



The Impact of a Multifaceted Intervention on the Rate of Preventive Services Offered in a Student-Run Clinic

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Abstract

Background: The importance of preventive services has been well established, yet rates of preventive service delivery continue to lag behind national goals. While numerous studies have identified barriers to preventive service delivery and implemented interventions to improve delivery, research into this important area is lacking in the setting of student-run clinics.

Methods: In this study a multifaceted intervention consisting of patient and provider education, provider check list, pre-clinic chart review, and financial assistance for preventive services was implemented for 14 months in a student-run clinic.

Results: Rates of delivery of United States Preventive Services Task Force (USPSTF) Grade A and B recommended preventive services were evaluated before and after implementation of the intervention with 16 of 26 services improving during the intervention but only tetanus immunization reaching significance. In addition, rates of delivery of preventive services were compared to reported national averages and targets set by *Healthy People 2020* with 16 of 20 services being offered at or above reported national averages and 10 of 16 services meeting the targets laid out in *Healthy People 2020*.

Conclusions: The rate of preventive services can be improved in student-run clinics through the implementation of multi-faceted interventions to a level that meets national averages and targets.

Introduction

While the importance of preventive services is well-established¹⁻⁶ and widely accepted,⁷⁻¹² rates of completion of these services lag behind target levels published in *Healthy People 2020*, with up to 50% of eligible patients failing to receive recommended care.^{6,9,12-17} Furthermore, the vast disparity in receipt of these services based on race,¹⁸⁻²⁰ socioeconomic status,^{20,21} education level, and insurance coverage¹⁸⁻²² contributes to the growing inequality in health outcomes.^{6,15,16,21,22} To effectively improve the distribution of preventive services and the resultant health outcomes, interventions must be targeted at these underserved populations.²³

Numerous factors account for the disconnect between the importance ascribed to preventive services and the rates of delivery actually achieved. Many interventions have been implemented to

overcome barriers to delivery with the most successful employing multifaceted interventions that address multiple interplaying barriers. Multifaceted interventions result in up to 60% improvement in delivery of services^{8,9,17,20,24-28} and have a duration of at least 24 months after the initial intervention.^{27,28}

While the amenability of preventive services to interventions has clearly been demonstrated, there is a paucity of research on the level of preventive services provided as well as the effectiveness of these proven interventions in student-run clinics (SRCs). SRCs offer a unique opportunity for self-directed hands-on learning while providing key, high-quality healthcare to underserved individuals.²⁹⁻³³ While the number of SRCs has burgeoned over the last decade,^{29,30} research into these unique clinical setups has lagged behind.^{31,32}

The limited research on SRCs revealed that many preventive services are underutilized in relation to *Healthy People 2020* goals and national averages. Zucker et al. found that one SRC offered tobacco cessation counseling and alcohol abuse screening above the national average, but fell short on colonoscopies, mammograms, Pap smears, and pneumococcal and influenza vaccination.³⁴ Likewise, Butala et al. found that another SRC provided HIV testing and fasting blood glucose screening at or above the national average while other services, such as fasting lipid panels and Pap smears, fell short of the national average.³⁵ In a later study, Butala et al. demonstrated that implementing a pre-visit review to identify preventive services to be addressed at the visit resulted in a significant improvement in HIV testing and fasting lipid panels.³⁶

This study will evaluate the impact of a multifaceted intervention consisting of patient and provider education, provider checklists, and pre-clinic chart review on adherence to the United States Preventive Services Task Force (USPSTF) guidelines³⁷ (Table 1) within a SRC. In addition, this study will evaluate the quality of preventive care delivered at a national level of care and goals set in *Healthy People 2020*.

Methods

Setting

The Student Health Alliance Reaching Indigent Needy Groups (SHARING) clinic is an interprofessional student-run medical clinic for low-income, uninsured adults in Omaha, Nebraska. The clinic, affiliated with the University of Nebraska Medical Center (UNMC), serves as a medical home for patients providing acute and chronic medical care, preventive services, physical therapy, dietitian consultation, social work consultation, and psychological services. In addition, sub-specialty referrals are provided at no additional expense to the patient. Spanish interpreters are available at every clinic and a language line is available for other language needs. The pre-intervention period occurred between January 1, 2012 and October 28, 2013. The intervention period occurred between October 29, 2013 and December 18, 2014. All patients older than 19 years of age who presented to the clinic between January 1, 2012 and December 18, 2014 were included in the study.

