral	22 (88)	1.70(1.46, 2.02)
Injectable	3 (12)	1.71(1.31, 2.14)
<b>First round NVBP &amp; oral</b>		
First round NVBP & injectable		1.68(1.48, 2.09)
Successive period & oral		1.94(1.65, 2.30)
Successive period & injectable		1.71(1.39, 1.98)
<b>ATC classification (indications)</b>		
C02 Hypertensive	7 (28)	1.49(1.27, 1.60)
Non-C02 Hypertensive	18(72)	1.86(1.5, 2.18)
First round NVBP & Hypertensive		1.50(1.26, 1.64)
First round NVBP & non-Hypertensive		1.90(1.58, 2.30)
Successive period & Hypertensive		1.48(1.32, 1.5)
Successive period & non-Hypertensive		1.81(1.35,2.02)

Features of the contract execution speed in NVBP drugs

Supported by the NVBP policy and emerging clinical demand, healthcare institutions quickly met the contracted procurement volume.

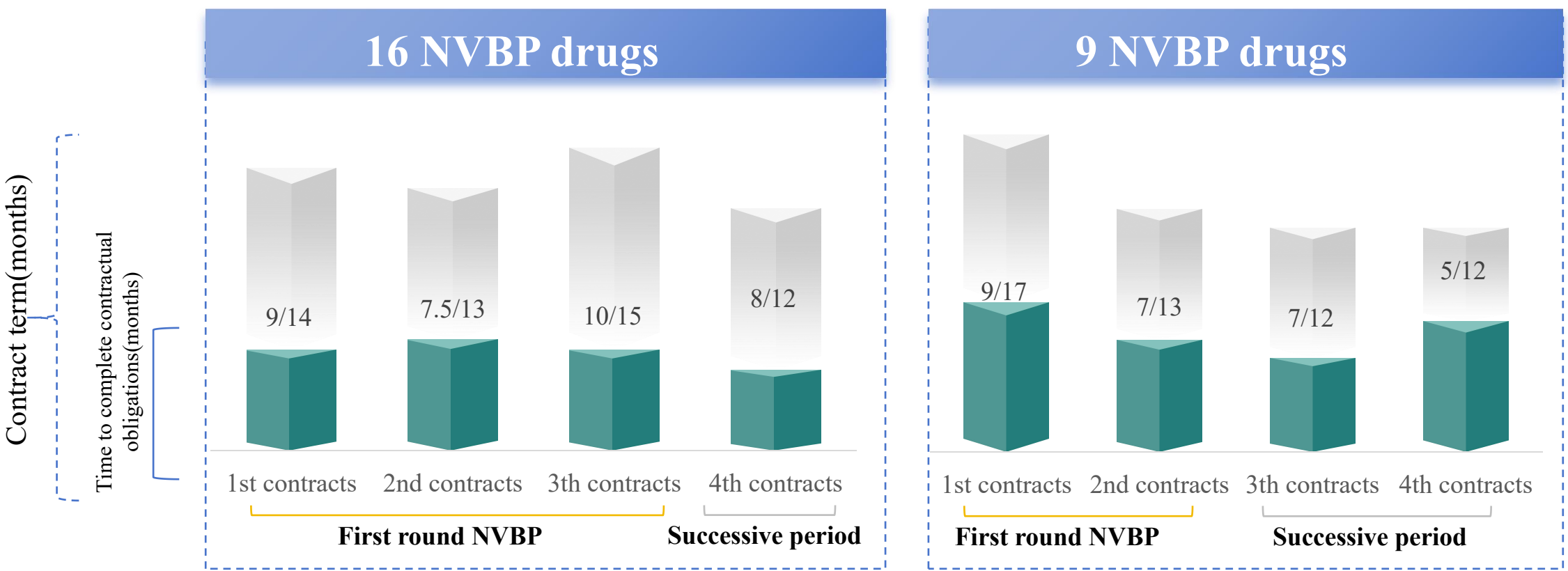


Figure 2. Contracted term and the time to achieve contracted volumes

DISCUSSION

- Our findings have revealed that actual procurement volumes often exceed contracted volumes, highlighted over-fulfillment as a common issue. Reducing these discrepancies could help mitigate supply risks associated with monopolistic "winner-takes-all" conditions.
- Identifying these gaps and their contributing factors is crucial for advancing NVBP policy goals.
- This study was limited to NVBP drugs with completed contracts from the initial round and subsequent periods. The future research should incorporate additional factors related to market competition for deeper insights.

CONCLUSIONS

The significant differences between contracted and actual drug purchasing volumes were found for the first-round NVBP drugs in China. The gradual decrease of the ratio of actual drug purchasing to contracted volume along the VBP horizon might be associated with execution speed across the contract periods.

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