Intervention

Preliminary studies found the SHARING clinic performed many services above reported national averages rates for all clinics in general but fell below average for breast, cervical, and colorectal cancer screening, as well as tetanus vaccination. In response, students in the UNMC Preventive Medicine Enhanced Medical Education Track (PM-EMET) implemented a multifaceted intervention consisting of patient and provider education, provider checklists, and pre-clinic chart review as described below. The clinic also partnered with local clinics to provide colonoscopy and mammography to patients free of charge regardless of their qualification for Every Woman Matters or the Nebraska Colon Cancer Screening Program.

Before each clinic, students of the PM-EMET reviewed patients' charts to identify needed preventive services and reported their findings to student providers in the preclinical meeting. The importance of preventive services was emphasized with special attention given to the under-provided services previously identified. Students were provided a checklist of preventive services for which patients may be eligible and were instructed how to find the relevant information in the electronic medical record. In addition, posters in both English and Spanish were placed in all exam rooms encouraging patients to ask providers about preventive services.

Method of Evaluation

Information regarding patient demographics, family history, personal medical history as documented in the problem list, social history and appropriate use of preventive screening measures as determined by USPSTF recommendations were abstracted from the electronic health record.

Statistical Analysis

The rates of compliance for all Grade A and B preventive services recommended by the USPSTF guidelines from each period were compared to each other as well as national averages for all health clinics in the United States and *Healthy People 2020* targets using chi-square analysis.³⁷⁻⁴² Patient demographic data was compared between periods using a two-tailed chi-square analysis for categorical variables and a t-test for continuous variables. International Business Machines' Statistical Package for the Social Sciences version 21.0 was used in the analysis of the data.

Table 1. United States Preventive Services Task Force A and B Recommendations for Preventive Services

Preventive Service	Application
Behavior	
Alcohol misuse screen and counseling	Adults age 18 years and older
Chlamydia screen	Women age 24 years and younger or women 25 years and older at increased risk
Gonorrhea screen	Pregnant women and women at increased risk
Fall prevention	All community dwelling adults age 65 years and older who are at increased risk of falls
Healthy diet counseling	Adult patients with hyperlipidemia or known risk factors for cardiovascular or diet-related chronic disease
Hepatitis C screen	Adults born between 1945 and 1965; once
HIV screening	Age 15-65 or high risk individuals
Intimate partner violence screen	Women of child bearing age
Syphilis screen	Men and women at increased risk, pregnant women
Tobacco use screen and counseling	Adults age 18 years and older
Chronic Condition	
Abdominal aortic aneurysm screen	One-time screening all males age 65-75 years old who have ever smoked
Aspirin prophylaxis for cardiovascular disease	Males age 45-79 when potential benefit outweighs harm; females age 55-79 when potential benefit outweighs harm
Blood pressure screen	Adults age 18 years and older
Depression screen	Adults age 18 years and older
Lipid disorders screen	Every 5 years if normal: Males age 35 years and older or 20-34 with increased risk for cardiovascular disease; females age 45 and older or 20-44 with increased risk for cardiovascular disease
Obesity screen	Adults age 18 years and older
Osteoporosis screen	Women age 65 years and older or younger women whose fracture risk is equal or greater than a 65 year old woman
Type 2 diabetes mellitus screen	Asymptomatic adults with sustained blood pressures greater than 135/80 mm Hg
Immunization	
Influenza	Adults age 18 years and older annually
Pneumococcal	1 dose age 65 years and older or sooner if at increased risk
Tetanus, diphtheria, and pertussis	Adults age 18 years and older every 10 years
Cancer	
Breast cancer screen	Every 1 to 2 years for women age 50 years and older
Cervical cancer screen	Cytological screening for women ages 21 to 65 every 3 years or for ages 30 to 65 cytology + HPV testing every 5 years
Colorectal cancer screen	Fecal occult blood testing, sigmoidoscopy, or colonoscopy in adults between the ages of 50 and 75 years
Skin cancer behavior counseling	Age 10-24 years

Ethics Statement

This study was approved by the UNMC institutional review board committee.

Results

There were 583 visits for 81 individuals during the pre-intervention period and 345 visits for 72 individuals during the intervention period. The two populations were similar in regard to demographic factors, health status (Table 2), level of provider, and use of an interpreter (Table 3).

Table 2. Characteristics of Pre-intervention and Intervention Period Participants

	Pre-Intervention (N=81)	Intervention Period (N=72)
Age (years)		
Mean +/- standard deviation (range)	52.8 +/- 11.9 (23-94)	50.3 +/- 12.5 (20-94)
Sex		
Female (%)	46 (56.8)	41 (56.9)
Male (%)	35 (43.2)	31 (43.1)
Race/ethnicity		
Hispanic (%)	40 (49.4)	29 (40.3)
Non-Hispanic (%)	39 (48.1)	41 (56.9)
Not documented (%)	1 (1.2)	3 (4.2)
Health status		
Systolic blood pressure mean +/- SD	131.7 +/- 11.2	131.1 +/- 14.0
Diastolic blood pressure mean +/- SD	81.2 +/- 6.4	80.5 +/- 7.4
Body mass index mean +/- SD	32.7 +/- 8.9	32.1 +/- 7.8

Table 3. Characteristics of Visits

Student Provider	Pre-Intervention	Intervention Period
M1 (%)	26 (4.5)	42 (12.2)
M2 (%)	157 (26.9)	117 (34.0)
M3 (%)	13 (2.2)	19 (5.5)
M4 (%)	55 (9.4)	35 (10.1)
M, not otherwise documented (%)	17 (2.9)	18 (5.2)
NP (%)	5 (0.8)	0 (0)
PA-1 (%)	77 (13.2)	15 (4.3)
PA-2 (%)	13 (2.2)	1 (0.2)
PA-3 (%)	5 (0.9)	1 (0.2)
PA, not otherwise documented (%)	47 (8.1)	32 (9.3)
Not recorded (%)	168 (28.8)	65 (18.8)
Total visits	583	345
Language Interpreter used (%)	25 (30.9)	21 (29.2)

M: medical student followed by year of training; NP: nurse practitioner student; PA: physician assistant student followed by year of training

As fewer than five patients qualified for skin cancer screening, aortic aneurysm screening, and fall prevention these services were not reported.

Comparative rates of cancer screening and vaccination at the SHARING clinic during the pre-intervention and intervention periods are depicted in Figure 1 and Figure 2.

During the intervention, the SHARING clinic offered preventive services at or above the national average for mammography, colonoscopy (Table 4, Figure 3), influenza vaccination in individuals 18-64 as well as individuals age 65 and over, tetanus vac-

ination (Table 5, Figure 4), alcohol abuse screening/counseling, chlamydia screening, healthy diet counseling, HIV screening, tobacco use screening/cessation counseling (Table 6), blood pressure screening, depression screening, lipid screening, obesity screening, and osteoporosis screening (Table 7). The SHARING clinic offered the following services below the national average: Pap smear (Table 4, Figure 3), pneumococcal vaccination (Table 5, Figure 4), hepatitis C screening (Table 6), and folate supplementation (Table 7).

Figure 1. Rates of Cancer Screening at the SHARING Clinic During the Pre-intervention and Intervention Periods

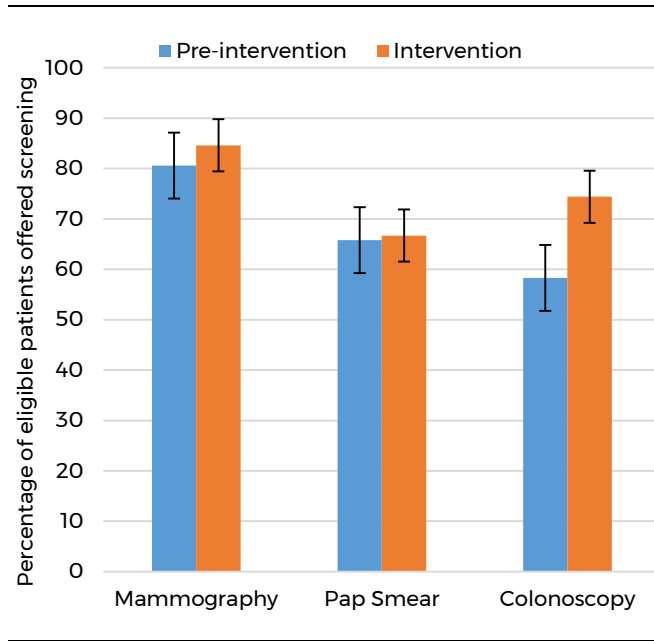
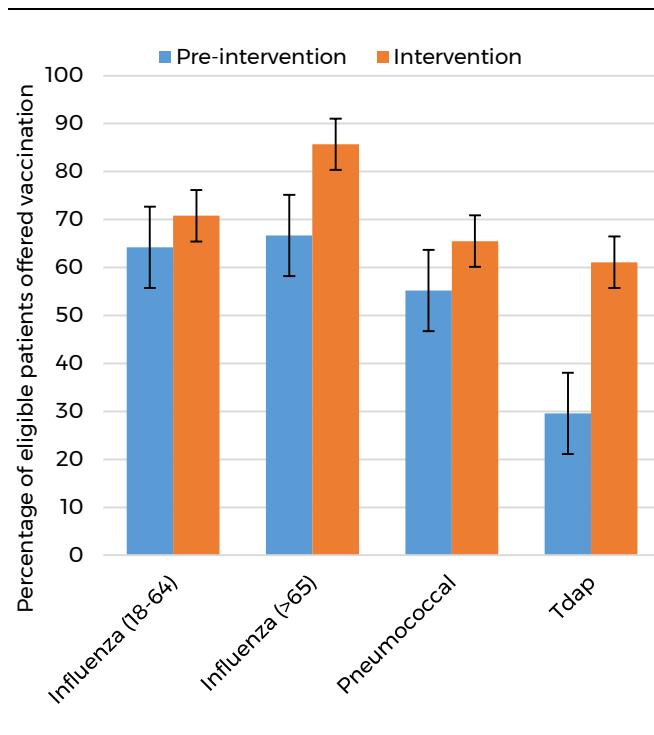


Figure 2. Rates of Vaccination at the SHARING Clinic During the Pre-intervention and Intervention Periods



Tdap: tetanus, diphtheria, and pertussis vaccine

Figure 3. Rates of Cancer Screening at the SHARING Clinic During the Intervention Period in Comparison to Reported National Averages and Healthy People 2020 Targets

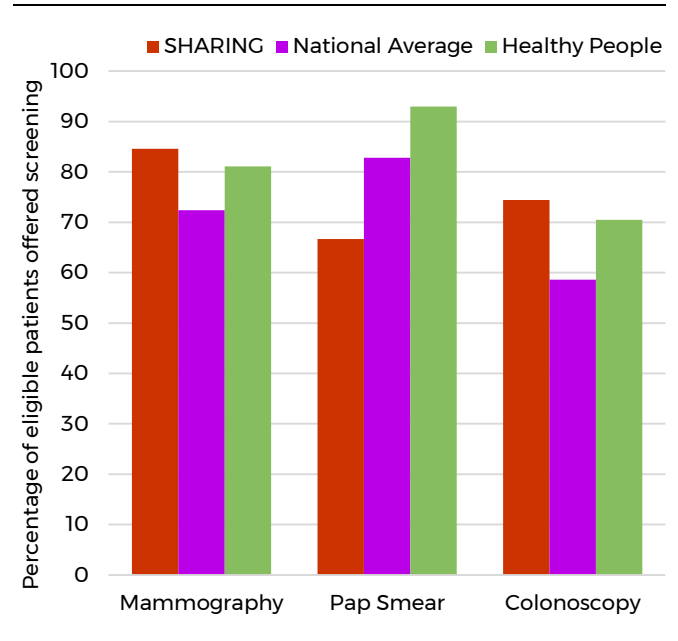
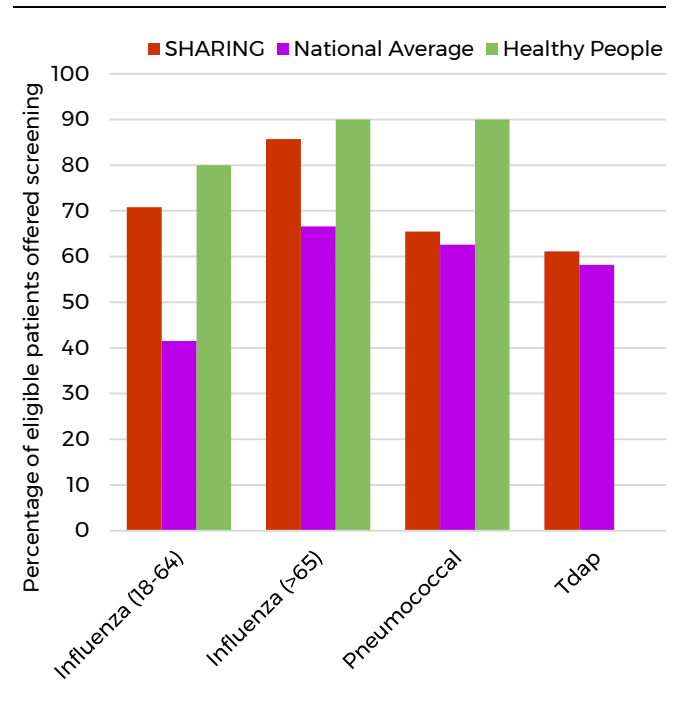


Figure 4. Rates of Immunization at the SHARING Clinic During the Intervention Period in Comparison to Reported National Averages and Healthy People 2020 Targets



Tdap: tetanus, diphtheria, and pertussis vaccine

Table 4. Rates of Preventive Cancer Screening Services Offered Pre-intervention and Intervention Period Compared to National Averages and *Healthy People 2020* Targets

Preventive service	Pre-Intervention	Intervention Period	National Average	Healthy People 2020
Breast cancer screening with mammography	80.6% (29/36)	84.6% (22/26)	72.4%	81.1%
Cervical cancer screening	65.8% (25/38)	66.7% (22/33)	82.8%	93%
Colorectal cancer screening	58.3% (28/48)	74.4% (29/39)	58.6%	70.5%
Lung cancer screening	0% (0/9)	16.7% (1/6)	NA	NA

NA: not available

Table 5. Rates of Immunizations Pre-intervention and Intervention Period Compared to National Averages and *Healthy People 2020* Targets

Preventive Service	Pre-Intervention	Intervention Period	National Average	Healthy People 2020
Influenza, age 18-65 years	64.2% (45/70)	70.8% (46/65)	41.5%	80%
Influenza, age >65 years	66.7% (4/6)	85.7% (6/7)	66.6%	90%
Pneumococcal	55.2% (37/67)	65.5% (38/58)	High risk age 18-64 years 16.6% (15.5-17.8%), age >65 years 62.6%	90%
Tetanus, diphtheria, and pertussis	29.6% (24/81)	61.1% (44/72)	58.2%	NA

NA: not available

Table 6. Rates of Preventive Behavior Services Offered During the Pre-intervention and Intervention Period Compared to National Averages and *Healthy People 2020* Targets

Preventive Service	Pre-Intervention	Intervention Period	National Average	Healthy People 2020
Alcohol misuse screening and counseling	80.2% (65/81)	84.7% (61/72)	2-93% screening 0.9-73.1% counseling	NA
Chlamydia screening	70.0% (14/20)	70.0% (14/20)	48.5%	78.3%
Gonorrhea screening	70.0% (14/20)	75.0% (15/20)	41.5-63.4%	NA
Healthy diet counseling	61.4% (43/70)	72.4% (42/58)	12.3-19.1%	22.9%
Hepatitis C screening	10.8% (7/65)	12.8% (6/47)	15.8%	NA
HIV screening	16.3% (13/80)	19.7% (13/66)	17.2%	18.9%
Intimate Partner Violence	25.0% (3/12)	20.0% (3/15)	NA	NA
Syphilis screening	23.8% (5/21)	16.7% (3/17)	NA	NA
Tobacco use screening	91.4% (74/81)	88.9% (64/72)	67.5% (63.9-71.4%)	68.6%
Tobacco Cessation Counseling	93.5% (29/31)	83.8% (31/37)	19.1% (16.2-22.0%)	21.1%

NA: not available

Table 7. Rates of Preventive General Health Services Offered During the Pre-intervention and Intervention Period Compared to National Averages and *Healthy People 2020* Targets

Preventive Service	Pre-Intervention	Intervention Period	National Average	Healthy People 2020
Aspirin prophylaxis for cardiovascular disease	48.9% (23/47)	63.9% (23/36)	NA	NA
Blood pressure screening	98.8% (80/81)	100% (72/72)	90.6%	92.6%
Folate supplementation	20% (2/10)	20% (2/10)	23.8%	26.2%
Depression screening	81.3% (65/80)	78.9% (56/71)	2.2%	2.4%
Lipid disorders screening	85.2% (69/81)	77.5% (55/71)	76.4%	82.1%
Obesity screening	64.6% (31/48)	61.9% (26/42)	48.7%	53.6%
Osteoporosis screening	62.5% (5/8)	72.7% (8/11)	56-70%	NA
Type 2 diabetes mellitus screening	93.2% (69/74)	92.3% (60/65)	NA	NA

NA: not available

Discussion

SRCs face many unique challenges in providing quality care, including limited patient-provider continuity and providers in early years of training with limited clinical experience. Given the numerous challenges, it is essential that SRCs regularly assess the quality of care they are delivering. Overall the SHARING clinic performed at or above national average for delivering preventive services despite serving a traditionally underserved population. The SHARING clinic was below average for only 4 of the 20 preventive services (Pap smear (Table 4, Figure 3), pneumococcal vaccination (Table 5, Figure 4), hepatitis C screening (Table 6), and folate supplementation (Table 7)). In addition, the SHARING clinic met 10 of the 16 targets laid out in *Healthy People 2020*, falling short for Pap smear (Table 4, Figure 3), influenza vaccination in individuals age 18-64 as well as individuals age 65 and over, pneumococcal vaccination (Table 5, Figure 4), chlamydia screening (Table 6), folate supplementation, and lipid screening (Table 7). Interestingly, a previous study also found that another SRC offered Pap smear, pneumococcal vaccination and influenza vaccination at rates below the national average.³⁴ Likewise, the HAVEN SRC fell below the reported national average and the *Healthy People 2020* targets in providing Pap smears.³⁵

The findings from the current study are consistent with a previous report that quality improvement interventions improve the quality of preventive services provided at SRCs.³⁶ While the present study was limited by a small sample size, there was a trend toward improvement in the offering of preventive services with improved rates during the

intervention period seen for 16 of 26 services including: mammography, Pap smear, lung cancer screening, colonoscopy (Figure 1, Table 4), influenza, pneumococcal vaccination (Figure 2, Table 5), alcohol abuse screening/counseling, healthy diet counseling, gonorrhea, hepatitis C and HIV screening (Table 6), aspirin prophylaxis, BP screening, and osteoporosis screening (Table 7) as well as the only service to reach significance ($p < 0.001$), tetanus vaccination. No change or a decrease, though not significant, was seen in the rates for tobacco use screening and cessation counseling, folate supplementation, and screening for: chlamydia, intimate partner violence, syphilis, depression, lipididemia, obesity and diabetes mellitus type 2. The intervention placed special emphasis on improving rates of immunization and cancer screening of which all eight services improved, including the only service that met significance, tetanus immunization. Pap smears improved the least, which is in agreement with findings previously described by Butala et al.³⁶ We hypothesize this minimal improvement is a result of students and clinical faculty avoiding this service due to lack of comfort performing the procedure, misconception that the procedure cannot be performed in clinic, and the significant time commitment required to perform the procedure in comparison to giving a vaccination or completing a referral form for colonoscopy or mammography. Further research is needed to better delineate the barriers to Pap smear screening at SRCs.

SRCs face the unique challenge of balancing education with providing proper clinical care. Students must balance their need to develop history taking and physical exam skills, learn basic diagnostics and management principles, and find

their role within an interdisciplinary team with the needs of the patient to receive quality health care in a timely manner. Given the time constraints of the clinical encounter it is not surprising that preventive services may be overshadowed by more acute concerns. We believe these unique characteristics of SRCs make them especially amendable to provider prompts for preventive care.

In conclusion, the SHARING clinic performed multiple preventive services at or above the national average and at levels meeting the *Healthy People 2020* targets. The implementation of a multifaceted quality improvement intervention resulted in a statistically significant increase in the rate of tetanus immunization as well as improvement in rates of many preventive services though these did not reach significance. A similar interventional approach may improve the rate of preventive services at other student run clinics.

Disclosures

The authors have no conflicts of interest to disclose.

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